

Street Performer Vocal Health at the Edinburgh Fringe

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Chapter 1

Project Portfolio

1. Introduction and Rationale

Street performing is one of the most challenging disciplines of vocal performance, with working and environmental conditions presenting various challenges for preserving vocal health (Hoffman-Ruddy et al., [2001](#); Souza et al., [2019](#); Birol et al., [2026](#)).

As both a vocal coach and regular performer at the Edinburgh Fringe Festival (Ashcroft, [2022](#)) for the past decade, I've observed that vocal loss and strain are a near universal experience among Fringe performers, both street performers and others. Despite this, there is very little on-the-ground vocal support available to performers during the festival and little research into the vocal demands presented by intense performance runs with the particular conditions presented by the Edinburgh Fringe.

This literature review research aims to combine academic research into:

- The vocal demands of street performance and related performance disciplines (Hoffman-Ruddy et al., [2001](#); Souza et al., [2019](#); Birol et al., [2026](#)).
- The teaching strategies used to allow performers to be heard clearly outdoors (Myers and Finnegan, [2015](#); Melton, Bradford, and Lee, [2022](#)).
- The types of intervention available to performers experiencing vocal strain (Murphy Estes, Flynn, Clark, et al., [2024](#); Murphy Estes, Flynn, Born, et al., [2026](#)).

The rationale behind this research is to fill a gap in my pedagogical knowledge to allow me to better provide voice support to performers during the Edinburgh Fringe in 2026. My existing teaching practice is grounded in long-term vocal habilitation, where I work with students to gradually address and adapt to their existing vocal patterns. The context of the Edinburgh Fringe demands a different model, as performers may present already experiencing vocal difficulties and require immediate, usable guidance to continue performing their show daily across a three-week performance run.

2. Planned Programme of Study

My planned program of study combines both the aims and objectives of this literature review project and practical outputs that I aim to use during the Edinburgh Fringe Festival in August 2026.

2.1. Context and Theoretical Influences

Among professional voice users, actors and other performers experience unique vocal demands and a higher risk of voice injury and impairment compared to non-performers, such as teachers or call-centre operatives (Zeine and Waltar, 2002; Guss et al., 2014; Murphy Estes, Flynn, Clark, et al., 2024). Within this, street performers are found to experience higher degrees of vocal damage, specifically higher vascularity and deviations in vibratory behaviour, compared to other high-risk performers such as choral singers and musical theatre performers (Hoffman-Ruddy et al., 2001). Despite voice issues being common, stigma around vocal injury is persistent in the performing arts industry (Murphy Estes, Flynn, Clark, et al., 2024), a situation I wish to tackle with my teaching practice.

My own voice pedagogy combines various overlapping theoretical and practical traditions. For avoiding vocal damage, the Alexander technique is central to my approach (McCallion, 1998; Hensel, 2013) and frames vocal efficiency in terms of the reduction of unnecessary habitual tension and effort, where training this release allows the voice to leave the body uninhibited (Rootberg, 2011). For teaching strategies to increase vocal loudness and clarity, I draw from a range of backgrounds including, Estill vocal technique (Benson, 2017), actor vocal training (Rodenburg, 1992; Houseman, 2002; Linklater, 2006), and the physicality-focused voice explorations I gained during my clown training (Kendrick, 2011; Purcell Gates, 2011).

2.2. Aims and Objectives

Most of my existing teaching strategies focus on long-term habilitation, which occurs over the course of months. In this study, I aim to fill my knowledge gap for short-term strategies that can be imparted quickly to time-scarce performers that allow them both to be heard and reduce the likelihood of vocal injury.

To achieve this, this study has the following objectives:

1. To review the literature on the vocal demands specific to street performance, which is possibly the most taxing vocal performance modality in the Edinburgh Fringe, in my experience as a performer.
2. To review literature on healthy vocal strategies for being heard clearly in outdoor performance spaces.
3. To review literature and case study material on interventions used with performers experiencing vocal strain during high-demand performance runs.

2.3. Expected Learning Outcomes

By the end of this study, I expect to have developed both foundational understanding and knowledge to inform my voice teaching practice and also begun to build a set of practical interventions that I can use with street performers and other high-risk vocal performers.

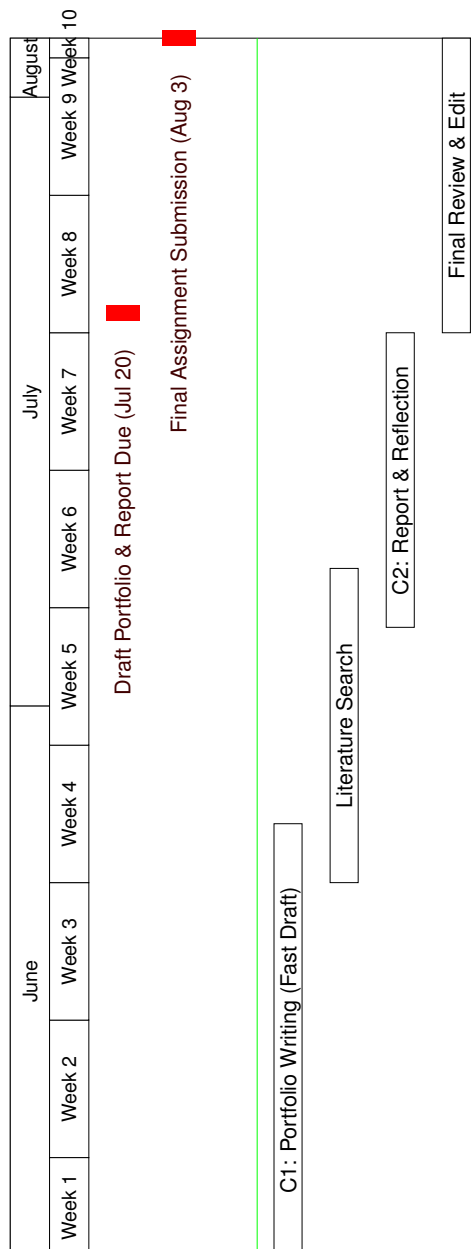
Expected learning outcomes are:

1. Gained knowledge and confidence that can help me to work with performers in acute time-pressure situations.
2. Become familiar with the typical vocal difficulties presented by street performers and other high-risk vocal performers.
3. Developed a repeatable triage-style toolkit of interventions that can be applied quickly to performers operating in street performance environments.

The triage-style toolkit is presented in Appendix I, as the core outputs of this study are the literature review research outcomes.

2.4. Timescales and Review Dates

The project chart for this research study is presented below in Gantt chart format (Geraldi and Lechter, 2012):



3. Review Methodology

This is intended as an exploratory review to both draw practical knowledge that can inform my voice practice and identify potential research gaps for future research studies.

In the likely case that there is little research into the vocal demands of street performance specifically, my aim is to map what does exist across related research areas such as vocal habilitation for long runs in musical theatre and stage acting (Phyland, Thibeault, et al., [2013b](#); Moniz, [2024](#); Murphy Estes, Flynn, Born, et al., [2026](#)).

3.1. Rationale for Review Type

This study adopts a narrative review methodology with the initial search process beginning with AI-assisted deep research for scoping the general landscape. While the scoping review was initially considered (Munn et al., [2018](#)), narrative review was chosen as it allows for the bridging of disparate research literature and forging links between them, without the review becoming overwhelmingly complex as could happen with a scoping review or systematic review (Munn et al., [2018](#)).

The use of artificial intelligence-assisted deep research in this literature review requires some justification, as it is a new development in academic research. Conventional approaches to literature review often involve defining keyword lists with specific inclusion and exclusion criteria and databases searched (Pollock et al., [2024](#)). However, the advancement of deep research features in AI platforms introduces a potential shift in the process of amassing initial references to start a literature review (Timmer and Hermkens, [2026](#)). Researchers who had previously highlighted the unsuitability of ChatGPT for conducting a literature review in 2024 (Haman and Školník, [2024](#)), within just two years reconsidered their position and recommended ChatGPT Deep Research as a valuable tool for identifying truly influential papers in various fields (Haman and Školník, [2026](#)).

3.2. Identification of Initial Research Papers and Inclusion Criteria

In this study, initial papers were identified by Claude AI Deep Research, chosen over the more commonly researched ChatGPT as it has integrated connectors to Wiley Scholar Gateway and Consensus (Faix, [2025](#)). These papers were then used as a starting point to find further relevant literature, using a pearl growing strategy (Schlosser et al., [2006](#)) and long-tail keyword research in

using Google Scholar (Yasin et al., [2020](#)).

As an initial AI prompt, the introduction, context, and objectives of this project were copied, alongside instructions to "Perform an initial literature review for this study."

Follow-up prompts were then submitted to the same Claude AI chat to gain further insight into the already-surfaced literature and identify additional relevant references. For example, the following follow-up prompt was provided alongside a PDF of Cazden ([2023](#)).

In this paper, Cazden presents some case studies of clients and then recommendations for different people. I'm looking for ones that do the same for either street performers or actors in the street, specifically street theatre. Could also be tour guides, but really people who are outside and specifically looking at scientific papers that present maybe case studies of individuals and the process by which the therapist or the researcher prescribed what was prescribed. Could even be a meta-analysis, whatever there is.

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Types of literature included in this study include only published research in journals and conferences and books, as well as some practitioner books for particular voice teaching approaches, chosen as those I have drawn exercises from and verified as effective through my voice practice.

3.3. Justification of Literature Types

The choice to only include peer-reviewed literature and selected practitioner books was made to keep the scope of research small enough that it could provide a useful knowledgebase for evidence-based practice.

Rather than including other types of literature, such as grey literature or internet content, additional references were sourced by selecting from relevant related fields of research. For example, a lack of relevant literature into the vocal demands of long performance runs in street performing was supplemented by literature into vocal endurance for musical theatre (Phyland, Thibeault, et al., [2013b](#); Moniz, [2024](#); Murphy Estes, Flynn, Born, et al., [2026](#)).

Chapter 2

Project Report and Review

1. Introduction

As both a performer and vocal coach, I have observed that vocal loss and strain are a near universal experience among performers at the Edinburgh Fringe Festival (Ashcroft, [2022](#)). The purpose of this study is to identify the relevant literature into acute vocal support for street performers and other high-risk performers, with a goal of amassing a corpus of knowledge to inform my work as a vocal coach and performer at the Edinburgh Fringe Festival in 2026.

The literature review presented here aims to fill a gap in my pedagogical knowledge to allow me to provide better voice support to performers during the Fringe. It incorporates research into:

- The vocal demands of street performance and related high-risk performance disciplines (Hoffman-Ruddy et al., [2001](#); Souza et al., [2019](#); Birol et al., [2026](#)).
- The teaching strategies I can incorporate into my teaching to allow performers to be heard clearly outdoors (Myers and Finnegan, [2015](#); Melton, Bradford, and Lee, [2022](#)).
- The types of intervention available to me as a voice teacher to give guidance and support to those performers. (Murphy Estes, Flynn, Clark, et al., [2024](#); Murphy Estes, Flynn, Born, et al., [2026](#)).

As well as this report, a learning objective of this research is to identify specific voice teaching exercises and practices that I can use in my daily warm-ups for street performers during the Ed-

inburgh Fringe and create a triage coaching for performers who are already experiencing vocal strain. With these, my aim is to fortify my teaching practice with a strong theoretical foundation and also increase my confidence as a teacher, knowing that the recommendations that I give to performance are evidence-based.

2. Theme A: Vocal Load for Street Performances

Street performing and other outdoor settings present a unique set of challenging conditions for vocal performers (Souza et al., 2019; Melton, Bradford, and Lee, 2022). To identify the most suitable vocal interventions for supporting street performers in my voice practice, the first step of literature review was to understand these unique conditions and their impact on the types of vocal difficulties that performers may experience (Raphael, n.d.).

Street performing falls within the category of high-risk vocal performance, which also includes professions like musical theatre performers, choral ensemble singers, video game voice over artists, opera singers, and actors (Hoffman-Ruddy et al., 2001; Souza et al., 2019; Aiken et al., 2025; Shang, Mei, and Ai, 2025; Birol et al., 2026; Raphael, n.d.). High risk performers are required to use their voice in ways that require a wider than usual range, under intense and varied environmental conditions, for long hours over many weeks (Raphael, n.d.).

Literature into various outdoor vocal use modalities, including outdoor theatre and tour guiding, identifies the unique conditions that affect vocal performance and the potential negative impacts that this can have on performer voices (Hoffman-Ruddy et al., 2001; Souza et al., 2019; Melton, Bradford, and Lee, 2022; Birol et al., 2026). In this part of the review, I describe the findings of three key sources to identify the environmental challenges present in street performing and resulting vocal diagnoses (Hoffman-Ruddy et al., 2001; Souza et al., 2019; Birol et al., 2026). This forms the basis of the recommendations for interventions in the following themes.

2.1. The Physical Environment as Vocal Stressor

The physical environment of street performance is a primary source of potential vocal stressors, and is often largely outwith the control of the performer (Foy and Meier, 2001). As street performers often work with little-to-no amplification (Souza et al., 2019), vocal use in outdoor spaces requires performers to use particular vocal strategies for being heard by audiences (Melton, Bradford, and

Lee, 2022).

One of the few published voice studies specifically into street performing studied the organisational factors of the work, environmental challenges and vocal health alongside the subjective experience of performers in Brazil (Souza et al., 2019). Findings included that performers regularly use their voice for over six hours a day in environments that overwhelmingly included dust or smoke and uncomfortably high levels of background noise (Souza et al., 2019). However, the study participants only reported two environmental factors (background noise and dust or smoke) and the study included only 24 participants, many of whom took care of their voice so didn't experience so many negative impacts (Souza et al., 2019).

Birol et al. (2026) present a more comprehensive investigation into relevant environmental factors in a study into vocal risk factors affecting professional tour guides in an area of Turkey with a high tourist density. The Edinburgh Fringe has a very high tourist density, with the city's population doubling to 1 million people during the month of August as is the case in the Edinburgh Fringe (BBC, 2025). The study investigated eighty-five tour guides on factors including vocal symptoms, phonotraumatic behaviours, occupational factors, and lifestyle and health-related risks (Birol et al., 2026).

Across the two studies, the following environmental factors were present:

1. **High background noise** — By far the most common across the two studies, background noise was described as uncomfortable and sometimes unbearable (Souza et al., 2019; Birol et al., 2026). The well-established Lombard Effect shows that both humans and animals involuntarily increase vocal level when exposed to background noise (Brumm and Zollinger, 2011), meaning that performers automatically will try to speak louder in these environments.
2. **Dust or smoke** — Pollutants, such as dust and smoke, have various deleterious effects on the voice including vocal tract injury and decreased lung function (Sataloff, 1992).
3. **Temperature changes** — There is a widespread belief among performers that temperature and humidity affect the function of the voice; however, Sandage, Connor, and Pascoe (2014) found the vocal mechanism in fact adapts well to operating in different temperatures. However, high diurnal temperature ranges (the difference between maximum and minimum daily

temperatures) have been found to significantly associated incidences of respiratory tract infections, which are known to negatively impact the voice (Desjardins et al., [2022](#)).

4. **Windy weather** — Meteorological changes in wind direction, humidity, and temperature have been found to affect the incidence of respiratory diseases (Danielides et al., [2002](#)).
5. **Humid weather** — The presence of high humidity has been found to cause a loss of distinctness in plosives like /p/, /t/, and /k/, and fricatives like /f/ and /j/ (Foy and Meier, [2001](#)), adding to the challenge of being understood in such environments.
6. **Dry weather** — Dry weather is known to dehydrate the vocal folds, causing a loss of sound intensity and vocal efficiency (Leydon et al., [2009](#)).
7. **Echo** — Research into echo interference in large spaces has found that the presence of echoes significantly impairs speech intelligibility (Wang et al., [2025](#)), which would make it even harder for street performers to be understood.

Almost all of these factors are likely to be present during the Edinburgh Fringe in August 2026. In particular, the high background noise caused by the tourist-heavy environment of the Royal Mile is a certainty given that the high population of Edinburgh during the month of August (BBC, [2025](#)). Variable weather conditions, including fluctuating temperatures, windy weather, and high humidity, are also common meteorological conditions during this month in Scotland (Met-office, [2026](#)). On top of these environmental factors, the high presence of international people travelling from all over the world increases the likelihood of voice-affecting conditions including the common cold, flu, and viral infections (Bové, Kansal, and Rosen, [2008](#); Kakoullis et al., [2023](#)).

As a voice coach, these factors are not something that I have any control over, nor do the performers who I work with. However, any recommendations that I make about vocal use will necessarily need to take these environmental factors into account. For example techniques to increase the perceived loudness of a person's voice should be applicable to environments with high background noise.

2.2. Cumulative Vocal Load Across a Performance Run

Another factor to consider is the high vocal load or vocal dose presented by street performing, with vocal load defined as the accumulated vibration of the vocal folds that causes mechanical strain

on the tissues (Gaskill and Hetzel, 2017). Exaggerated speech has been found to increase vocal dose compared to normal and monotone speech (Titze, Švec, and Popolo, 2003). Exaggerated speech is defined as an increased range in fundamental frequency and sound pressure level and is likely closer to the vocal style used in street performing, as actors have been found to use wider ranges of both when speaking on stage compared to in a studio (Emerich et al., 2005). Increased vocal load has been linked to various detrimental outcomes, including vocal fatigue and discomfort, muscle soreness, and changes to properties like fundamental frequency, jitter and shimmer (Fujiki and M.P. Sivasankar, 2017).

The Edinburgh Fringe involves a three-week performance run with street performers performing multiple times per day. This is comparable to the eight shows per week that was classed as high vocal use in musical theatre performers, a group who report regularly experiencing vocal fatigue (Phyland, Thibeault, et al., 2013b; Thomas and Alexander, 2025). Even without the environmental impacts, this comparison suggests that street performing can contribute to high vocal loads over the duration of the festival.

Although the time dimension of vocal load may be comparable to musical theatre performers, overall vocal load is likely to be higher for street performers according to the laryngostroboscopic research comparing the two groups (Hoffman-Ruddy et al., 2001). Street performers were more likely to experience a high degree of vocal fold edema, severely decreased vibration behaviour, decreased musical wave, and a high degree of vascularity compared to musical theatre performers and choral singers (Hoffman-Ruddy et al., 2001).

When working with street performers, the presence of this cumulative vocal load is something that I must account for in any vocal recommendations I provide. Rather than urging performers to reduce vocal load completely and engage in total vocal rest, which would stop them from performing shows, my recommendations should be more about managing vocal load and reducing unnecessary voice use outside of performance times.

2.3. Combining Environmental Factors and Vocal Load in Practice

When working with street performers in the Edinburgh Fringe, it is important that any vocal work I recommend takes into account the factors identified above. As loss of income was one of the key concerns for street performers losing their voices (Souza et al., 2019), it would be unrealistic of me

to recommend that performers stop performing completely. Instead, any recommendations I make should take the environmental factors and increased vocal load into account.

The presence of high levels of background noise requires that I teach vocal strategies that improve intelligibility and allow for healthy loud vocal production. The presence of meteorological conditions, like temperature changes, windy weather, and humid weather, means recommending basic vocal health measures to reduce the chance of contracting the common cold or flu, which can negatively impact the voice.

Finally, the high vocal load present in the street performing and the corresponding negative outcomes — including fatigue, muscle soreness, vocal fold edema, and decreased mucosal wave (Hoffman-Ruddy et al., [2001](#); Birol et al., [2026](#)) — require that I incorporate education on how to manage vocal load over long performance runs.

3. Theme B: Teaching Vocal Strategies for Being Heard Outdoors

Given the presence of high background noise, other environmental factors, and high vocal loads for street performers in the Edinburgh Fringe, it is necessary to identify what vocal strategies I can teach that take these factors into account and will allow the performers to be heard.

In this part of the review, I investigate the literature on basic vocal health for performers and two vocal strategies for be heard in outdoor environments: the actor's formant (Pinczower and Oates, [2005](#); Bele, [2006](#); Leino, Laukkanen, and Radolf, [2011](#); Master, De Biase, and Madureira, [2012](#)) and precise articulation for perceived loudness (Myers and Finnegan, [2015](#)). My aim is to incorporate specific exercises from the literature into the daily vocal warm-ups that I am providing for Fringe performers and increase my knowledge of vocal strategies for being heard in outdoor environments.

3.1. Basic Vocal Health for the Vocal Performer

The first step when working with any vocal performer is to ensure that they have a working knowledge of basic vocal health, which is recommended for performers managing vocal dose (Behlau and Oliveira, [2009](#); Gaskill and Hetzel, [2017](#)).

Gaskill and Hetzel ([2017](#)) propose that professional voice users, specifically actors, adopt the

mindset of the vocal athlete, taking steps of:

- Engaging in training for proper vocal technique.
- Adopting vocal exercises as a form of physical training.
- Using warm-ups and cool-downs such as semi-occluded vocal tract (SOVT) exercises and other resonant voice techniques.
- Strategically scheduling rehearsal and performance demands.
- Minimizing vocal strain and fatigue.
- Following vocal hygiene and scheduled vocal rest for recovery.

On top of this, keeping adequate hydration is a commonly recommended and necessary step to ensure the vocal mechanism functions correctly (Leydon et al., [2009](#); M. Sivasankar and Leydon, [2010](#); Hartley and Thibeault, [2014](#)). Studies have found that systemic hydration, achieved through drinking enough water daily, keeps the vocal fold mucosa adequately hydrated to avoid the negative aerodynamic and acoustic measures of phonation caused by dehydration (Hartley and Thibeault, [2014](#)). Superficial hydration, increased by use of a nebulizer, also improves voice quality and reduces vocal fatigue (Hartley and Thibeault, [2014](#)).

Vocal health steps such as these are commonly talked about in vocal circles, but I have noticed in my practice that it's sometimes easy to forget to impart them to clients in my haste to try to find strategies to adapt their vocal use during performances. This suggests that a set of supporting materials, such as videos on my YouTube channel or printed vocal health advice, may be a useful addition to my face-to-face vocal support during the Edinburgh Fringe.

3.2. Training the Actor's Formant for Outdoor Projection

Research into outdoor theatre without microphones finds that professional actors speak with distinct peaks of long-term average spectrum (LTAS) between 3-4 kHz, otherwise known as the Speaker's Formant or Actors's Formant (Melton, Bradford, and Lee, [2022](#)). The Speaker's Formant is well established in the literature and is present in the voices of professional performers regardless

of gender, despite an initial bias in the literature towards male voices (Bele, 2006; Master, De Biase, and Madureira, 2012; Tayal, Stone, and Birkholz, 2017). Voices that exhibit the Speaker's Formant are associated with a higher perceived loudness and intelligibility in outdoor performance environments (Pinczower and Oates, 2005).

Various studies exist that quantify the acoustic and perceptual properties of the Speaker's Formant (Bele, 2006; Master, De Biase, and Madureira, 2012; Saruhan, 2017; Tayal, Stone, and Birkholz, 2017; Melton, Bradford, and Lee, 2022). However, there are comparatively fewer sources that include how to actively train this vocal quality though it is noted that it can be established by vocal training (Leino, Laukkanen, and Radolf, 2011). The most commonly cited study comes from Laukkanen, Syrjä, et al. (2004) and includes a set of exercises devised by teacher Niilo Kuukka from the Academy of Dramatic Art, Helsinki, Finland.

Exercises listed from the Kuukka exercise series include (Laukkanen, Syrjä, et al., 2004):

1. Beginning by relaxing and slowing down the breath.
2. Activating the breath through visualizations like imitating an old train with a repeated silent [hɑ] sound, blowing up a balloon, and repeatedly blowing out candles.
3. Exercises that 'open the upper resonance cavity', such as long low relaxed low pitch [u:] sound like a ship's horn or long [v:], [β:], and [m:]
4. Various repeated words exercises with alternating vowels that include [ŋ]-sounds, such as "bingo-bongo-bango" and "vingun-vangun-vongun".
5. Various repeated words exercises that include [m] and [ŋ] sounds, such as "mmy-mummu-mommo" and "noin-nain-noin-nain".

These exercises have similarities with various exercises from both Houseman (2002) and Linklater (2006) that focus on activating the soft palate (velum) and back of the tongue by cycling between [ŋ] and [ɑ]. The relaxing and slowing down of breath, coupled with a silent [ɑ], is similar to the Body Buzz exercise proposed by McCallion (1998) and aims to release unnecessary tension in the vocal mechanism while producing an open, resonant sound. Although the aforementioned vocal pedagogues don't show up so much in the literature, correlations have been found between the

Speaker's Formant and the concept of the y-buzz proposed by Lessac (Munro, Leino, and Wissing, 1996), which seems to serve a similar function.

These exercise similarities suggest a compatibility between the Kuukka exercise series, which is often linked to Speaker's Formant training (Leino, Laukkanen, and Radolf, 2011), and foundational teachers that inform my own pedagogical approach (McCallion, 1998; Houseman, 2002; Linklater, 2006). This suggests that training the Speaker's Formant may not require any special additional teaching strategies beyond that already included in my own teaching practice. However, teaching street performers to use this Speaker's Formant in the midst of the Edinburgh Fringe presents a challenge. In my experience, the type of vocal release that these particular exercises bring is often achieved over the course of weeks or months and may be less suited to acute vocal support.

3.3. Articulation and Twang as a Strategies for Perceived Loudness

In the presence of actual vocal fatigue or tensions that cannot be fully addressed in a short time, as may be the case in the Edinburgh Fringe, I conducted further research to identify other teaching strategies that can increase intelligibility and loudness without affecting the vocal folds. Two such strategies are developing more precise articulation and training of aryepiglottic narrowing to produce a ringing twang-like quality, both of which we found to increase perceived loudness of the voice (Lombard and Steinhauer, 2007; Bagnall, Dorrian, and Fletcher, 2011; Myers and Finnegan, 2015).

Precise articulation has been found to increase the perceived loudness of a voice (Myers and Finnegan, 2015), offering an alternative or additional vocal strategy for performers whose vocal folds are already compromised. Myers and Finnegan (2015) found that training actors to over-articulate, using exercises from Lessac-Madsen Resonant Voice Therapy (Yiu, Lo, and Barrett, 2017), sounded louder and better projected than the person's habitual speech. These exercises involve playfully repeating voiced and unvoiced consonants as if playing instruments in an orchestra, with sounds like [d] and [g] representing large timpani drums and voiced fricatives [z] and [v] representing double bass and cello (Lessac, 1973). The strategy is ideal for warming up the voices of street performers as it requires little exploration, is fun for participants, and can be intuitively understood using a call-and-response group teaching style.

Teaching performers to use a twang quality — by retracting the ventricular folds, raising the larynx

and tongue, and narrowing the aryepiglottic sphincter (AES) — has been found to increase the perceived brilliance of the voice, giving a loud, bright ringing quality that counteracts hoarseness even in people deprived of sleep for 24 hours (Bagnall, Dorrian, and Fletcher, 2011). Twang is present in the Estill vocal technique (Benson, 2017) which forms part of my vocal practice. Teaching twang presents an alternative form of resonance to that described in the previous section, as it involves activation of laryngeal muscles (such as of the AES) rather than prioritising the release of tension as in the Lessac y-buzz (Munro, Leino, and Wissing, 1996).

3.4. Integrating Health and Technique in Practice

The findings in this section show a distinct three-part set of interventions for use in supporting street performers' vocal use. Firstly, it would be useful for me to develop a set of supporting resources containing advice on basic vocal health in the form of videos and written information that I can give to people, to ensure they understand the basics of vocal hygiene (Gaskill and Hetzel, 2017) .

In terms of specific vocal teaching strategies, exercises such as those by the Kuukka exercise series (Laukkanen, Syrjä, et al., 2004) encourage the release of unnecessary tensions in the vocal mechanism to produce a resonant voice which exhibits the Speaker's Formant and can be effective in outdoor vocal performances (Pinczower and Oates, 2005). Also, adding techniques like precise over-articulation (Myers and Finnegan, 2015) and exercises to encourage a twang-like quality (Bagnall, Dorrian, and Fletcher, 2011) can provide supporting strategies to help street performers achieve loudness and clarity in their voice even in cases where it's not feasible for time reasons to teach them the type of resonance developed by the Lessac y-buzz (Munro, Leino, and Wissing, 1996).

4. Theme C: Vocal Triage for High-Risk Performers

A final consideration when providing voice care in such an intense performance environment as the Edinburgh Fringe is the necessity for well-defined professional boundaries as to the types of intervention and support that I can offer as a spoken vocal coach (Monti, Durham, and Reynolds, 2024). Performers may present with vocal problems that require expert medical attention and I need a way to identify and funnel people quickly to the best support for their needs (Klein and Johns, 2007).

Triage and screening tools are regularly used in acute, high-pressure situations to divert patients towards the most relevant medical care for their needs (Klein and Johns, 2007). A study into the existing screening tools vocal issues allowed the creation of a lightweight triage tool, specifically catered for Edinburgh Fringe performers.

4.1. Existing Voice Screening Tools: VHI-10, DIVA, VAS Voice, and EASE

Various patient-reported screening tools for voice disorders have been developed over the years, both for use with the general population (Jacobson et al., 1997; Francis et al., 2017; Naunheim et al., 2020; Slavych, Zraick, and Ruleman, 2024) and professional voice users specifically (Phyland, Pallant, Benninger, et al., 2013a; Phyland, Pallant, Thibeault, et al., 2014; Ackermann et al., 2022). These serve as a first port of call for practitioners seeking to understand the degree, the type and severity of voice problems that may a patient or client may present (Rosen et al., 2004).

Patient-reported outcome measures (PROMs) differ from the objective voice assessments that were the traditional focus of voice diagnosis before the 1990s and assess the acoustic and aerodynamic measures of the voice such as shimmer, jitter and airflow (Francis et al., 2017). PROMs provide clinicians with valuable information for decision-making and measurement of the efficacy of interventions (Slavych, Zraick, and Ruleman, 2024).

Systematic reviews of voice-related PROMs from between 1984 and 2020 identified 42 distinct assessment tools (Francis et al., 2017; Slavych, Zraick, and Ruleman, 2024). In addition to the tools from these reviews, the Dancers, Instrumentalists, Vocalists, and Actors (DIVA) screening protocol (Ackermann et al., 2022) was included as well as the VAS Voice (Naunheim et al., 2020). Inclusion and exclusion criteria involved excluding tools targeted at specific non-relevant populations (e.g. telephone customer service advisers (Lehto et al., 2003), primary school teachers (Laukkanen, Leppänen, and Ilomäki, 2009)), individuals with specific voice disorders (e.g. thyroidectomy (Nam et al., 2012), spasmodic dysphonia (Isetti and Meyer, 2014)), and voice use in long-term everyday life (e.g. the Vocal Fatigue Handicap Scale (Paolillo and Pantaleo, 2015)) Tools specifically targeted professional performers or applied to these contexts were included (Wingate et al., 2007; Phyland, Pallant, Thibeault, et al., 2014).

The following eight tools or tool pairings were chosen as a focus for this study:

1. **Voice Handicap Index (VHI) and VHI-10 (Jacobson et al., 1997; Rosen et al., 2004)** — The most well-established and common assessment tools found in the literature, the VHI and shortened VHI-10 present a robust inventory for individuals exhibiting a variety of impacts on voice in categories of functional, physical and emotional.
2. **Visual Analog Scale Voice (VAS Voice) (Naunheim et al., 2020)** — A further simplification of the VHI-10, the VAS Voice provides a simple four-question screening protocol that could be useful for time-pressured Fringe performers.
3. **Vocal Rating Scale and Vocal Effort Scale (Wingate et al., 2007)** — Developed for professional voice users, these scales provide a simple visual rating scale similar to VAS Voice that offer a useful modality for surveying performers.
4. **Glottal Function Index (GFI) (Bach et al., 2005)** — Another simplified four-question assessment, the GFI is included in the performer-focused DIVA protocol (Ackermann et al., 2022) and could be a useful set of questions to help me as a practitioner to identify if a client may have symptoms of glottal dysfunction that would require referral to a specialist.
5. **Evaluation of the Ability to Sing Easily (EASE) (Phyland, Pallant, Benninger, et al., 2013a; Phyland, Pallant, Thibeault, et al., 2014)** — One of the few tools targeted specifically at professional performers, EASE presents a useful two-component split that identifies if an individual's voice symptoms are related to vocal fatigue or could be an indicator of pathologic risk.
6. **Vocal Fatigue Index (VFI) (Nanjundeswaran et al., 2015)** — Designed to assess symptoms associated with vocal fatigue, the VFI has been applied to professional performers in the context of fatigue management as an alternative to outright vocal rest.(Johnson and Sandage, 2021; Düzenli-Öztürk et al., 2026).
7. **Voice-Related Pain Scale (VRPS) (Tohidast et al., 2022)** — For voice clients presenting with pain, the VRPS provides a useful framing to quickly identify the location and severity of that pain and the relevance for voice interventions.

From these tools, the following were assessed in detail to create the Triage Tool for use in the Edinburgh Fringe that is presented in Appendix I.

4.1.1. Performance Context: Dancers, Instrumentalists, Vocalists, and Actors (DIVA) Assessment

Professional performers have been shown to be more susceptible to voice injury and have a higher incidence of vocal injury than non-performers (Murphy Estes, Flynn, Born, et al., [2026](#)). Despite this, there exist very few assessment tools targeted specifically at professional performance contexts (Phyland, Pallant, Benninger, et al., [2013a](#); Ackermann et al., [2022](#)).

One tool developed specifically for performance context is the Dancers, Instrumentalists, Vocalists and Actors (DIVA) Assessment Protocol developed by the Performing Arts Medicine Association and American College of Sports Medicine (Ackermann et al., [2022](#)). It provides a comprehensive set of assessments for a wide range of physical, psychological and related areas, with the aim of assessing performers before they participate in any sort of project.

Within the section on Voice, Breathing, Throat, and Jaw Health, the tool draws from the Singing Voice Handicap Index (SVHI-10) (Cohen et al., [2007](#)), Glottal Function Index (GFI) (Bach et al., [2005](#)), and Reflux Symptom Score (Dhillon and Akst, [2016](#)). This approach validates my use of multiple assessment protocols combined into a single tool for evaluating those voice elements related to professional performance. However, the specific tools used in the DIVA assessment protocol are not the most useful for my own voice practice, as the SVHI-10 contains too many questions for time-pressed performers and is specifically designed for singing, while the measurement of reflux is less important than questions around vocal use in performance.

4.1.2. Simple Triage: Visual Analog Scale Voice (VAS Voice)

The Vocal Handicap Index (VHI) (Jacobson et al., [1997](#)) is perhaps the closest to a standard voice assessment tool across research literature and translated into multiple languages (Cohen et al., [2007](#); Seifpanahi et al., [2015](#)). However, its large list of 30 questions across 3 domains can be overwhelming when used for an initial evaluation, which has prompted the development of shorter versions such as the 10-question VHI-10 (Rosen et al., [2004](#)).

For time-pressured performers within the Edinburgh Fringe, even the VHI-10 does not present the ideal tool as the questions (e.g. "I feel left out of conversations because of my voice") are more focused on day-to-day vocal use than professional performance (Rosen et al., [2004](#)).

As a voice practitioner, I'm seeking a screening triage tool that allows me to quickly identify the severity of a client's situation in the most efficient way possible. For this purpose, the further condensed Visual Analog Scale Voice (VAS voice) provides an efficient method to identify the emotional, functional, and physical impacts of a person's voice problem on their life and has been validated against the VHI-10 (Naunheim et al., [2020](#)).

The tool provides the following four questions and their corresponding domains, ranked along a continuous line from "not at all" to "worst possible."

1. How much does your voice bother you? (overall impact)
2. Does your voice problem make you feel upset? (emotional impact)
3. Does your voice problem make it difficult to participate in your normal functions? (functional impact)
4. Does your voice problem cause strain, discomfort, or increased effort to speak? (physical impact)

By asking these questions before a session, I could both prepare myself to provide the best voice care possible during their session and also elicit further questions in the case that they rank highly in any of these domains.

4.1.3. Assessment Without Pathology: Evaluation of the Ability to Sing Easily (EASE)

Street performers and other high-risk vocal performers experience a higher vocal demand than non-performers (Zeine and Waltar, [2002](#); Lerner et al., [2013](#); Gaskill and Hetzel, [2017](#); Calvache Mora et al., [2024](#)). A related group are musical theatre performers who experience unique vocal demands compared to other singers, including demanding character voices, extended production runs, multiple shows a week, environmental challenges like stage smoke, heavy costumes, loud orchestration, and little time for vocal rest (Phyland, Pallant, Thibeault, et al., [2014](#)). This makes the vocal demands of musical theatre a useful comparison for street performance as there exists more research into this population (Phyland, Thibeault, et al., [2013b](#); Thomas and Alexander, [2025](#)).

The Evaluation of the Ability to Sing Easily (EASE) tool was developed to address a gap in assessment instruments for evaluating the vocal load of professional singers in the absence of impairment

or disorder (Phyland, Pallant, Benninger, et al., 2013a). Unlike other tools that rely on the individual's recall or retrospection, EASE instead provides an immediate short-term snapshot of this singer's voice at the moment it is completed (Phyland, Pallant, Thibeault, et al., 2014). The intention of its creators is not to provide a full diagnostic of a person's vocal capabilities but instead to detect subtle perceptible changes that might indicate an emerging pathology or vocal fatigue (Phyland, Pallant, Thibeault, et al., 2014). This modality is ideal for the rapidly changing performance context present in the Edinburgh Fringe.

In the context of my vocal practice, a useful feature of EASE is its two-component structure that identifies whether a person's symptoms are related to vocal fatigue or could indicate a pathologic risk (Phyland, Pallant, Benninger, et al., 2013a). Statements are graded with a 4-item score including "Not at all", "Mildly", "Moderately", and "Extremely."

1. **Component 1: Vocal Fatigue** — Items in this category represent physical symptoms of vocal fatigue with statements like "my voice is husky", "my voice feels strained" and "my voice sounds rich and resonant".
2. **Component 2: Pathologic-Risk Indicator** — Items in this category relate to mucosal changes that can occur with chronic overuse, the common cold or vocal fold pathology, with statements like "my voice is breathy", "my voice cracks and breaks" and "I'm having difficulty projecting my voice".

This distinction is important because vocal pathology falls outside of my professional expertise. For vocal fatigue, I can introduce clients to vocal health measures as described in the next section but high indications of pathologic risk would necessitate a referral to the relevant voice specialist.

4.1.4. In-Session Follow-Up: Vocal Fatigue Index (VFI), Glottal Function Index (GFI) and Voice-Related Pain Scale (VRPS)

For vocal triage of new clients, I propose to use a combination of VAS Voice and a version of EASE adapted to include non-singing vocal performance (see Appendix I). However, it may also be necessary to ask follow-up questions to delve deeper and gain a more comprehensive understanding of the client's vocal situation. For this purpose, I have selected three further assessment tools to act as a basis for discussion with the client rather than using them as diagnostic tools.

The Vocal Fatigue Index (VFI) provides a selection of statements that provide language to experiences of vocal fatigue that can sometimes be difficult to describe (Nanjundeswaran et al., 2015). It includes statements related to symptoms such as "It feels like work to use my voice." and "I experience throat pain at the end of the day with voice use." as well as those around recovery such as "My voice feels better after I have rested." (Nanjundeswaran et al., 2015)

The Glottal Function Index (GFI) presents a simple four-question protocol to identify the presence and degree of symptoms of glottal dysfunction (Bach et al., 2005). As they require the client to identify patterns within the last month, they may indicate the presence of a longer-term vocal problem. For clients presenting with a reduction in voice function, these four questions can be a useful tool to give me confidence in a recommendation to pass them on to a relevant voice specialist.

Finally, the Voice-Related Pain Scale (VRPS) provides a useful framing for discussion around pain associated with vocal difficulty (Tohidast et al., 2022). The tool presents a list of areas where pain can present, such as "Right ear", "Left temporomandibular joint" and "Larynx" alongside scales for frequency, severity, and time of the occurrence of that pain (Tohidast et al., 2022). As with the VFI, a major benefit of this in my practice is to provide more precise language for the client to describe their vocal symptoms.

4.2. Using the Combined Triage Tool in Practice

The questions and patient reported outcome measures identified here are not yet a robust triage tool for my vocal practice, which would require more in-depth research. However, they provide a useful set of questions for me to be thinking about when talking to Edinburgh Fringe performers who are already experiencing vocal pain.

My intention is to become familiar with the different questions and rating scales, outlined in Appendix I, and use them as a reference when asking questions to clients during the Edinburgh Fringe. This will provide an evidence-based foundation to help me identify the precise nature and severity of the person's vocal difficulties as well as direct them to other professionals for interventions outside of my scope as a voice practitioner.

5. Conclusion

This review has set out to fill the gaps in my own pedagogical knowledge of interventions suitable for support street performers and their voices during the Edinburgh Fringe. This knowledge serves as a new foundation that extends my usual vocal practice, which tends to prioritise long-term habituation across several months, rather than the more acute, time-scarce environment and conditions presented during the Edinburgh Fringe.

In terms of vocal load, street performing is classed as high-risk vocal performance (Hoffman-Ruddy et al., 2001), presenting a unique set of challenging conditions for performers including physical and environmental conditions such as high background noise and variable weather conditions (Souza et al., 2019; Birol et al., 2026). These are likely to be present during Edinburgh during the month of August and increase the likelihood of voice-affecting conditions such as the common cold, flu, and viral infections (BBC, 2025; Met-office, 2026).

Additionally there is a high cumulative vocal load across the three-week performance run that is comparable to musical theatre performers often classed as high vocal use (Phyland, Thibeault, et al., 2013b; Thomas and Alexander, 2025). This is with an additive vocal load that has been found to make street performers more likely to experience vocal fold edema, decreased vibration behaviour, decreased mucosal wave, and high degrees of vascularity (Hoffman-Ruddy et al., 2001). These combined environmental factors and vocal load mean that any voice work I undertake with street performers must take into account the factors. The vocal strategies I teach must be suitable in high-noise environments and the focus should be on managing high vocal load rather than suggesting complete vocal rest, which would be unfeasible due to the loss of income for performers (Souza et al., 2019).

For specific vocal teaching strategies, three promising directions were gathered from the literature including: Incorporating basic vocal health information with an encouragement for performers to follow the mindset of a vocal athlete (Gaskill and Hetzel, 2017) and engage in adequate hydration, both systemic and superficial (Leydon et al., 2009; M. Sivasankar and Leydon, 2010; Hartley and Thibeault, 2014). For being heard clearly in street performance, vocal training into the resonance of Actor's Formant has been found to be used by actors speaking in outdoor environments (Melton, Bradford, and Lee, 2022). This is associated with high perceived loudness and intelligibility (Bele, 2006; Master, De Biase, and Madureira, 2012; Saruhan, 2017; Tayal, Stone, and

Birkholz, 2017; Melton, Bradford, and Lee, 2022) and can be taught using resonance exercises already in my teaching toolkit (McCallion, 1998; Houseman, 2002; Linklater, 2006) and the Kuukka exercise series often referenced in relation to the Actor's Formant (Laukkanen, Syrjä, et al., 2004). Precise articulation (Myers and Finnegan, 2015) and twang (Bagnall, Dorrian, and Fletcher, 2011) can have been found to increase the perceived loudness and intelligibility of the voice and can be an additional training tool in time-pressured situations where habituation of a more released vocal resonance would be infeasible. Finally, research into assessment tools for vocal triage provide a useful set of questions for me to be thinking about during voice coaching sessions with performers already experiencing vocal pain. By combining a selection of voice assessment tools, I have created an initial set of questions that combine the VHI-10 (Rosen et al., 2004), VAS Voice (Naunheim et al., 2020), and EASE (Phyland, Pallant, Benninger, et al., 2013a) tools for initial assessment, as well as specific follow-up questions related to vocal fatigue (Nanjundeswaran et al., 2015), glottal function (Bach et al., 2005), and voice-related pain (Tohidast et al., 2022). While these are not yet a full triage tool that I can use in my ongoing work, they provide an evidence-based foundation of questions that can allow me to quickly identify vocal problems that street performers are having, allowing me to suggest relevant interventions and pass them on to other professionals for interventions that fall outside my scope as a voice practitioner.

Part I

Appendices

From the research carried out into vocal triage assessment tools, the following triage questionnaire was developed. Sections 1, 2, and 3 were presented through an online questionnaire that new clients filled out when booking a 1-to-1 voice session. These assessments were anonymized as they were stored with random identifiers that the client was required to keep a note of and bring to the session. As a result, no personal data was stored digitally along with their responses.

0.1. 1. New Clients: Simple Question

A simple single question is used to screen those people with concerns about their voice versus those who would just like some preventative or developmental voice work:

-
-

0.2. 2. Voice Concern: Simple Six Questions

For new clients signing up for one-to-one voice sessions who have indicated they are concerned about their voice, the following six-question questionnaire was used to identify their situation quickly and without creating undue anxiety.

Four sliding-scale questions from Visual Analog Scale Voice (VAS Voice) (Naunheim et al., [2020](#)). Includes a continuous line from "not at all" to "worst possible."

1. How much does your voice bother you?
2. Does your voice problem make you feel upset?
3. Does your voice problem make it difficult to participate in your normal functions?
4. Does your voice problem cause strain, discomfort, or increased effort to speak?

Two text-input questions from Klein and Johns ([2007](#)):

1. What **is** your voice doing that it **should not** do?

2. What is your voice **not doing** that it **should** do?

0.3. 3. Triage: Vocal Fatigue or Pathologic-Risk Indicator?

For clients rating in the half of the scale "worst possible" for any of the four questions in the VAS Voice, they are given the option of filling out the following questions based on the Evaluation of the Ability to Sing Easily (EASE) scale with the wording changed to incorporate any performance type (Phyland, Pallant, Benninger, et al., [2013a](#); Phyland, Pallant, Thibeault, et al., [2014](#)).

Questions are provided with a 4-item score including "Not at all", "Mildly", "Moderately", and "Extremely". Those marked with a ^a are positively worded and reverse-scored.

0.3.1. Component 1: Vocal Fatigue

- My voice is husky
- My voice is dry/scratchy
- My throat muscles are feeling overworked
- My performing voice feels good^a
- The onsets of my words/notes are delayed or breathy
- My voice feels strained
- My top vocal range words/notes are breathy
- My voice sounds rich and resonant^a
- My voice is tired
- My voice feels ready for performance if required^a

0.3.2. Component 2: Pathologic-Risk Indicator

- My voice cracks and breaks
- My voice is breathy

- I am having difficulty with my breath for long phrases
- My voice is cutting out on some notes
- I am having difficulty speaking/singing softly
- I am having difficulty changing vocal registers
- I am having difficulty with my high range spoken phrases or sung notes
- Speaking/singing feels like hard work
- I am having difficulty projecting my voice
- I am having difficulty sustaining long spoken phrases or sung notes

0.3.3. Original EASE questions

For completeness the original wording of the questions from the EASE scale is provided below:

Component 1: Vocal Fatigue

- My voice is husky
- My voice is dry/scratchy
- My throat muscles are feeling overworked
- My singing voice feels good^a
- The onsets of my notes are delayed or breathy
- My voice feels strained
- My top notes are breathy
- My voice sounds rich and resonant^a
- My voice is tired
- My voice feels ready for performance if required^a

Component 2: Pathologic-Risk Indicator

- My voice cracks and breaks
- My voice is breathy
- I am having difficulty with my breath for long phrases
- My voice is cutting out on some notes
- I am having difficulty singing softly
- I am having difficulty changing registers
- I am having difficulty with my high notes
- Singing feels like hard work
- I am having difficulty projecting my voice
- I am having difficulty sustaining long notes

0.4. 4. In-Session: Vocal Fatigue Discussion

For a deeper understanding of the client's vocal fatigue I would use a talk around the statements presented in the Vocal Fatigue Index. These are ranked by how frequently the person experiences the symptoms: "Never", "Almost never", "Sometimes", "Almost always" and "Always"

0.4.1. Part 1

1. I don't feel like talking after a period of voice use
2. My voice feels tired when I talk more
3. I experience increased sense of effort with talking
4. My voice gets hoarse with voice use
5. It feels like work to use my voice
6. I tend to generally limit my talking after a period of voice use
7. I avoid social situations when I know I have to talk more

8. I feel I cannot talk to my family after a work day
9. It is effortful to produce my voice after a period of voice use
10. I find it difficult to project my voice with voice use
11. My voice feels weak after a period of voice use

0.4.2. Part 2

12. I experience pain in the neck at the end of the day with voice use
13. I experience throat pain at the end of the day with voice use
14. My voice feels sore when I talk more
15. My throat aches with voice use
16. I experience discomfort in my neck with voice use

0.4.3. Part 3

17. My voice feels better after I have rested
18. The effort to produce my voice decreases with rest
19. The hoarseness of my voice gets better with rest

0.5. 5. In-Session: Glottal Function Discussion

For clients presenting with a reduction in voice function that was present before the Edinburgh Fringe, the four questions from the Glottal Function Index can be a useful tool for me, as practitioner, to gain confidence in my recommendation to pass the client on to a specialist. Questions are presented with a 5-item scale ranging between "No Problem" to "Severe Problem."

Within the last MONTH: How Did the Following Problems Affect You?

1. Speaking Took Extra Effort
2. Throat Discomfort or Pain After Using Your Voice

3. Vocal Fatigue (Voice Weakened as You Talked)
4. Voice Cracks or Sounds Different

0.6. 6. In-Session: Voice Pain Discussion

For clients experiencing vocal pain, the following tool was presented to them in the form of a discussion during our session, adapted from the voice-related pain scale (VRPS).

0.6.1. Location of Pain

- Head
- Right ear
- Left ear
- Right TMJ
- Left TMJ
- Submental area
- Anterior (front) neck
- Posterior (back) neck
- Throat
- Larynx
- Chest
- Right shoulder
- Left shoulder
- Upper back

TMJ is temporomandibular joint, the jaw and its attachment to the skull. Submental area is area underneath chin and above hyoid bone.

For those areas where pain is located, the discussion would be around the following, rated as shown.

1. Frequency of pain — with ratings of never, seldom, sometimes, often, and always.
2. Severity of pain — 0 is equal to no pain and 10 equals the worst possible pain
3. Time of pain occurrence — rated as below
 - a. During speaking
 - b. After speaking
 - c. During swallowing
 - d. After long time speaking
 - e. All the time

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