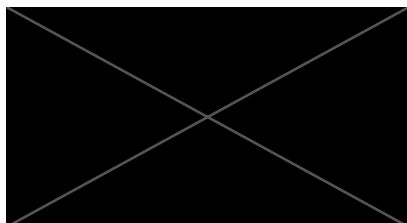


Voice Workshop / UWTSD MA in Voice Pedagogy

Independent Study Module (Extended) (BMPF7013)

Muscle Tension Dysphonia in Professional Voice Users: A review of the literature

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Part 1 – portfolio and rationale

Introduction and rationale for the project

This project will explore the current literature, to establish the effects and occurrence of muscle tension dysphonia in professional voice users. Such voice problems can be primary or secondary, and are considered a Functional Voice Disorder (FVD) (Andrea, Dias, Andrea and Figueira, 2017) and can be wide-ranging in both symptoms and causes. For the sake of this literature review, the author will use the term Muscle Tension Dysphonia and the abbreviation MTD to cover all etiologies and symptoms as described by Morrison et al in 1983 and subsequent reviews such as Altman, Atkinson and Lazarus (2005).

A desktop literature review will be undertaken to explore the etiologies, occurrences, assessment methods, symptoms and current treatments for MTD, so that a clear definition can be established in reference to professional voice users. This research will be used as a ground clearing exercise for a future project exploring new ways of working with muscular tension in singers, through a targeted programme of yoga-informed Exercises, and will be necessary to provide the researcher with a clear understanding and evidence base.

The researcher has previously worked with singers who have received a clinical diagnosis of MTD and has been able to note anecdotally and through preliminary reading that movement protocols encouraging the relaxation of muscles in the neck and shoulders are very beneficial. Received wisdom from other teachers and articles also suggests that working with breath pressure SOVT¹ exercises has benefit for this

¹ Semi-Occluded Vocal Tract

condition, but as a vocal coach and singing teacher – rather than a speech and language therapist or pathologist – it is important and necessary to undertake further and more specific reading to be able to draw any meaningful conclusions.

There are several ways that MTD can be described, observed, diagnosed, and treated and so therefore, the researcher intends to read as widely and as deeply as possible to fully understand primary MTD, secondary MTD, and also the link to psychogenic voice disorders and organic vocal fold pathology.

Main Aims of Project

The main aims of this project are to understand and document the various forms of MTD that can affect singers and professional voice users, and the ways in which these are currently diagnosed and treated. It will also be important for the researcher to get a clearer understanding of the incidence of MTD for professional voice users, and what might be done to lessen the impact of their professional vocal load on this diagnosis. Although there is much research available into MTD, there are several different classifications and approaches that need to be evaluated. Ultimately, the researcher intends to develop a novel approach to helping professional singers who are experiencing muscle tension difficulties when singing, using yoga-inspired exercises in a specifically designed programme. In order to get to this point, clearly a thorough and detailed understanding of MTD will be necessary.

Professional voice users in particular have an above-average incidence of MTD diagnosis (Sielska-Badurek et al., 2017) and given the researcher's experience and field of work, this seems an excellent group to focus on in this research project.

It is hoped that the results of this study will prove useful to voice and singing teachers working within the field of vocal rehabilitation, in giving a clearer understanding of the typical muscles and structures that are affected by MTD and a wide overview of the current treatment methods used in multi-disciplinary voice clinics to manage them.

Role and Relevant Expertise

The author is an experienced vocal coach with more than 20 years experience in the field. He is Director of The Voice Teacher Ltd, and Joint CEO of READ College, a leading vocational centre for Performing Arts training. He has provided specialist vocal coaching for those rehabilitating from vocal injury since 2011, receiving referrals from Speech & Language Therapists and Multi-Disciplinary Voice Clinics both within the private and NHS sectors, and is an expert assessor for the NCFE Level 2 Vocal Health First Aid programme.

As already noted, whilst the researcher is an experienced voice pedagogue he is not trained as a voice therapist, and so undertaking an in-depth desktop study will be extremely important to underpin practice with theoretical knowledge. Singing teachers and vocal coaches are not medically trained and so will not be in any position to diagnose MTD or any other condition being lacking in the clinical training, experience and necessary equipment to do so, and nor is it for them to offer anything approaching a 'cure'. However, having a clear insight into the methods being used by clinical professionals to manage muscle tension in professional voice users will be extremely helpful in maintaining best practice and ensuring a multi-disciplinary understanding.

An experienced and well-trained singing teacher or vocal coach can be of great benefit in these circumstances when collaborating with a speech and language pathologist/therapist (Goffi-Fynn and Carroll, 2013).

The researcher is well placed to undertake this project based on past experience and training, and is also to commit to further research if this initial project proves successful.

Main Aims and Objectives

The main aims of this study will be:

- To widen and deepen the researcher's knowledge of Muscle Tension Dysphonia in the following key areas:
 - Symptoms
 - Etiologies
 - Diagnoses and Assessment Methods
 - Current Treatments
- To explore any literature that touches on the specific work of managing professional voice users who are experiencing muscular tension issues
- To search for any literature that will clear the way for future research into new ways of managing muscle tension in singers and other professional voice users

The main objectives of this project will be:

- To establish key authors and/or texts who have authority in the areas of study, and to include these in the literature review
- To search for evidence in the literature of the overlap between professional voice users and the incidence of vocal problems concerning muscle tension
- To lay the foundations for further practical research in this area

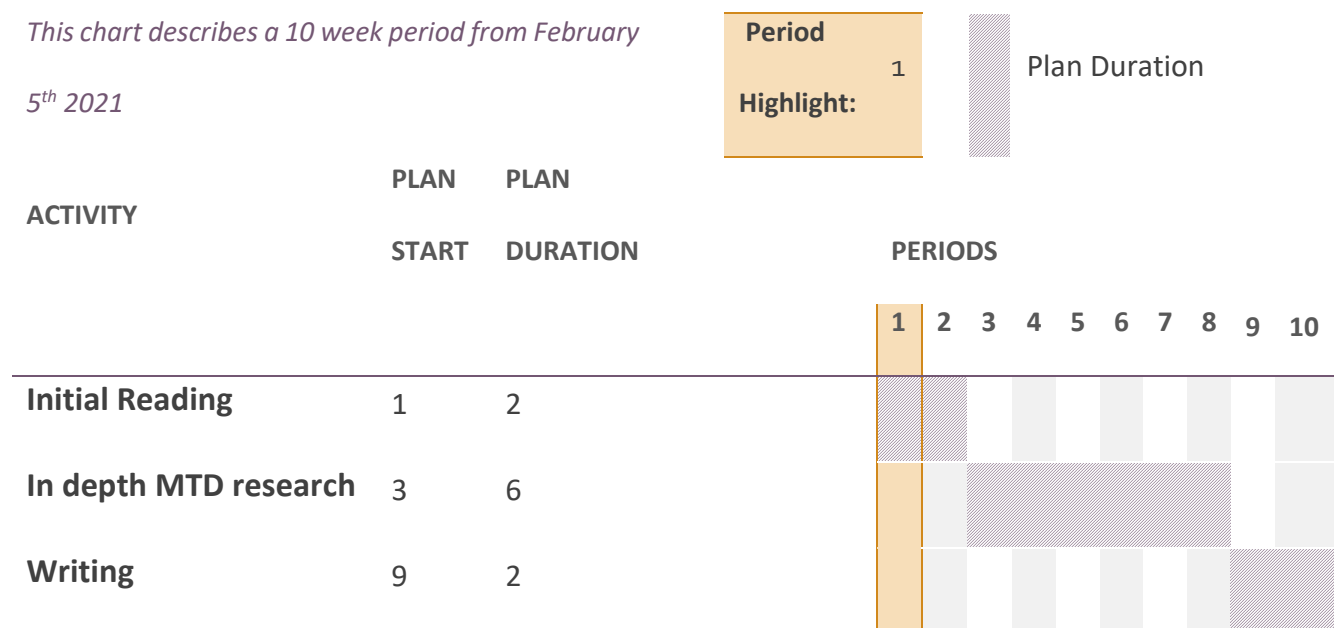
Time Scale of Project

The initial reading phase of this project will begin on February 5th, with in-depth research in the areas of MTD and professional voice users to follow. This phase will take a combined 8 weeks, with two full weeks to write the literature review. The Gant chart below gives an indication of the timescale.

This project comes at a very busy time in the researcher's professional life, due to running an academic institution through the coronavirus pandemic and the subsequent management of staff and students. Therefore, very careful planning will be required to ensure that adequate time is allocated to this research, and so the researcher has allowed more reading and writing time than usual to mitigate for this.

Research Plan

This chart describes a 10 week period from February 5th 2021



Resources

June 2021, Jamie Read 2019016

The resources that the researcher will require for this literature review are straightforward and easy to access for the researcher. These will include:

1. Access to a library of books and academic journals for the desktop review. These will be found via the online library service for UTSWD, with the researcher purchasing other books of particular interest that will be relevant to conducting a thorough literature review.
2. Study space. The researcher is fortunate to have a home studio/office away from busy professional and family life, allowing for quiet and reflective working
3. Computer and internet access, both of which are provided at the researcher's home working space as part of standard working practice
4. Time to complete the research, which is detailed in the research Gant Chart later in this report

Specific Skills and Knowledge That Will Be Gained

Through this project, the researcher will aim to understand the effect of MTD for professional voice users, and how it is currently observed and managed in clinical environments.

The researcher hopes to develop a better understanding of the various muscle tension conditions, looking at which muscles and structures are implicated and what effective treatments (whether manual or therapeutic) are currently being employed.

Finally, the researcher hopes to synthesise the results of this research to form a pedagogical standpoint from which further research can be conducted as detailed previously.

Literature Review Process

Key to being able to complete successful future research is the process of conducting a thorough review of current literature in the chosen academic field (Hart, 1998). During this project therefore, the researcher will consider a range of academic literature, gaining an understanding of different disciplines within the field including voice therapy, singing teaching, manual therapy and any other valid areas of interest. The range of subject matters will mean that the researcher will address and synthesise data that is both qualitative and quantitative, which will be drawn from scientific studies and experiential work.

In order to keep the review focussed it will be necessary to narrow the field. This will prevent the review from losing focus and becoming unclear or irrelevant (Randolph, 2009). To a certain extent this work has already been started in a previous research project by the researcher in looking at the links between Muscle Tension Dysphonia and Yoga, during which the researcher was able to narrow down a wide field of voice disorders that can affect professional voice users and focus on MTD, which is the most commonly reported voice disorder in voice clinics (Kempster et al., 2009; Sielska-Badurek et al., 2017).

Whilst literature is important to take on board in order to understand how the field of study has developed and change over the years, the researcher will be giving priority to research that will give a better understanding of current practice, ideally written within the last ten years.

Cooper's 1988 'taxonomy of literature reviews' (Cooper, 1988) categorises desktop literature reviews in the following key areas of focus –

Focus, Goal, Perspective, Coverage, Organisation, and Audience

To help give clearer focus to the research process, each so-called characteristic can be categorised even further (Randolph, 2009). Using this system, the researcher has been able to establish the research goals listed below:

1. The project will focus on the research outcomes themselves. This will give a clearer understanding to the research field and help the researcher to understand where this might lead
2. The goal of the project is to integrate and generalise findings, to draw conclusions and comparisons between the different areas of study
3. The researcher will set out to have a clear hypothesis which will then be supported or rejected at the end of the project. The conclusions arrived at by Hart (1988) state that almost all literature reviews are created for a particular audience and from a certain standpoint, and therefore the researcher needs to be aware of their own frame of reference and personal biases and be clear about how these might affect the end result
4. No literature can be completely exhaustive in its exploration and coverage, especially in an area as widely covered as MTD which has data going back over many years on a wide range of angles. The timescale of the project also plays into this, with a need for a clear and systematic approach leading to the need for representative coverage (Boell and Cecez-Kecmanovic, 2014)
5. The desktop study will be organised in terms of concept
 - a. exploring a hypothesis and then exploring this rationale in more detail, and also methodologically
 - b. using the format of introduction, research method, analysis and conclusion.

6. The audience for this study would be described by the researcher as academics with a special interest in this field, and therefore it will be both important and appropriate to write in an academic style at all times.

Rhoades (2011) lays out systematic steps for undertaking a literature review. The researcher has found this process useful in previous work, and will followed the steps detailed:

1. Defining the Topic or Research Question
2. Identifying Relevant Information
3. Conducting the Search
4. Screening
5. Scrutinizing
6. Extracting Data
7. Synthesizing Findings
8. Develop Conclusion

The researcher has already details the topic and question in this rationale document. Relevant information and sourcing the correct research documents will be key to completing this project, and the researcher has already undertaken a large amount of reading in this area both for the current project and for previous work. The specifics of the muscle tension dysphonia and the muscles and structures that are most often affected by tension in professional voice users are key areas of focus.

At the time of writing, peer-reviewed journals being cross-referenced as part of the 'Search' phase include the Journal of Voice; NATS Journal of Singing; Journal of Speech, Language, and Hearing Research; Voice Foundation; Otolaryngology Online

Journal; Advances in Therapy, and; the PhD and MA dissertations of other researchers in the field.

Screening will be necessary to rule out studies that are either irrelevant to the central research question or have been superseded by newer research. Due care will be given to make sure that all literature included in the review is from peer-reviewed sources, and/or acknowledged experts in the field.

Only relevant literature will then be scrutinized to find emergent patterns and themes, with quantitative and qualitative data been extracted to give a clear picture of the evidence either for or against the researcher's hypothesis.

Findings will be synthesised in the form of data analysis to fully explore the key themes in the literature, and finally conclusions will be drawn to propose areas ripe for further research. (Rhoades, 2011)

All literature that is read in the preparation of this review will be annotated and filed, to allow easy access to information when writing. Bell (2005) suggests logging all such information, and to allow easy access the researcher has created a virtual document store on Dropbox and will also be using <https://www.citethisforme.com> to store references and citations throughout the process.

Critical reflection

This project aims to consolidate current research and best practice for both the researcher, and the wider voice community. It is designed to facilitate further research that will inform a novel way of working for singers and other professional voice users who are experiencing with MTD problems that may be having a detrimental effect on both their career and their personal life.

The field of voice pedagogy is an evolving one with new information constantly being published, and therefore the researcher must recognise the importance of widening the field of study and awareness. Johns (2004) says that critical reflective practice is “the antidote to complacency, habit and blindness” and this project intends to open up new areas of research in this way. In conducting this research it is important to remain as unbiased as possible and to engage in critical reflection throughout the process. This is termed ‘hunting assumptions’ (Brookfield, 2017).

The researcher had some concerns at the start of this project, regarding the highly contentious area of vocal rehabilitation coaching for professional voice users, and the fact that this role is not clearly defined or regulated. Although the exact term ‘Vocal Rehabilitation Coach’ is never used by the researcher – in either this project or his role in working life – this is a thorny issue at the present time, and a voice or singing teacher working with professional voice users who are experiencing voice problems due to muscle tension issues could be seen to be operating in that capacity. Behlau et al. (2021) noted the overlap between the work of some Vocal Coaches and SLPs² and they note that behavioural dysphonia – where technical and emotional issues are holding a voice user back – are often better served by contemporary coaching methodologies which seek to bring awareness and change to behaviours. Further studies such as Goffi-Fynn and Carroll (2013) and Emerich Gordon and Reed (2019) explore the role of the singing teacher in assisting professional voice users with muscle tension voice disorders, which eased the concerns of the author in beginning this research. Indeed, it may be possible to produce a so-called integrative literature

² Speech Language Pathologist

review, with the potential to generate new knowledge within the field of study (Torraco, 2016).

Initially, the field of study in the area of Muscle Tension Dysphonia was again possibly contentious, and potentially limiting in its clinical diagnosis. The researcher recognises these difficulties after a useful tutorial discussing the future project, it was decided that whilst this current literature review will look at the clinically diagnosed condition of MTD, future practical research projects will be less direct in addressing MTD specifically, but instead to take a wider field of problematic muscle tension experienced by singers, thus side-stepping ethical and regulatory concerns. Research into literature review methodologies (Cooper 1988; Randolph, 2009; Boell and Cecez-Kecmanovic, 2014; Rhoades 2011; Torraco, 2016) was undertaken before commencing writing, and the regular screening of the literature has helped to keep reading focussed and within the subject area and time frame.

The researcher was able to establish where gaps were present in his knowledge of the field, and alongside research conducted through reading, the researcher undertook CPD opportunities online through the British Voice Association and Voice Workshop UK, and also joining a voice research book club to work as a so-called as a community of practice (Moon, 2013). This way of working has been seen to improve both outcomes in the pedagogical sector for learners and for teachers (Hine, 2013).

Work on this project has coincided with the return to in-person working after the nationwide lockdowns imposed due to the coronavirus pandemic. This has had both positive and negative effects on both the author and the work itself. From a positive perspective, it has been inspiring and uplifting to return to working face-to-face with colleagues and students. The lockdowns previously also allowed for long and

uninterrupted periods of reading and reflection, which fed into this project. However, from a negative perspective it has been an exceptionally busy and stressful time, with the researcher regularly working 50 hour weeks to manage the workload and also dealing with both the academic and emotional stresses and strains experienced by students and staff alike. Due to the high-pressure nature of leading an arts education charity through this time, the last months have been in fire-fighting mode and there was no meaningful possibility to engage in Reflection on Action - in other words, the researcher was unable to adequately learn from experiences, whether positive or negative (Schön, 1983).

Throughout the writing process, upon completion of the research, the author was able to stop and take time to reflect on the process using Gibbs 'Learning by Doing: A guide to teaching and learning methods' Reflective Model (Gibbs, 1988). Being as stressed and exhausted as was the case, the researcher was in danger of falling into a kind of pedagogical autopilot without taking adequate time to prepare or reflect. The nature of coaching and leading an organisation through a crisis is also an emotional drain, and again this had the potential to negatively impact the empathy and openness that is such an important part of the job.

In addressing these issues head on, the researcher saw that engaging with colleagues in a wider community of practice and support had the potential to help re-energise both teaching and writing this project, and this certainly proved to be the case.

Having noticed the effect of the lockdowns and subsequent workload on mental and physical health and connection to this project, the researcher took a short break before commencing the writing in order to come to the literature review fresh and with a clear mind.

The resulting reflections have not only positive effects on the researcher and on this project, but have also led to a renewed engagement with the work and opened up the potential for new fields of study.

Ethical Considerations

The ethical issues surrounding the work of a vocal coach in a more rehabilitative role are many and complex, and have been addressed by the researcher in a previous paper. It is extremely important that these are well understood and addressed.

The field of vocal rehabilitation coaching is unregulated with no formally accepted training pathways or methods of supervision and regulation. This contrasts with those working in the medical fields such as SLTs.

Gehard (2015) notes that, at that time, there are no formal training programmes in this field, although several programmes exist in the US to train singing voice rehabilitation. The researcher notes that Voice Workshop in partnership with UWTSD offer a Vocal Rehabilitation Coach pathway through the MA Voice Pedagogy programme as being the only UK-based pathway available, although again it is important to note that the literature from Voice Workshop affirms that being a vocal rehabilitation coach is not regulated. The suggestion is made that someone pursuing a career as a VRC should look to gain clinical experience, contact with voice clinics, ethics considerations and also to work towards British Association of Performing Arts Medicine (BAPAM) accreditation (Voice Workshop, 2021).

BAPAM offers registration for VRC's and seeks 'BAPAM approved competencies' as qualification which are available on request, however the researcher notes that at the

time of writing the BAPAM register is currently closed to new applicants (BAPAM, 2021).

There are plenty of examples of multi-disciplinary cooperation between vocal coaches and the medical professions, as detailed by Hoch and Sandage (2017) who aim to create a common set of terminology for all of those working in the voice professions through a brief literature review, which is necessarily limited in its scope due to a lack of published material in this area.

Taking this all into consideration, laying out ethical and pedagogical boundaries to help steer which sources should be included and which excluded from this desktop study is a very important part of the process, and it will be interesting to explore through this review how some regulatory or ethical framework could be put into place to create a more evidence-based approach.

Part 2 – research project

Introduction

Professional voice users – such as singers, actors, teachers and clergy – have a higher incidence of muscle tension and associated voice disorders compared to the general population (Van Houtte, Van Lierde and Claeys, 2011; Sielska-Badurek et al., 2017). Usually referred to by the term Muscle Tension Dysphonia, the tensions experienced by the voice user can be primary or secondary to the voice disorder (Andrea, Dias, Andrea and Figueira, 2017; Dehqan and Scherer, 2019) and will usually affect the extrinsic laryngeal musculature (Jafari et al., 2020).

Muscle tension dysphonia has many etiologies (Altman, Atkinson and Lazarus, 2005) and also has an important link to the emotional and psychological wellbeing of the voice user (Behlau et al., 2021; Andrea, Dias, Andrea and Figueira, 2017).

At the present time there are several treatment methods used by clinical professionals, including Manual Circumlaryngeal Therapy (Dehqan and Scherer, 2019), Stretch-and-Flow therapy (Watts et al., 2015), SOVT³ exercises (da Cunha Pereira, de Oliveira Lemos, Dalbosco Gadenz and Cassol, 2018) and many others.

The aim of this literature review is to draw together all relevant and currently available research to gain a clear insight into muscle tension dysphonia and the issues faced by professional voice users, and to explore the etiologies, symptoms and treatments and work towards a novel way of supporting this group.

³ Semi-Occluded Vocal Tract

Literature Review

The most common umbrella term for inappropriate muscular activity/tension experienced by professional voice users and resulting in loss of vocal control is Muscle Tension Dysphonia. First used in 1983 by Morrison et al., the term Muscle Tension Dysphonia describes a pathophysiological condition that is typified by – but is not limited to - hypertension of the extrinsic laryngeal structures. It will often include an elevated laryngeal position (Sielska-Badurek et al., 2017) and a posterior glottic chink (Altman, Atkinson and Lazarus, 2005) often resulting in a hoarse and aspirated sound.

Van Houtte, Van Lierde and Claeys, (2011) note the presence of supraglottic pressure and often isometric squeezing within the larynx as also being visible symptoms. Inappropriate muscular tension in the chest, tongue, jaw and abdominal wall are also noted as factors alongside the primary issues affecting the vocal tract itself, and these can create an unhealthy pattern of vocal function in the laryngeal musculature resulting in loss of resonance and control, hoarseness and vocal fatigue. (Sielska-Badurek et al., 2017; Jafari et al., 2017).

Singers and other professional voice users are reliant on using a larger vocal range and having greater control, and the muscular tension caused by MTD can have a negative result on the maximum phonation time (MPT) resulting in phrases and notes being shortened (Emerich Gordon and Reed, 2019; Sielska-Badurek et al., 2017). Professional voice users are reported by Van Houtte et al (2011) to have a greater prevalence of MTD diagnosis due to their increased vocal load, and it is noted that improper use of the phonatory musculature can cause disturbances to the resonance focus, loss of pitch/loudness control and, if left untreated, decompensation of the voice (Van Houtte, Van Lierde and Claeys, 2011). Such an effect would clearly be

devastating for a professional singer, who relies upon full access to vocal range and power to earn their living.

It should be noted that there is a similarity in symptoms and auditory perceptions between MTD and adductor spasmodic dysphonia (Sebastian, Prem and Gowri, 2014; Dromey, Nissen, Roy and Merrill, 2008) and consequently MTD can sometimes be mis-diagnosed. Adductor spasmodic dysphonia is characterised by interruptions to voluntary phonation due to a hyper adduction of the vocal folds, whereas MTD is a hyperfunctional voice disorder leading to anteroposterior and/or lateral compression in the larynx and the extrinsic musculature resulting in breathy, fatigued and strained phonation (Sebastian, Prem and Gowri, 2014). There is also a similar overlap with the comorbidity of Laryngopharyngeal Reflux, where patients may score on the Reflux Symptom Index but might in fact be suffering with MTD due to similar acoustic and perceptual results (Dabirmoghaddam et al., 2020).

Kempster et al., (2009) and Altman, Atkinson and Lazarus (2005) agree that MTD can be a causal factor in mucosal changes at the level of the vocal folds which in turn can lead to vocal pathologies including vocal nodules, cysts and swelling. Conversely, MTD has also been noted as a possible 'compensatory vocal gesture' where these pathologies are underlying and the MTD is a secondary diagnosis (Altman, Atkinson and Lazarus, 2005). MTD can also be seen in other underlying organic disorders including LPR⁴, and Reinke's oedema (Van Houtte, Van Lierde and Claeys, 2011).

Within the current body of research, it is noted that MTD has many, complex contributing factors which include postural problems, organic pathology, vocal loading,

⁴ Laryngopharyngeal Reflux

and psychological health. (Altman, Atkinson and Lazarus, 2005; Sielska-Badurek et al., 2017; Kempster et al., 2009).

Earlier literature has referred to MTD in a variety of terms, including 'hyperfunctional dysphonia', 'musculoskeletal dysphonia' (da Cunha Pereira, de Oliveira Lemos, Dalbosco Gadenz and Cassol, 2018) and even 'muscle misuse dysphonia' (Van Houtte, Van Lierde and Claeys, 2011).

The term MTD is noted by Van Houtte et al (2011) to refer to a very specific inappropriate muscular tension in the paralaryngeal musculature, rather than simply being synonymous with any/all functional voice disorders.

Importantly for this study, professional voice users are more likely to be diagnosed with MTD as a population which can have career-threatening results (Ropero Rendón et al., 2018), and various studies have explored the combined role of the clinical voice professions and the singing teacher or vocal coach in the process of assisting singers and professional speakers to be able to safely and effectively return to work (Behlau et al., 2021; Goffi-Fynn and Carroll, 2013; Ropero Rendón et al., 2018; Emerich Gordon and Reed, 2019).

Posture and alignment are identified as factors contributing to MTD in professional voice users (Kooijman et al., 2005; Cardoso et al., 2020; Cardoso, Meneses, Lumini-Oliveira and Pestana, 2021) and mental health is raised as both a causal and effective factor in MTD (Slavych et al., 2021; Andrea, Dias, Andrea and Figueira, 2017; Rocha et al., 2021).

Diagnosis of Muscle Tension Dysphonia broadly agreed upon throughout the literature included in this review, with the most widely noted methodologies being:

1. Video Laryngostroboscopy. The nasendoscope is the most commonly reported approach, allowing medical professionals to be able to see laryngeal/pharyngeal constriction and any vocal fold pathology in both static and dynamic real-time images (Sielska-Badurek et al., 2017; Altman, Atkinson and Lazarus, 2005; Lowell et al., 2020; Van Houtte, Van Lierde and Claeys, 2011)
2. Palpation of the neck and of the muscles surrounding the larynx is also an important assessment technique, and sometimes this tension is visible to the practitioner without the need for palpation (Van Houtte, Van Lierde and Claeys, 2011; Emerich Gordon and Reed, 2019; Altman, Atkinson and Lazarus, 2005). Sielska-Badurek et al (2017) and Jafari et al. (2020) set out their own versions of a novel approach to palpation for diagnosing and assessing MTD.
3. Finally, perceptual acoustic parameters for both healthy and unhealthy voice were also commonplace in diagnosing, assessing and treating dysphonia, including acoustic analysis, VHI10⁵, MPT and measurement of F⁰ (Fundamental Frequency) (Jafari et al., 2017; Gelfer and Van Dong, 2013; Lowell et al., 2020).

There is an important differentiation between primary MTD and secondary MTD, as noted by Da Cunha Piera et al (2018).

Primary Muscle Tension Dysphonia as a diagnosis refers to the absence of pathologies or any other structural changes within the larynx itself. On the other hand, secondary MTD as a diagnosis would show that these structural changes were/are already present and the muscle tension is essentially a maladaptation.

⁵ Voice Handicap Index Questionnaire

As a vocal coach, the researcher notes the ethical and practical importance of the difference between primary and secondary diagnosis. Clearly any change to the pathology of the vocal folds should not be dealt with in a voice studio and is firmly in the area of clinical diagnosis and intervention. As previously noted, whilst there is now a more multi-disciplinary approach to voice and an understanding of terminology between speech language therapists and those in the coaching and pedagogical sphere (Hoch and Sandage, 2017) it is important never overstep any professional boundaries and ensuring appropriate referrals are made. Behlau et al. (2021) write interestingly about the role of the vocal coach and contemporary coaching language in the treatment of so-called behavioural voice disorders, although once again it is always clear that diagnosis is never the role of anyone outside of the medical professions even though some areas of treatment may fall between both SLP and Coaching practices.

Jafari et al. (2020) suggest a novel new palpation scale to assess and diagnose MTD, which includes a visual assessment of habitual posture, and both static and dynamic palpation for tenderness and tightness of various extrinsic laryngeal muscles. This study looks at these parameters in the infrahyoid area, the geniohyoid, cricothyroids, and sternocleidomastoids, as well as addressing the laryngeal and hyoid position in the vocal tract, and the cricothyroid space.

It is worth noting that singers will have different muscular holding patterns dependent upon the style in which they sing. In general the hyoid is likely to be elevated for higher frequencies, but intraoral structures such as the tongue will be held in different positions to achieve different formant effects relevant to the style which is being sung (Hosbach-Cannon et al., 2020).

Both direct and indirect voice therapies have been used to treat MTD (da Cunha Pereira et al, 2018) and studies using Vocal Function Exercises (VFE) have also shown a positive effect on releasing vocal tensions (Jafari et al., 2017; Gelfer and Van Dong, 2013). A technique described a Stretch-and-Flow voice therapy (Watts et al., 2015) was applied in a randomised clinical trial, and proved effective in its focus on using unvoiced and voiced airflow with minimal vocal effort.

It is widely agreed that the most effective approach to working with MTD is a multi-disciplinary one (Altman, Atkinson and Lazarus, 2005; da Cunha Pereira, de Oliveira Lemos, Dalbosco Gadenz and Cassol, 2018; Lowell et al., 2020). This will likely include functional voice therapy practices such as yawn-sigh technique and stretch-and-flow (Jafari et al., 2017), but might also include working with a voice coach on Vocal Function Exercises (VFE's) or practical exercises (Gelfer and Van Dong, 2013), or breath-based training exercises including as the Accent Method (Altman, Atkinson and Lazarus, 2005) or Respiratory Lung Volume-based Training (RLVT) (Lowell et al., 2020).

It has been noted that humming, SOVT and straw phonation exercises have had a positive effect on MTD outcomes (Ogawa et al., 2014; da Cunha Pereira, de Oliveira Lemos, Dalbosco Gadenz and Cassol, 2018). Andrade et al. (2014) compared the electroglottographic results of 7 different SOVT exercises with non-occluded comfortable phonation, and divided the exercises into two types: those with only a primary source of vibration at the true vocal folds, and; those with a secondary source of vibration such as lip trills, tongue trills and straw in water. Those in the second category were found to have the greatest positive effect on closed quotient and bringing the first formant closer to the fundamental frequency – both important in terms of their impact on dysphonia and restoring voice. Similarly in 2018, Meerschman et al.

found positive audio-perceptual improvements in patients undertaking SOVT therapies (lip trills, water resistance therapy and straw phonation) who had been diagnosed with dysphonia.

In extreme cases of MTD where a patient has not been responsive to therapy, an injection laryngoplasty has been employed to give the voice user better fold closure (Novakovic, Nguyen, Chacon and Madill, 2020).

Since it is also noted by Altman et al (2005), da Cunha Piera (2018) and Jafari (2017) that personality and psychological factors are also contributing factors to MTD, it can also be said that counselling, psychotherapy, or other mental health treatments may prove beneficial in some cases as part of a holistic approach to treatment.

There is a growing body of work discussing the mental health of singers, much of it specifically addressing the phenomenon of Music Performance Anxiety (MPA). This condition can be said to arise from behavioural and psychological indicators, in reference to giving a performance of any kind with an audience (Driskill, 2012). Driskill's study goes on to explore the use of yoga as a psycho-physiological practice that combines the key practices of breath work, physical exercise and meditation. By the same token, Elliott (2010) discusses the application of mindfulness for singers noting its link to meditation, posture and breath. She also goes on to discuss how thoughts and emotions can be controlled by using the practice in performance.

Stress, loss of the mental perception of voice control and changes to breath patterns are clearly also symptomatic of many common mental health disorders (Sielska-Badurek et al., 2017; Rocha et al., 2021) and can be seen as part and parcel of the symptoms and/or causes of MTD (Altman, Atkinson and Lazarus, 2005). Effective

treatment of mental - as well as physical - symptoms therefore, is very much a part of addressing MTD for singers.

Another potential cause of MTD that has a strong link to professional voice users which emerges through the literature review is that of vocal fatigue. Singers, public speakers and other professionals who require their voice for their work will naturally have a significantly higher vocal load compared to the general population (Cardoso, Meneses, Lumini-Oliveira and Pestana, 2021; Altman, Atkinson and Lazarus, 2005; Cardoso et al., 2020). Vocal loading can be described as the demands that are placed on the structures of the vocal organs, based upon the requirements for voice use (Carroll et al., 2006).

Singers in particular are required to use an extensive amount of vocal range and resonance (Emerich Gordon and Reed, 2019) and this can ultimately lead to fatigue of the laryngeal structures and extrinsic musculature (Sandage and Hoch, 2019). It is possible for singers and other professional voice users to plan and train for this vocal loading (Sandage and Hoch, 2019) and to mitigate for it using functional voice exercises (Carroll et al., 2006). These exercises are often very similar to those used by an SLT for behavioural dysphonia, such as SOVT work (Paes et al., 2013).

In reviewing the literature in this area, it can be said that the primary purpose of any treatment for MTD is to release the excessive paralaryngeal tensions, and ultimately give the patient access to free and normal voice. Due to a lack of comprehensive and accredited pathways for training as a voice rehabilitation coach for singers or other professional voice users (Gerhard, 2015) there is potential for professional voice users suffering with MTD to be left without adequate support once they have been discharged from Speech and Language Therapy.

Interestingly, there is also an amount of research assessing patient engagement with ongoing voice therapy (Slavych, 2011; (Slavych et al., 2021) which notes that, although there is no statistically relevant difference between age, gender, ethnicity and other socio-economic factors, overall only 60% of patients completed voice therapy. It has also been suggested by Wenke et al. (2021) that there are benefits to patients undergoing intensive therapy over 4 days per week for 2 weeks, rather than following the standard once-per-week model and also agreed with Rangarathnam et al. (2015) that remote (or 'telepractice') therapy sessions are still beneficial for treating MTD, as borne out by the experience of many practitioners during the COVID19 pandemic.

Analysis

The research is clear that the most commonplace treatments goals for MTD include releasing the paralaryngeal tensions in the vocal tract and surrounding structures in order to restore normal function and phonation (Altman, Atkinson and Lazarus, 2005; da Cunha Pereira et al, 2018; Jafari et al., 2017; Lowell et al., 2020; Sielska-Badurek et al., 2017; Van Houtte, Van Lierde and Claeys, 2011). There are several ways that this restorative work is done, principally using direct voice therapies such as Stretch-and-Flow or SOVT exercises, manual therapy such as myofascial release or Manual Circumlaryngeal Therapy, or in extreme non-responsive cases through laryngeoplasty.

Once again we can see that singers and professional voice users who are more likely to have a high vocal load are consequently more likely to be diagnosed with Muscle Tension Dysphonia (Altman, Atkinson and Lazarus, 2005; Cazden, 2012; Edman, Kondrad and Rakel, 2012). There is also a problem with engaging patients with traditional voice therapy methods, with up to 40% of people not completing the full

treatment plan and therefore not making maximal gains in terms of their voice use (Slavych et al., 2021). The highest levels of patient engagement are with direct voice therapy techniques, within which patients are being encouraged to alter their vocal behaviours rather than simply educating them about their voice or vocal hygiene. (Ziegler et al., 2014). This links to the potential to engage patients in their own recovery by using coaching strategies for voice training and therapy, such as GROW (Goal, Reality, Options, Way Forwards), active listening, and implementation intentions (Behlau et al., 2021).

It can also be extrapolated from the current literature that there is a tangible link between Music Performance Anxiety and other common mental health disorders that have causal and/or effective relationships with MTD. Due to the higher vocal load and greater mental stress levels for singers, it is necessary to treat both the physical and emotional aspects of MTD, and practices such as yoga, mindfulness and meditation may be beneficial to support professional voice users.

Breathing techniques are often employed in the treatment of MTD, which will not only be familiar to many professional voice users but may also be used to help calm stress and anxiety which are also symptoms and effects of the condition (Rosen and Murry, 2000; Emerich Gordon and Reed, 2019; Lowell et al., 2020; Sielska-Badurek et al., 2017). Many professional voice users will also be familiar with SOVT exercises, whether created by using particular vowels and filter gestures or by using props such as straws and water. There is a proven benefit to using SOVT work with those suffering from MTD, with improvements showing in acoustic perceptual measures as well as through a longer closed quotient of the vocal folds and a closer fundamental frequency/first harmonic formant ratio (Meerschman et al., 2018; Ogawa et al., 2014).

Most effective amongst these SOVT exercises are those which use two vibratory sources, such as lip and tongue trills or using a tube in water. Since there is a greater variation in closed quotient during these exercises from the changes in intraoral pressure created by introducing a secondary vibration source, it can be said that these have a greater massage effect in the larynx and could therefore be more important for those suffering from excessive extrinsic muscular tension (Andrade et al., 2014). Such exercises are commonplace in the voice studio, and in the researcher's experience would be readily made into habitual practice patterns for professional voice users.

The aforementioned exercises are also shown within the research to be effective in helping singers to manage vocal fatigue (Paes et al., 2013; Carroll et al., 2006; Sandage and Hoch, 2019). Fatigue within the larynx and also in the extrinsic musculature has a demonstrable relationship to MTD (Andrade et al., 2014) and so once again we see that MTD is an occupational hazard for professional voice users (Van Houtte, Van Lierde and Claeys, 2011).

Posture and good alignment are equally as critical in the rehabilitation of MTD patients, both as causal factors that can be easily seen and identified, but also as effects of the extrinsic muscular tension (Cardoso et al., 2020; Kooijman et al., 2005). Muscular tension can be treated effectively using myofascial release techniques (Cardoso, Meneses, Lumini-Oliveira and Pestana, 2021) and manual circumlaryngeal therapy (Dehqan and Scherer, 2019). Palpation can be used to assess both the tenderness and the tension within specific extrinsic muscles which are associated with MTD, and this could be used along with traditional methods (such as laryngoscopic examination and perceptual methods like the VHI10 or the GRBAS scale) to more accurately assess the levels and changes in muscular tensions (Jafari et al., 2020).

There is a link between SLP therapeutic vocal function exercises, such as yawn-sigh technique and stretch-and-flow therapy (Aghadoost et al., 2020; Jafari et al., 2017) and the work done in a voice coaching studio such as musical exercises and SOVT work (Goffi-Fynn and Carroll, 2013; Behlau et al., 2021). It is also possible to see in the current literature, that patients place higher value on direct, behavioural voice therapy (Ziegler et al., 2014) and that engagement with the work is critical for professional voice users to overcome MTD (Slavych, 2011; Slavych et al., 2021). Studies have shown that intensive voice therapy (rather than the traditional 1hr x once per week model) can be beneficial to MTD patients, and results in flow phonation therapy can be just as positive working with so-called teletherapy (more widely conducted on platforms such as Zoom and Microsoft Teams during the 2020/21 global pandemic) as they are working face-to-face (Wenke et al., 2021; Rangarathnam et al., 2015).

Mental health and wellbeing also have a measureable impact on MTD (Rocha et al., 2021). Altman, Atkinson and Lazarus (2005) note the importance of a multi-disciplinary approach due to the complexity of physiological and psychological etiologies, and Andrea, Dias, Andrea and Figueira (2017) are clear that a psychologist ought to be present in clinical voice assessments for the same reason. In terms of professional voice users, one can draw comparisons to Music Performance Anxiety and the fear of failure, which require careful attention and a functional approach by the voice coach or pedagogue (Bačlija Sušić, 2018).

Drawing on this information, it is possible to see how good research and the sharing of best practice could result in positive long-term outcomes for professional voice users, by working with a multi-disciplinary team.

Conclusion

Within the body of available literature, it is clear that a widely agreed set of symptoms and etiologies exist.

The extrinsic muscular tensions and laryngeal squeezing associated with MTD can refer to muscles in the chest, jaw, shoulders and elsewhere in the body and can be a primary or secondary cause of dysphonia. The specific functional disorder termed as MTD is the most regularly diagnosed voice disorder for those presenting at voice clinics, and the resulting lack of vocal control and resonance have a great impact for singers and professional speakers.

A diagnosis of primary MTD presents without any mucosal or structural changes within the larynx, but where these pathologies are already present and result in muscular tension, a diagnosis of secondary MTD will be made. Alongside physical health considerations, the mental health and psychological profile of the patient may also have an effect.

MTD is usually diagnosed by a combination of visual evaluation within the larynx using a nasendoscope, palpation and visual evaluation of the external musculature, and acoustic parameters of the disordered voice by the patient and by a qualified professional using acoustic analysis and observations of F° and MPT.

At the present time, MTD is treated through a variety of means including, but not limited to manual therapy and myofascial release, and functional voice exercises, including SOVT work. The best levels of patient engagement are found in voice therapy exercises that directly target changes in vocal behaviour, and therapy can be as

effective when delivered in intensive sessions, or even remotely through so-called teletherapy.

Both mental and physical health are important in the diagnosis and treatment of MTD, and a multi-disciplinary approach that can take into account everything from posture to performance anxiety is highly preferable for those who rely on their voices to earn a living. Managing their vocal load and fatigue is an important part of the picture, and anxiety levels may be managed using practices such as mindfulness or yoga.

Further research is warranted into a novel way of working with professional voice users to overcome both the physical, emotional and social factors that are affected by MTD, using direct behavioural exercises to encourage completion of the therapy, and coaching methodologies to increase the level of personal engagement with recovery. Such a programme would need to draw on a multi-disciplinary approach and would need to inculcate strategies for managing breath, vocal fold closure, muscular release and calming for the mind.

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