

Developing a Vocal Manual Therapy Intervention for the Treatment of Laryngopharyngeal Reflux in Professional Voice Users: A Pilot Study of Two Elite Singers

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INTRODUCTION

LARYNGOPHARYNGEAL REFLUX (LPR) is an inflammatory condition characterized by the backflow of gastric contents into the larynx, pharynx, and upper aerodigestive tract.¹ Prevalence estimates suggest 4–6% of people receiving care within ear-nose-throat clinics present with LPR symptoms,² and comorbidity with voice disorders, such as muscle tension dysphonia and globus pharyngeus, is common.³

It is important to note that LPR differs from gastroesophageal reflux disease (GERD). Although both involve the reflux of gastric contents, LPR is distinct from GERD, as individuals with LPR present with laryngopharyngeal symptoms without heartburn or regurgitation.⁴ In addition to this difference in clinical presentation, the physiological mechanisms underlying the two conditions are different. LPR is related to dysfunction of the upper esophageal sphincter, exposing the laryngeal mucosa to gastric substances like acid, pepsin, and bile salts,⁵ whereas GERD is associated with dysfunction of the lower esophageal sphincter, hence why individuals with GERD primarily report night time reflux whilst in the supine position.

There is increasing evidence to suggest that the reflux of pepsin specifically contributes to the voice-related symptoms associated with LPR.⁶ Pepsin is an enzyme that is responsible for breaking down proteins into smaller peptides, and so increased amounts of pepsin in the upper aerodigestive tract because of LPR can lead to vocal fold damage (because pepsin breaks down the proteins that typically promote healthy laryngopharyngeal function).⁷ Therefore, repeated episodes of LPR can lead to a host of voice-related difficulties, including hoarseness, sore throat, throat clearing, and difficulty swallowing.⁸ Of these, hoarseness is described as a prominent feature of LPR, with more than 71% of individuals with LPR identifying hoarseness as a primary symptom.⁹ If not treated, the symptoms of LPR can become chronic, and thereby have

the potential to have a long term debilitating effect on vocal health and wellbeing.

Elite singers rely on efficient, consistent, and effective voice use in order to excel in their field.¹⁰ However, the demanding nature of the career, combined with its physical, psychological, and lifestyle stressors, means that singers are at an increased risk of developing LPR. For example, researchers posit that the physical actions involved in singing, such as increased pressure against the lower esophageal sphincter following diaphragm compression, increase the potential for acidic substances to flow into laryngopharyngeal regions—causing LPR symptoms.¹¹ This physiological explanation of increased LPR risk in singers has been extended to include psychological and lifestyle factors (e.g., career stress, late nights and lack of sleep, dietary schedules) contributing to increased LPR symptoms.¹² Together, this work highlights the distressing and debilitating effect that LPR can have on elite singer occupational performance and wellbeing, and thereby identifies a need for more meaningful interventions for singers with LPR.

Only a small number of intervention options are available to elite singers with LPR. The majority of these are pharmacological, including proton pump inhibitors (PPIs), H₂-receptor antagonists, prokinetic agents, and mucosal cytoprotectants.¹³ PPIs are one of the more dominant pharmacological interventions and aim to manage LPR symptoms by controlling the amount of acid produced in the stomach. A meta-analysis of studies comparing the effect of PPI and placebo administration on LPR symptoms reported mixed results across studies, with a lack of clear evidence for PPI usefulness and acceptability.¹⁴ A similar conclusion was reached in a randomized controlled trial of PPIs, which found that PPI administration (in this case lansoprazole) did not significantly improve LPR-related throat discomfort any more than placebo.¹⁵ Taken together, these empirical investigations of (limited) PPI effectiveness are consistent with other research,¹⁶ suggesting that PPIs may not be fully appropriate for use in LPR treatment, particularly long-term.¹⁷

Developing a Vocal Manual Therapy Intervention for LPR

The debate around the suitability of PPIs as a long term LPR intervention strategy underlines the need

for more nonpharmacological intervention options for elite singers with LPR. One such nonpharmacological intervention is vocal manual therapy. The main tenet of vocal manual therapy is gentle, integrated myofascial release techniques applied to the regions of the muscles surrounding the larynx.¹⁸ It mainly targets the neck and larynx, but also includes techniques that focus on reducing tension in the jaw and tongue. Although perhaps once considered a potentially painful intervention, more contemporary approaches to vocal manual therapy prioritize noninvasive, effective techniques informed by pain science research and biopsychosocial approaches to vocal health. Indeed, there is growing evidence to suggest that vocal manual therapy may have utility in the treatment of muscle tension dysphonia,¹⁹ in addition to improving voice user vocal performance and vocal agility.²⁰

Despite preliminary evidence for its improving effect on vocal health and performance, little research to date has specifically investigated the effect of vocal manual therapy on LPR symptoms. Previous research investigating links between vocal manual therapy and reflux symptoms studied the effects of diaphragmatic myofascial release on self-reported reflux symptoms within a sample of 30 participants with GERD diagnoses.²¹ Fifteen participants were allocated to the intervention group and received four 25-minute myofascial release interventions, administered twice weekly for two weeks. The intervention involved six techniques: 1) diaphragmatic transverse plane, 2) anteroposterior equilibrium technique, 3) supra- and infrahyoid fascial induction, 4) psoas fascial induction, 5) diaphragm stretching technique, and 6) phrenic center inhibition. Fifteen comparison participants were allocated to the control group and received a placebo intervention, consisting of the same contact treatment and respiratory movements, but without the fascial stimulus or pressure. Reflux symptoms were assessed using the Reflux Disease Questionnaire at baseline (prior to intervention), one week after intervention, and four weeks after intervention.²² The researchers reported a significant difference in self-reported reflux symptoms between intervention and control groups four weeks after intervention, with significantly lower symptoms in the intervention group compared to the control group.

The finding that myofascial release techniques had a significant improving effect on self-reported reflux symptoms has considerable implications for work aiming to provide nonpharmacological interventions for reflux problems. Whilst the study described above focused on GERD, which as reviewed earlier is mechanistically and clinically different to LPR, its core principles might translate to research investigating vocal manual therapy and LPR.²³ Within this, it is important to test changes in symptomatology over time and employ a variety of manual therapy techniques and exercises. As described earlier, LPR symptoms most markedly affect those who rely on their voices occupationally, and thus developing a manual therapy intervention that is accessible and useful for professional voice users is a major priority.

Our pilot study, therefore, extends existing research and details the development of a vocal manual therapy intervention specifically designed for use with professional voice users. Within this, it aimed to provide preliminary evidence of the potential effectiveness of manual therapy in reducing elite singer LPR symptoms.

METHODS

Participants

Two participants were recruited into this pilot study via volunteer sampling. Both participants were elite musical theatre performers and engaged in professional contracts at the time of participation. Both participants had received a diagnosis of LPR within six months prior to enrollment into the study. Neither participant was using PPIs or other pharmacological interventions for LPR at the time of participation. Both participants maintained a consistent lifestyle routine across the course of the intervention so to limit the influence of extraneous variables (e.g., diet, sleep patterns, stresses) on their LPR symptoms. Detailed case descriptions of both participants are found in Table 1. All data were collected as part of routine clinical practice and both participants provided written informed consent for their data to be written up anonymously for research publication.

Intervention Protocol

The vocal manual therapy intervention protocol was created by author SK. The protocol was informed by the techniques employed in previous manual therapy studies

of voice function²⁴ and reflux,²⁵ and its development was grounded in principles of evidence-based practice.²⁶ As presented in Figure 1, evidence-based practice applies the findings of external, evidence-based research within a framework that embraces overlaps between practitioner clinical experience and judgment, and the individual differences and preferences of the client. Adopting this evidence-based practice approach empowers the practitioner to incorporate client experience within practice, thereby facilitating the shared discovery of how subtle changes in therapeutic touch can lead to changes in therapeutic outcome.²⁷ Including multidisciplinary approaches to voice work is important within this.²⁸

The vocal manual therapy protocol included a Suprahyoid Stretch, Infrahyoid Stretch, Diaphragm Release, Cricothyroid Manipulation, and Thyrohyoid Manipulation. The techniques included in the protocol are shown in Figure 2.

The vocal manual therapy intervention was implemented over the course of four weeks, and the manipulations were all applied and facilitated by the same practitioner each time, with the total protocol lasting eleven minutes. Participant experience of LPR was recorded weekly using the Reflux Symptom Index (RSI).²⁹ Both participants completed the RSI prior to engaging in the first treatment (hereon referred to as baseline) and completed the RSI before and directly after each in-person intervention session. This generated a total of eight data points per participant, spanning the full course of the intervention: Baseline, Posttreatment 1, Pretreatment 2, Posttreatment 2, Pretreatment 3, Posttreatment 3, Pretreatment 4, Posttreatment 4.

Measuring LPR

Participant experience of LPR was assessed using the RSI. The RSI is a nine item self-report measure that asks participants to rate their experience of LPR-related problems on a six-point Likert scale (0 = no problem, 5 = severe problem). Total RSI score is used as a global measure of LPR symptomatology, and has a possible range of 0–45, with scores over 13 usually sufficient to receive a LPR diagnosis. The RSI was selected because its items are more relevant to LPR symptomatology than other reflux self-report measures, such as the Reflux Symptom Questionnaire.³⁰

TABLE 1. Participant case descriptions.

	Participant A (PA)	Participant B (PB)
Age	23 years old	29 years old
Gender	Cis male	Cis female
Voice Type	High baritone	Mezzo soprano
Voice Injury History	During musical theatre training, PA raised concerns regarding hoarseness, dryness, and throat clearing. Diagnosed with LPR following consultation with a Voice Specialist Laryngologist.	Shortly after starting their third West End contract, PB began experiencing symptoms of hoarseness, dryness, and throat clearing. Diagnosed with LPR following consultation with a Voice Specialist Laryngologist.
Presentation	PA was perceptively hoarse on first meeting and reported tightness in the paralaryngeal region. This was later confirmed when the manual therapy protocol was administered, and PA mentioned discomfort at the sites of intervention.	PB reported experiencing heart burn, chest pain, and indigestion—symptoms consistent with GERD. Also presented with symptoms associated with LPR, including throat clearing. Demonstrated laryngeal hypersensitivity and postnasal drip, perhaps indicative of globus pharyngeus or allergic Rhinitis diagnoses.
Previous Treatments	Previously used PPIs (omeprazole, six-week course) but experienced no change in symptoms. Revisited Voice Specialist Laryngologist six months later and was prescribed same medication and treatment plan. PA did not then pursue the same medication prescription.	Previously used PPIs (20mg omeprazole for six weeks, followed by 40mg for two weeks). Symptoms did not improve so medication discontinued.
Other Factors	PA had juvenile asthma. They used to carry a ventalin inhaler, although only used it sporadically and when needed, and not as a preventive measure. PA reported no experience of asthma or need for inhaler during adulthood. PA had no other physical or mental health considerations.	PB had a busy work schedule and lifestyle, meaning they often had late mealtimes—perhaps contributing to the reflux symptoms described above. PB also reported partying frequently, including spending extended periods of time in loud environments, resulting in a high vocal load outside of work. PB reported no other physical or mental conditions, although did seem anxious during the first in-person session.

Subjective Experience of Manual Therapy Protocol

In addition to measuring the effect of the intervention quantitatively via the RSI, qualitative data regarding the effectiveness of the intervention were also collected. Qualitative data were gathered before and after each in-person session, and were recorded in written form by author SK.

RESULTS

Changes in RSI Score

Both participants reported LPR symptoms far above the clinical threshold for LPR diagnoses at baseline (RSI threshold >13) and their baseline RSI profiles were consistent with the case histories provided in Table 1. Both participants rated “throat clearing” and “coughing

after eating or lying down” as problematic, with both participants rating those items as four out of five on the RSI. Participant B also rated “excess throat mucous or postnasal drip” as a severe problem, rating this item as five out of five. These baseline profiles illustrate the severity of participant LPR symptomatology and suggests that both were suitable subjects for this pilot study.

Results suggest that the vocal manual therapy intervention had a meaningful impact on self-reported experience of LPR symptoms. As shown in Figure 3, reductions in RSI score were observed following each of the four treatments and were also seen across the time course of the intervention. Taken together, these results suggest that vocal manual therapy may have had an improving effect on the LPR symptoms of the two elite singers who participated in this study.

Qualitative Responses

After the first treatment (Posttreatment 1), Participant B reported an ease in swallowing, commenting: “[I] had no idea I wasn’t swallowing easily until now.” They also expressed increased feelings of freedom and comfort in their voice and felt compelled to sing through their vocal range: “[My voice] never feels this warm in the mornings.” These examples highlight the immediate effect that the intervention may have had on Participant B’s subjective experience of their voice. Both the Suprahyoid and Infrahyoid Stretches target release of muscles involved in swallowing (such as digastric, mylohyoid, omohyoid, and thyrohyoid muscles) and so may have influenced greater ease of swallow for Participant B.

Between the third and fourth treatment sessions, Participant B attended an audition for a professional theatre contract. They said that the casting director (for whom they had auditioned previously) commented on the clarity and power of their voice, paraphrasing the casting director as saying, “Whoever you’re seeing as a teacher, keep seeing them, they’re doing wonders for your voice.” Participant B seemed to interpret this as linked to the vocal manual therapy, suggesting it had improved the quality of their singing voice. Given

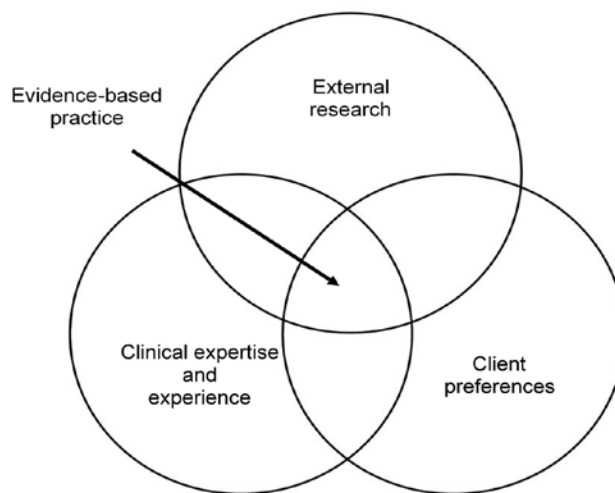


Figure 1. Illustration of evidence-based practice.

that this appraisal of their voice came from an external (industry-specific) observer, this potentially contributes additional relevance to this observation.

Participant A expressed thoughts similar to Participant B. When asked to reflect on their experience of the intervention and consequent improvements in clarity of vocal tone, Participant A emotionally remarked, “[I

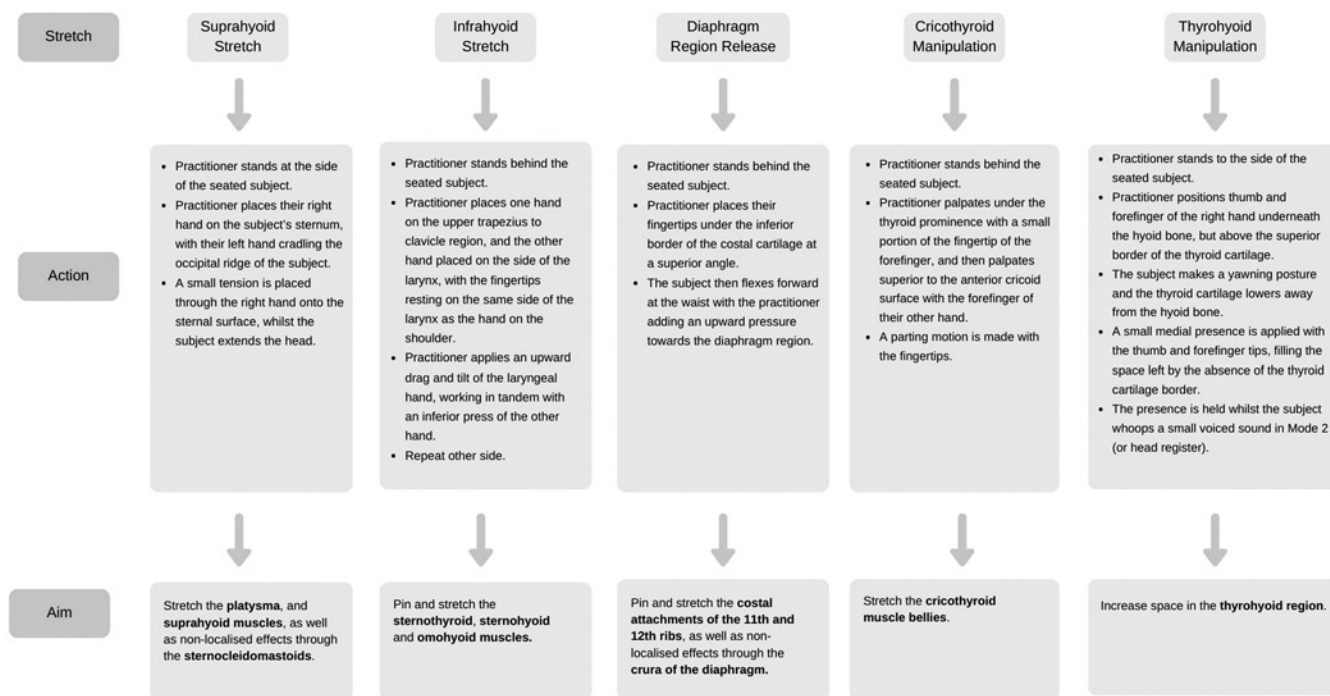


Figure 2. Techniques included in Vocal Manual Therapy Protocol.

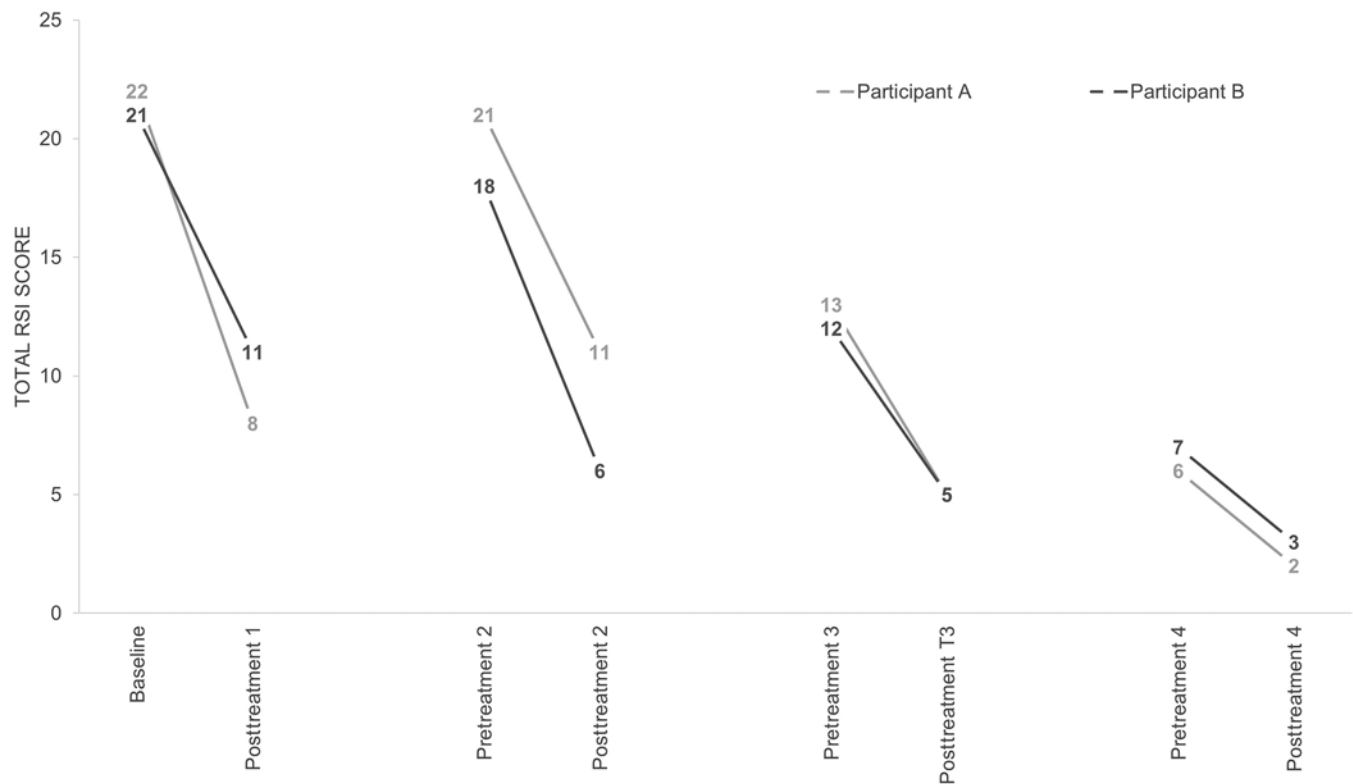


Figure 3. RSI Scores across intervention timepoints for Participant A and Participant B.

had] considered giving up singing . . . [my] voice had been unpredictable . . . doing this has restored faith in my voice and career.” This is both a poignant example of the damaging effect that LPR can have on elite singer occupational performance, and an illustration of the potential usefulness of vocal manual therapy in addressing LPR symptoms.

The qualitative data are in keeping with the RSI data in suggesting that vocal manual therapy may be associated with improvements in LPR symptoms. In addition to increased feelings of vocal comfort and relaxation following treatment, the participant qualitative responses also highlight that the intervention may have had a promoting effect on wellbeing by challenging expectations regarding vocal ability. Indeed, both participants reference having negative vocal experiences in the past, and thus expectations regarding how their voice will sound or feel. The preliminary qualitative data presented here suggest, therefore, that vocal manual therapy may have the potential to contribute to changes in these expectations, leading to increased feelings of positivity

regarding vocal ability (e.g., “restored faith in voice and career” / “doing wonders for your voice”).

DISCUSSION

This pilot study described the development of a vocal manual therapy protocol for use with singers with LPR. Two elite singers were engaged in a four-week intervention that included in-person application of myofascial manual therapy techniques. Both participants entered the study with severe LPR symptoms (scoring 21 and 22 on RSI). Results showed that both participants responded well to the intervention, demonstrating meaningful reductions in self-reported LPR symptoms after each treatment and across the time course of the intervention. The observed reductions in LPR symptoms in response to the vocal manual therapy intervention may therefore suggest that vocal manual therapy has some utility in addressing LPR symptoms in elite singers.

By highlighting the positive effect of manual therapy on singer LPR, the results of this study are aligned with previous research that has shown that myofascial release

can reduce self-reported reflux symptoms.³¹ The findings presented here extend existing knowledge by demonstrating that manual therapy could be useful for LPR as well as GERD, with changes in LPR symptomatology detectable after each treatment session as well as longitudinally across the course of the intervention. Given that (to the best of our knowledge) this study is the first to date to investigate the effect of vocal manual therapy on singer LPR, its preliminary findings contribute new knowledge regarding nonpharmacological treatment options for singers with LPR.

As described earlier, singers are frequently affected by LPR and require suitable alternatives to routinely prescribed pharmacological interventions. This vocal manual therapy intervention was developed with this need in mind. The intervention relaxes the muscles involved in vocal production, aiming to facilitate efficient and comfortable voice use, and thus is potentially helpful for those experiencing vocal discomfort or fatigue—such as singers with LPR. It is important to note that the intervention did not directly address the probable cause of the LPR (upper esophageal sphincter dysfunction), but instead helped the singers manage (and reduce) their voice-related symptoms. It may be that manual therapy reduces the need for PPIs,³² but it was beyond the scope of this study to investigate this directly as neither participant was using PPIs at the point of participation.

This pilot study has provided preliminary evidence for vocal manual therapy as a potential intervention strategy for singers with LPR. In showing both immediate and longitudinal effects using quantitative and qualitative approaches, the protocol described here may be appropriate for use with singers who need immediate symptom management strategies (for example, managing LPR symptoms alongside performance requirements), in addition to those who are looking for more longterm symptom solutions. Furthermore, it focuses on laryngeal muscular release, and so the protocol may also be useful for those who are looking to find relaxation within their voice use or address non-LPR related vocal discomfort. Within this, whilst the present study has focused on LPR, its findings contribute to previous work that has demonstrated the effectiveness of vocal manual therapy in addressing vocal pathology more broadly (e.g., muscle tension dysphonia).³³ Moreover, the pre-

liminary qualitative findings presented here suggest that it may be interesting for future research to explore how engaging in vocal manual therapy affects psychological aspects of vocal production (e.g., relationship with voice, vocal identity, self-esteem, and self-efficacy). As the vocal manual therapy protocol has been described in detail above, suitably qualified practitioners could look to apply the techniques employed here and explore this as a potential future research direction.

Although this pilot study has provided preliminary evidence for the positive effect of vocal manual therapy on elite singer LPR symptoms, there are some methodological considerations that restrict the robustness of its findings. Firstly, the RSI was employed as a self-report measure of LPR symptoms. Although suitable for use here, employing the RSI in combination with other (perhaps more objective) measurement techniques (e.g., acoustic analysis, pH monitoring, endoscopy) would provide more comprehensive insight into the effect of vocal manual therapy on LPR symptoms. Similarly, including additional self-report measures of symptom experience, such as the Voice Handicap Index, could delineate how vocal manual therapy affects subjective appraisals of vocal functioning and corresponding interactions with LPR.³⁴ Furthermore, whilst changes in RSI were observed immediately before and after each session, it is of course possible that other unaccounted for variables contributed to the observed longitudinal reductions in RSI score. These variables might include participant levels of motivation, participant practice of vocal techniques outside of intervention, and lifestyle factors (e.g., sleep, diet—although participants were mindful of these across the course of the intervention). Future research could look to account for these, which would increase the strength of the reported findings. Finally, and most obviously, the small size of this study limits confidence in its findings. Future research should, therefore, look to replicate the approach described here in larger samples of singers with LPR.

In conclusion, LPR symptoms can be extremely debilitating for elite singers. This pilot study has described a vocal manual therapy intervention that may have the potential to address LPR symptoms. Although preliminary, the findings presented here underline the need for more nonpharmacological treatment options for singers with LPR, and some avenues for future research investi-

gating vocal manual therapy have been discussed. The treatment potential of vocal manual therapy for singers with LPR is not currently well understood, and so it is hoped that this study provides a foundation for future work investigating nonpharmacological intervention strategies for singers with LPR.

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