

The Effects of Singing-Based Voice Training on Vocal Functions and Quality of Life of Older People with Visual Impairments (VI)

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References



1. Introduction

Target population: Older people with VI

- Older people aged 65 or above account for 20.5% of Hong Kong's population in 2021 (Census and Statistics Department, 2023)
- 5.1% of Hong Kong's population has VI, with the prevalence increasing significantly with older age (You et al., 2020)

Voice problems in older people

- 27.7% perceived themselves as having voice problems, e.g. hoarseness, reduced loudness, and effortful to talk (Wong & Ma, 2021)
- Attributed to atrophy of laryngeal muscles and reduced elasticity of the vocal fold (Gregory et al., 2012)
- Negative impact on quality of life, e.g. may lead to depression and social isolation (Wang et al., 2023; Wong & Ma, 2021)

Current practice in voice management: Lee Silverman Voice Treatment (LSVT)

- High-intensity treatment program that improves voice quality in older people, e.g. increased vocal loudness and increased intelligibility (Nakayama et al., 2020; Pu et al., 2021)

The emerging practice: Singing-based voice training

- Relaxing and strengthens self-confidence (Eidevall & Leufstadius, 2013)
- Consists of longer phrases and wider pitch ranges than speaking (Pingel et al., 2022)
- Activate structures essential for voice production, e.g. larynx, tongue, lips, fascial and respiratory muscles (Pingel et al., 2022)
- Effective in improving respiratory capacity and support, and increasing pitch voice intensity ranges (Benedetto et al., 2009; Pingel et al., 2022; Stupsinskiene & Lycke, 2011; Tamplin, 2008; Tamplin et al., 2014; Yinger & Lapointe, 2012)
- Few studies focused exclusively on older people with VI

2. Objective

To explore the effectiveness of singing-based voice training in improving the vocal functions and quality of life of older people with VI.

- Vocal functions: Maximum phonation time (MPT) and maximum phonational frequency range (MPFR)
- Voice-related quality of life: Score in Aging Voice Index (AVI) and perceived phonatory effort rated using the OMNI-scale

3. Methods

Participants

- Six older women with VI aged between 66 and 91 (M = 81.33, SD = 10.84)
- Recruited from the Kowloon Home for the Aged Blind under the Hong Kong Society for the Blind (HKSB)

Eligibility

- Aged 60 or above
- Native Cantonese speakers
- ≥ 12 marks in the MOCA-VI assessment

Participants' Demographic Information

Participant	Age	Gender
1	71 years	F
2	90 years	F
3	66 years	F
4	91 years	F
5	80 years	F
6	90 years	F

Procedures

Study design: One-group pretest-posttest design

Voice assessment

Assessment time points

- Pre-test: Before the first training
- Post-test: Immediately after the last training

Assessment measures

- Completed the Chinese version of the AVI
- Indicated their perceived phonatory effort using the OMNI-Scale
- Audio recorded by reading aloud a Cantonese sentence, sustaining the vowel /a/, and performing pitch glide of the vowel /a/ to low and high frequencies

Equipment

- Recordings were made using Audacity 3.6.1 with a AKG410 microphone connected to a MacBook Pro, with Focusrite Scarlett Solo external sound card connected

Voice intervention

- Eight 30-minute singing-based voice training sessions, once to thrice weekly in four weeks
- Practised Cantonese and Mandarin song excerpts, which targeted:
 - Endurance: Sang phrases in one breath with phrase lengths adjusted based on participants' MPT
 - Coordination: Practised pitch alteration
- The pitch and speed of the audio tracks were adjusted using the Google Chrome extension "Transpose"
- Examples of songs: 鮮花滿月樓, 分飛燕, 舊夢不須記, 上海灘, 問我和月亮代表我的心

Data analysis

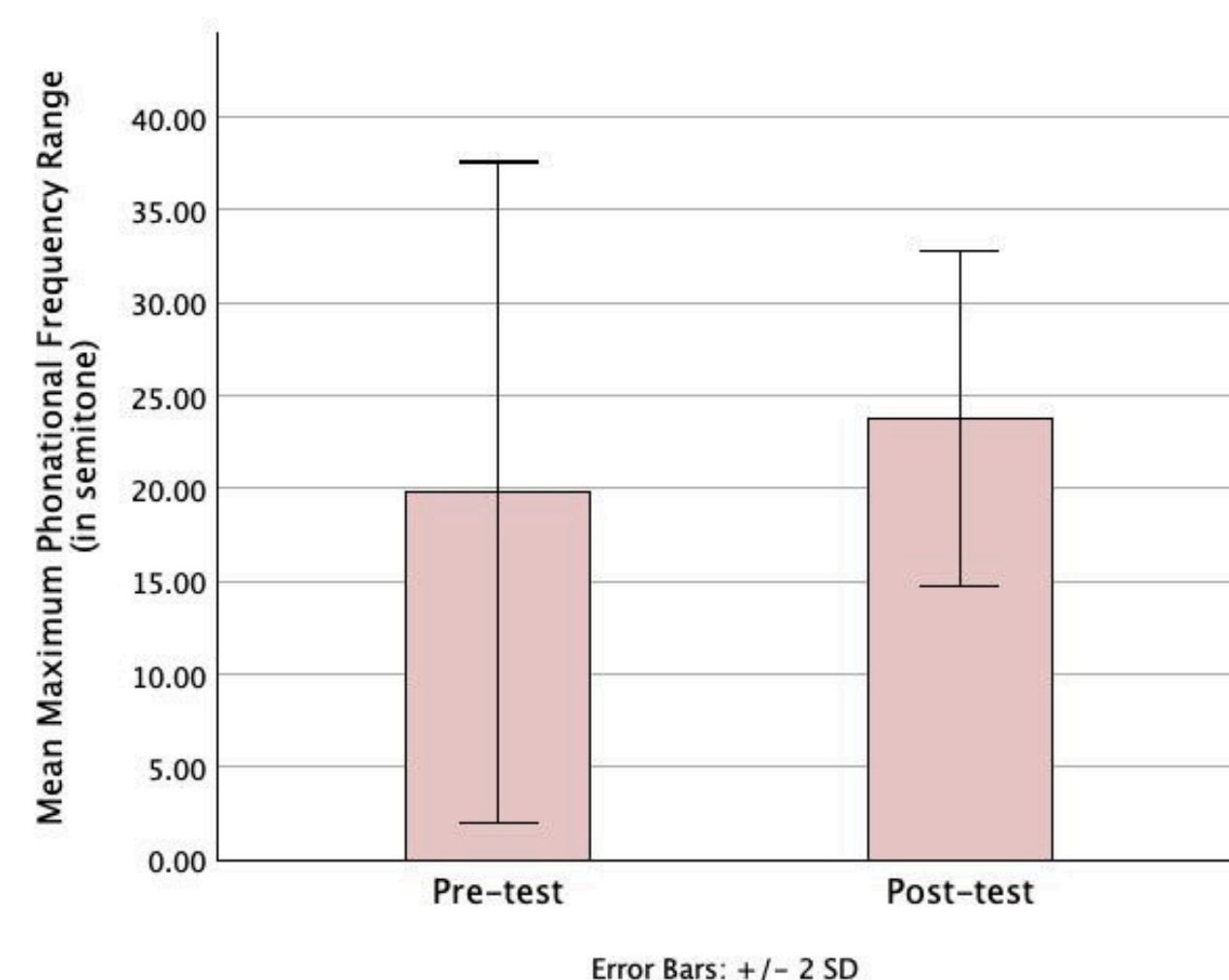
- Acoustic analysis - Praat software: Obtained participants' MPT and MPFR
- Statistical analysis - SPSS software: Non-parametric related-samples t-tests were used to compare pre-test and post-test measures

4. Results and Discussion

Effects of singing-based training on vocal functions

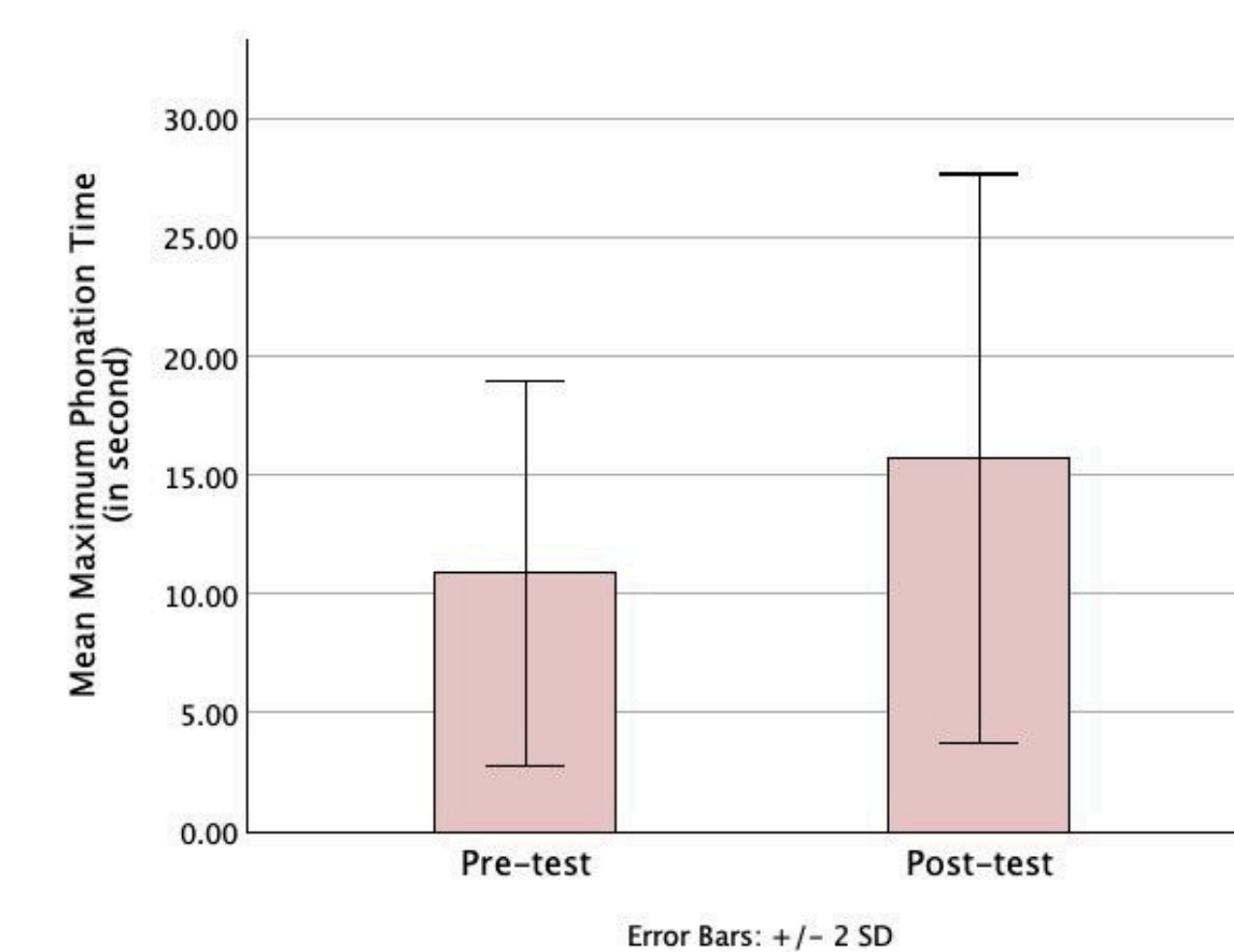
Maximum phonation time

- Significantly higher after singing-based voice training (M = 15.68, SD = 5.99) than before training (M = 10.88, SD = 4.05), W = 21.00, p = .028, r = .64 (large-sized effect)
- Running out of air when talking is a common issue encountered by older people (Wong & Ma, 2021)
- Singing-based voice training can help improve older people's breath support and thus be more capable of saying longer phrases



Maximum phonational frequency range

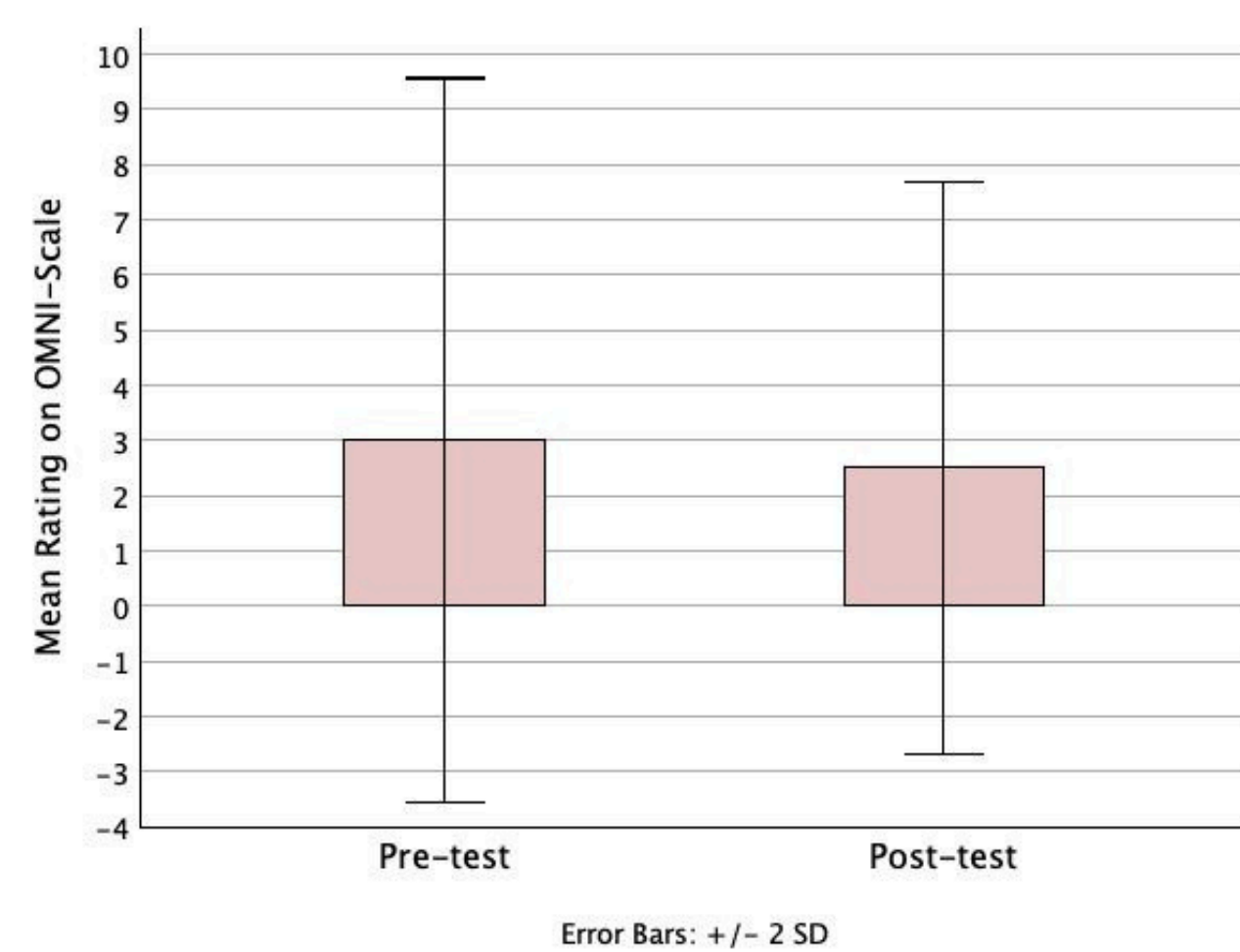
- Higher after singing-based voice training (M = 23.75, SD = 4.50) than before training (M = 19.79, SD = 8.89), yet the change was insignificant, W = 15.00, p = .35, r = .27 (small-sized effect)
- Reduced elasticity in vocal fold muscles among older people limited their increase in MPFR (Ptacek et al., 1966)
- The present study lacked components directly targeting the expansion of MPFR during singing training



Effects of singing-based training on voice-related quality of life

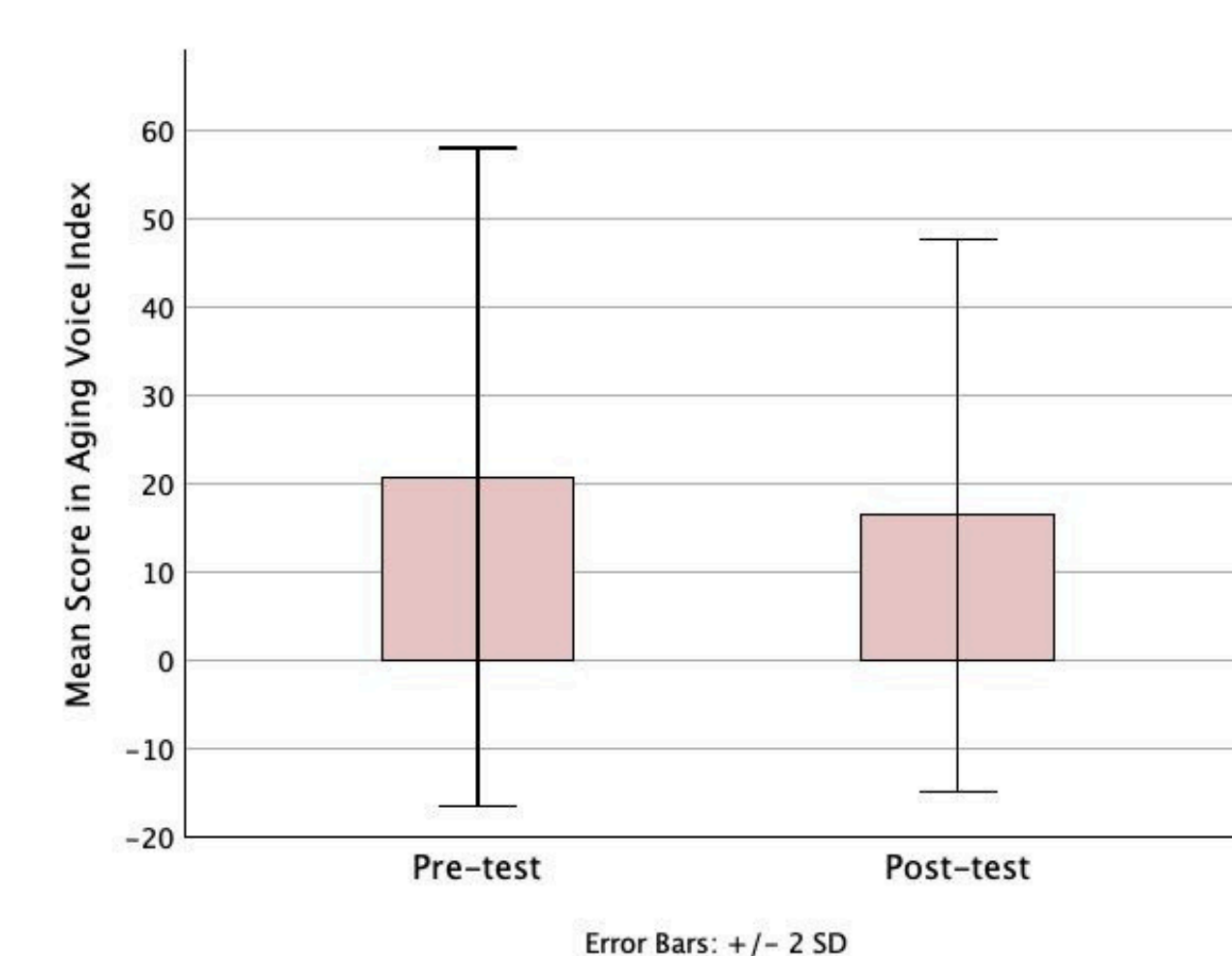
Aging Voice Index

- Total score: 92
- Score ≥ 12: Voice impacts one's quality of life (Liao et al., 2023), with higher scores reflecting more negative impact, e.g. feeling hindered or unsatisfied with their voice (Etter et al., 2019)
- Decreased after singing-based voice training (M = 16.33, SD = 15.62) than before training (M = 20.67, SD = 18.62), yet the change was insignificant, W = 4.00, p = .35, r = .27 (small-sized effect)
- Participants' pre-test mean AVI score of 16.33 was only marginally above the cut-off score of 12, reflecting minimal negative impact on quality of life
- Significant decrease in scores may not be seen



Perceived phonatory effort

- Rated using the OMNI-Scale which ranges from 0-10, with a higher score indicating that phonation is more effortful
- Lower after singing-based voice training (M = 2.50, SD = 2.59) than before training (M = 3.00, SD = 3.29), yet the change was insignificant, W = 2.50, p = .79, r = .079 (very small effect)
- Rating on the OMNI-Scale may not be significantly reduced as participants did not perceive themselves as requiring much effort when speaking in the pre-test measurement



5. Limitations and Suggestions for Future Research

Limitations	Suggestions for future research
Lack components directly targeting the expansion of MPFR	Choose songs with richer melody lines that have bigger alterations in pitch
Small sample size, with high standard deviations of all outcome measures indicating huge variability of effects among participants, results hence may not be generalised	Conduct similar research with larger samples to ensure the generalisability of outcomes measured
No follow-up measures to investigate the maintenance of participants' changes in vocal functions and quality of life	Maintenance of intervention outcomes can be investigated to examine the long-term effects of the intervention on participants

6. Conclusion

Summary of outcomes

- Singing-based voice training yielded a significant increase in MPT, effectively enhancing participants' breath support
- Effects of singing-based voice training on MPFR and quality of life were insignificant, and have to be further investigated

Prospect

- It is envisioned that singing-based voice training can be more widely utilised for voice management in speech-language pathology, improving the vocal functions and quality of life of older people with VI