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Warm-up exercises for choir singers: The effects of warm-ups on community choir singers' vocal quality and experience

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INTRODUCTION



Communal singing can have a profound, positive effect on individuals' health and well-being (Cohen et al., 2007; Moss et al., 2017; Reagon et al., 2016). Choir singing has been an essential part of Icelandic culture for generations.

Most churches in Iceland have a choir with many singers older than 50 years of age, with limited or no formal singing instruction. Most choirs use warm-up routines, including general physical, vocal, and musical approaches.



Anatomical changes in the larynx and changes in the chemical makeup of the vocal folds can be observed with increased age (Branco et al., 2014; 2015). These changes lead to a less malleable larynx which is more prone to discomfort and fatigue.



Experimental group	Measurement	Warm-up	Measurement	Rehearsal		Measurement
Control group		Measurement	Silent period	Measurement	Rehearsal	Measurement
Duration	10 minutes	10 minutes	10 minutes	10 minutes	1.5-2 hours	20 minutes

OBJECTIVES AND METHODS

Does an evidence-informed warm-up impact participants' vocal quality and their subjective experience of singing related to warm-up exercises?



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Participants

- 41 choir singers in 4 choirs: 11 sopranos, 10 altos, 10 tenors, and 10 basses
- 21 participants: warm-up exercises prior to rehearsal (experimental group)
- 20 participants: no warm-up (control group)
- Warm-ups: breathing and voice stability, semi-occluded vocal tract exercises etc.

Measurements

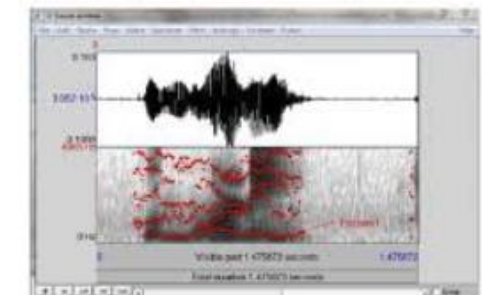
before and after the warm-up/silent period and after participation in a choir rehearsal:

- Perceptual, e.g., VHI-10; vocal comfort and effort
- Instrumented: acoustic analysis

Item	Description	0	1	2	3	4
F1	My voice makes it difficult for people to hear me.	0	1	2	3	4
F2	People have difficulty understanding me in a noisy room.	0	1	2	3	4
F8	My voice difficulties restrict my personal and social life.	0	1	2	3	4
F9	I feel left out of conversation because of my voice.	0	1	2	3	4
F10	My voice problem causes me to lose income.	0	1	2	3	4
P5	I feel as though I have to strain to produce voice.	0	1	2	3	4
P6	The clarity of my voice is unpredictable.	0	1	2	3	4
E4	My voice problem upsets me.	0	1	2	3	4
E6	My voice makes me feel handicapped.	0	1	2	3	4
P3	People ask, "What's wrong with your voice?"	0	1	2	3	4

Data Analysis

- Correlations between perceptual and instrumented measurements





RESULTS

Perceptual measurements

There were no statistically significant differences between the groups on any of the perceptual measurements, with the exception of the baseline measure for the Comfort-value: control group scored 83.18 and experimental group 69.37 (p -value of 0.015; however, no longer statistical ($p=0.45$) after Bonferroni Correction).

Acoustical analysis

No statistically significant differences were observed between the warm-up and control groups regarding change in fundamental frequency, jitter, shimmer, HNR, or frequency range at either the second (after warm-up/silent period) or third (after rehearsal).

Correlation

A statistically significant correlation was found between perceived vocal comfort and five of the eight instrumented variables: f_0 (continuous speech and sustained vowel), upper end of frequency range, and shimmer, ranged from $r=-0.194$ (shimmer) to $r=0.334$ (upper end of frequency range).



The higher a singer rated their comfort at any given time, the larger frequency range they had (specifically due to their F_{max}), higher f_0 in both continuous speech and sustained vowel, and lower shimmer values. Of these, the strongest correlation concerned variables related to pitch, other than the lowest part of the frequency range.



CONCLUSIONS

Typical outcome measures (instrumented and perceptual) at all time points indicated that mature, amateur choir singers generally have typical voices.

The study revealed no statistically significant differences between the experimental and control groups on any of the variables measured, other than the comfort rating at the start of rehearsal (baseline measurement) where the control group scored significantly higher than the experimental group.

It could be speculated whether vocal warm-up exercises are necessary, at least if the purpose is to increase vocal performance and avoid vocal damage. However, the types of acoustic measurements used in this study are insufficient to make conclusive statements about the long-term benefits of warm-up exercises.



REFERENCES

- Branco, A., Rodrigues, S. A., Fabro, A. T., Fonseca-Alves, C. E., & Martins, R. H. G. (2014). Hyaluronic Acid Behavior in the Lamina Propria of the Larynx with Advancing Age. *Otolaryngology–Head and Neck Surgery*, *151*(4), 652-656. <https://doi.org/10.1177/0194599814544673>
- Branco, A., Todorovic Fabro, A., Gonçalves, T. M., & Garcia Martins, R. H. (2015). Alterations in Extracellular Matrix Composition in the Aging Larynx. Cohen et al., 2007
- Cohen, G. D., Perlstein, S., Chapline, J., Kelly, J., Firth, K. M., & Simmens, S. (2007). The Impact of Professionally Conducted Cultural Programs on the Physical Health, Mental Health, and Social Functioning of Older Adults—2-Year Results. *Journal of Aging, Humanities, and the Arts*, *1*(1-2), 5-22. <https://doi.org/10.1080/19325610701410791>
- Moss, H., Lynch, J., & O'Donoghue, J. (2017). Exploring the perceived health benefits of singing in a choir: an international cross-sectional mixed-methods study. *Perspectives in Public Health*, *138*(3), 160-168. <https://doi.org/10.1177/1757913917739652>
- Reagon, C., Gale, N., Enright, S., Mann, M., & van Deursen, R. (2016). A mixed-method systematic review to investigate the effect of group singing on health related quality of life. *Complementary Therapies in Medicine*, *27*, 1-11. <https://doi.org/10.1016/j.ctim.2016.03.017>