Normative data on teachers' voice use in real-life situations

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Background – teacher's voice

- Professional voice users with high vocal demands
- Increased risk of developing voice disorders

(Behlau et al. 2012, Roy et al. 2004; Verdolini & Raming 2001)

- Higher vocal load among teachers than among general population

(Schneider-Stickler & Bigenzahn 2013)

- Several studies on teachers' voice use

(Bottalico & Astolfi 2012; Gaskill, O'Brien & Tinter 2012; Lindstrom, Waye, Södersten, McAllister & Ternström 2011; Morrow & Connor 2011a, 2011b; Södersten, Granqvist, Hammarberg & Szabo 2002)

- Few studies have investigated potential differences regarding
  - teaching level

(Masuda et al. 1993; Remacle, Morsomme & Finck 2014)

  - environment (professional vs. extra-professional)

(Titze, Hunter & Svec, 2007; Hunter & Titze,2010; Remacle, Morsomme & Finck 2014).

Background – Voice dosimeter

- Used to objectively analyze vocal behavior over an extended period of time
  - Can record several vocal parameters for over 18 hours
- Ambulatory Phonation Monitor (APM) (KayPENTAX, Lincoln Park, New Jersey, USA)
  - uses an accelerometer as a voice sensor, mounted on a silicon pad which is adhered to the neck at laryngeal level

Fig. 1: Ambulatory Phonation Monitor

Aim of the study

To quantify vocal parameters of teachers and identify most at-risk conditions

Methods

- 76 French-speaking teachers
  - 15 males and 61 females
  - Age: between 23 and 59 years (M = 37; SD = 11)
  - No history of voice complaints
- Device: APM voice dosimeter
  - Worn for one workweek from early morning until late night
  - Data was saved on a computer each morning before new recording

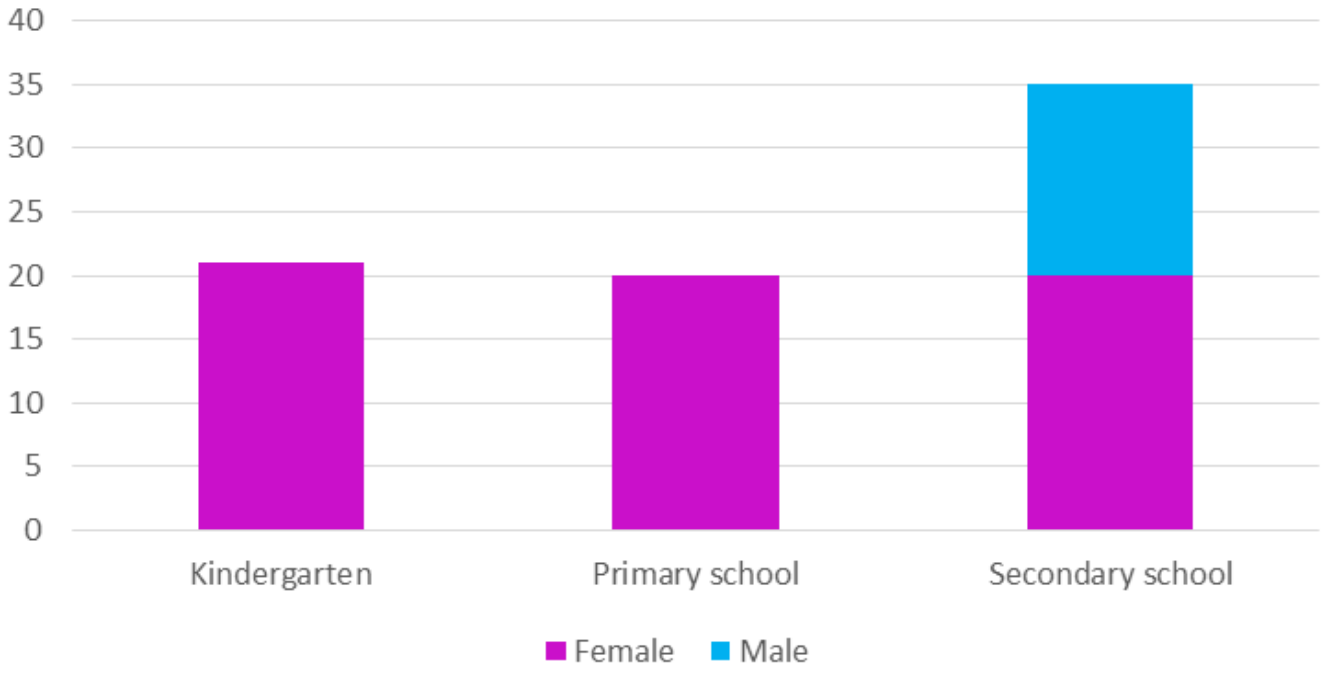

Fig. 2: Subjects: Gender and teaching level

Methods

- Parameters:
  - Phonation time (%)
  - Voice SPL (dB)
  - Fundamental frequency or F0 (Hz)
- Influence of the factors
  - Gender
    → Mann-Whitney U Test
  - Teaching level
    → ANOVA, paired t-Tests
  - Environment (professional versus extra-professional)
    → Wilcoxon Test

Results – Phonation time

- Environment: higher phonation times in the professional environment compared to the extra-professional environment for both male ($p < .005$) and female ($p < .001$) subjects.

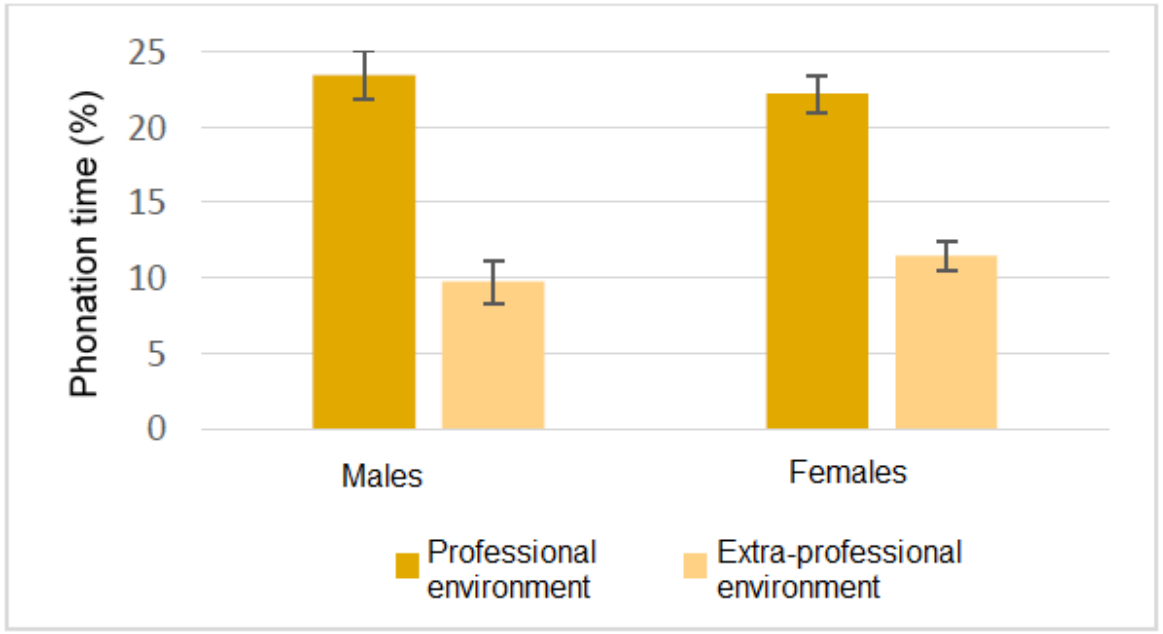

Fig. 3: Duration of phonation (%) with respect to gender

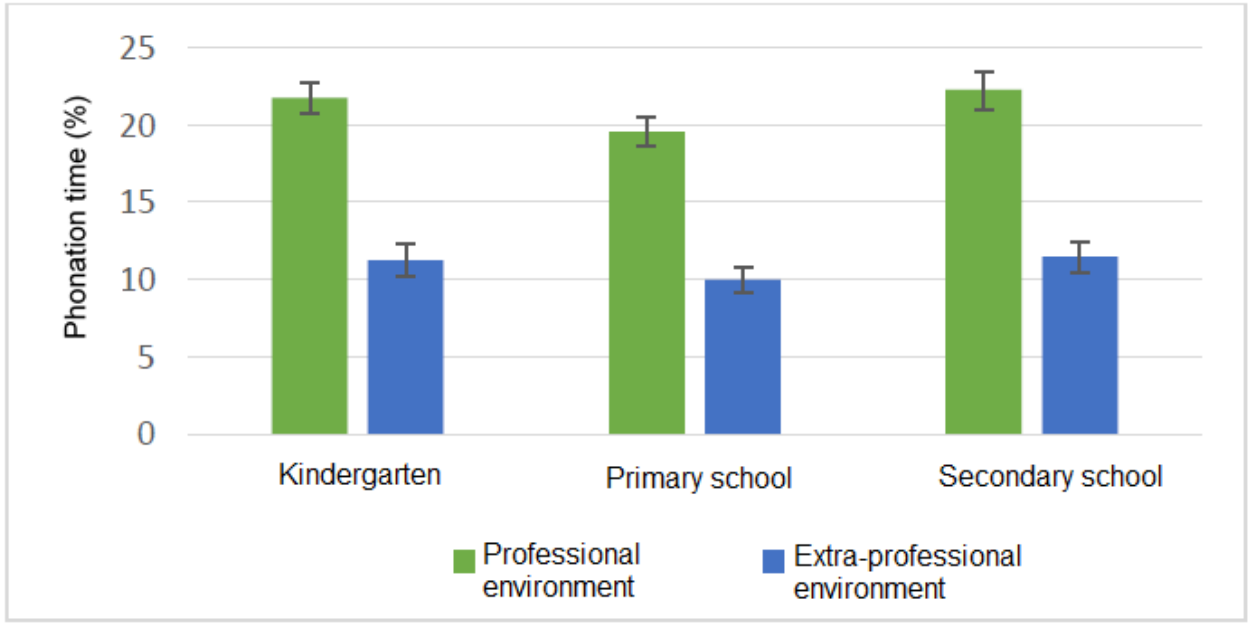

Fig. 4: Duration of phonation (%) with respect to teaching level

Results – SPL

- Gender: females spoke at higher SPL than their male colleagues in the extra-professional environment ($p < .05$)
- Environment: higher SPL in the professional environment compared to the extra-professional environment for both males ($p < .001$) and females ($p < .005$)

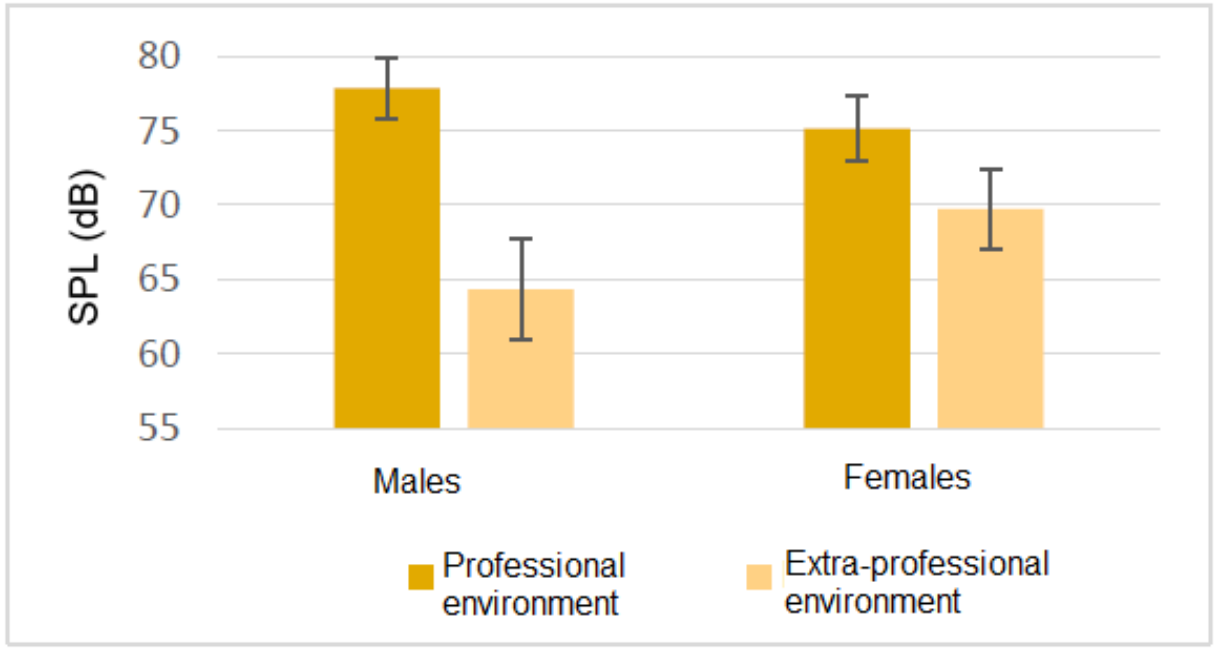

Fig. 5: Voice intensity or SPL (dB) with respect to gender

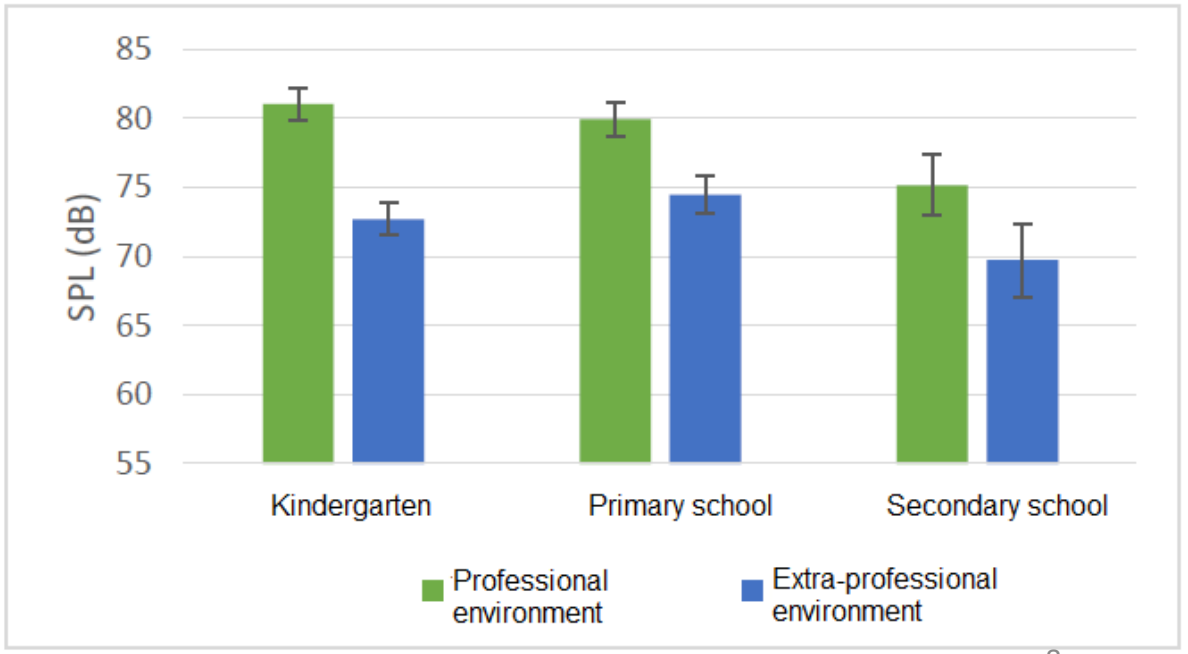

Fig. 6: Voice intensity or SPL (dB) with respect to teaching level

Results – F0

- Gender: higher F0 in female teachers ($p < .001$)
- Teaching level: significant F0 variation regarding teaching level ($p < .05$)
  - Kindergarten teachers > primary school teachers > secondary school teachers
- Environment: higher F0 in the professional environment compared to the extra-professional environment for both males ($p < .005$) and females ($p < .001$)

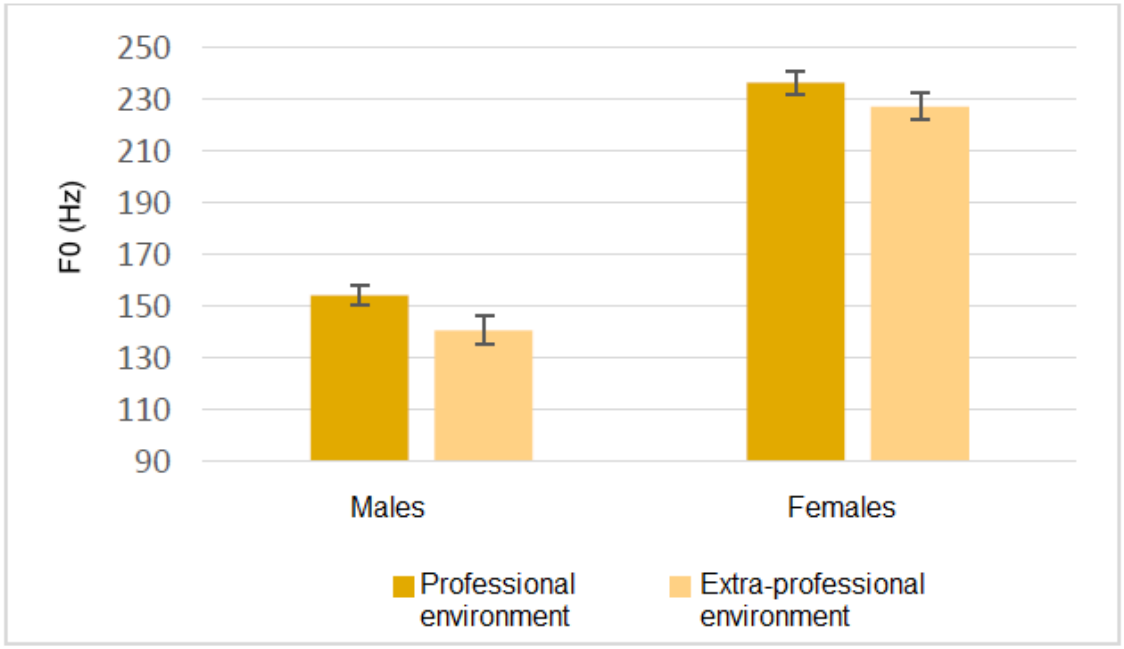

Fig. 7: Fundamental Frequency of F0 (Hz) with regard to gender

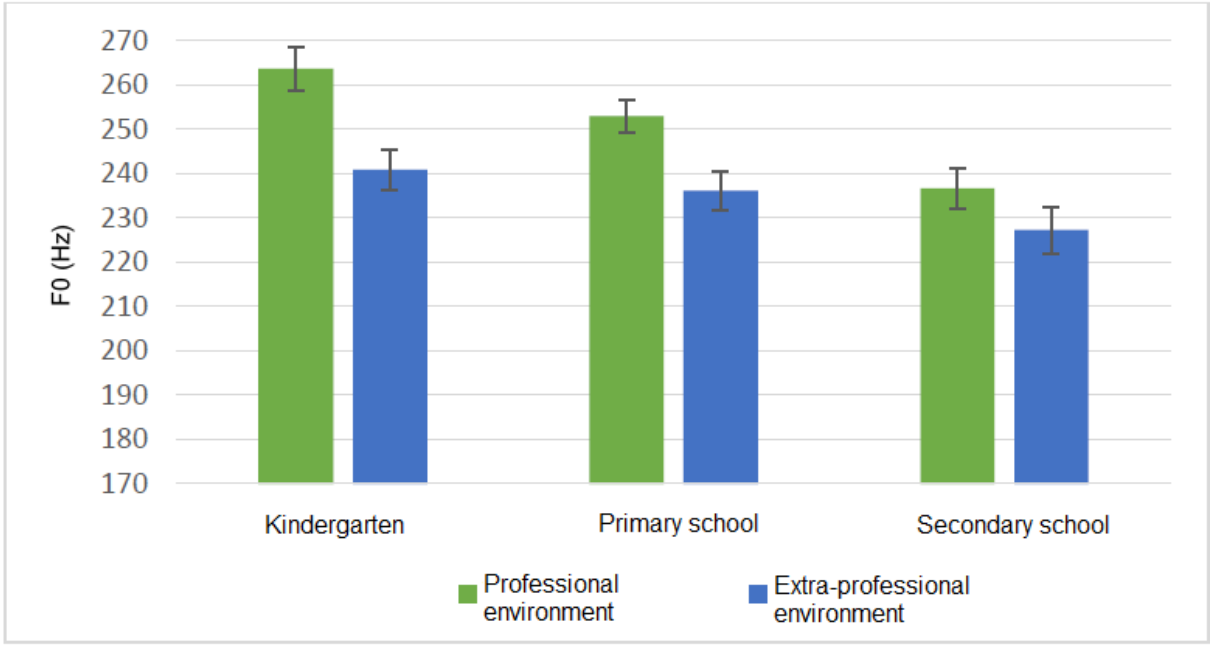

Fig. 8: Fundamental Frequency or F0 with regard to teaching level

Conclusion

- Increase of vocal parameters at work compared to free time irrespective of gender
  - Confirms results of earlier studies

(Titze, Hunter & Svec 2007; Hunter & Titze 2010)

  - Demonstrates that teaching is an occupation with high vocal demands
- Lower educational levels were associated with higher F0
  - Adaptation to pupil's F0
- Higher vocal load in female teachers than in male teachers

References

Behlau, M., Zambon, F., Guerrieri, A., & Roy, N. (2012). Epidemiology of voice disorders of teachers and non-teachers in Brazil: Prevalence and adverse effects. *Journal of voice,* 26(5), 665.e9 665.e18.

Bottalico, P., & Astolfi, A. (2012). Investigations into vocal doses and parameters pertaining to primary school teachers in classrooms. *The Journal of the Acoustical Society of America*, 131(4), 2817-2827.

Gaskill, C. S., O'Brien, S. G., & Tinter, S. R. (2012). The effect of voice amplification on occupational vocal dose in elementary school teachers. *Journal of Voice*, 26(5), 667-e19.

Hunter, E. J., & Titze, I. R. (2010). Variations in intensity, fundamental frequency, and voicing for teachers in occupational versus nonoccupational settings. *Journal of Speech, Language, and Hearing Research*, 53(4), 862-875.

Lindstrom, F., Waye, K. P., Södersten, M., McAllister, A., & Ternström, S. (2011). Observations of the relationship between noise exposure and preschool teacher voice usage in day-care center environments. *Journal of Voice*, 25(2), 166-172.

Masuda, T., Ikeda, Y., Manako, H., & Komiyama, S. (1993). Analysis of vocal abuse: Fluctuations in phonation time and intensity in 4 groups of speakers. *Acta Oto-Laryngologica*, 113, 547–552.

Morrow, S. L., & Connor, N. P. (2011a). Voice amplification as a means of reducing vocal load for elementary music teachers. *Journal of voice*, 25(4), 441-446.

Morrow, S. L., & Connor, N. P. (2011b). Comparison of voice-use profiles between elementary classroom and music teachers. *Journal of Voice*, 25(3), 367-372.

Remacle, A., Morsomme, D., & Finck, C. (2014). Comparison of vocal loading parameters in kindergarten and elementary school teachers. *Journal of Speech, Language, and Hearing Research*, 57(2), 406-415.

Roy, N., Merrill, R. M., Thibeault, S., Parsa, R., Gray, S. D., & Smith, E. M. (2004). Voice Disorders in Teachers and the General Population. *Journal of Speech, Language, and Hearing Research,* (47), 281-293.

Schneider-Stickler, B., & Bigenzahn, W. (2013). *Stimmdiagnostik - Ein Leitfaden für die Praxis.* Wien: Springer.

Södersten, M., Granqvist, S., Hammarberg, B., & Szabo, A. (2002). Vocal behavior and vocal loading factors for preschool teachers at work studied with binaural DAT recordings. *Journal of Voice*, 16(3), 356-371.

Titze, I. R., Hunter, E. J., & Švec, J. G. (2007). Voicing and silence periods in daily and weekly vocalizations of teachers. *The Journal of the Acoustical Society of America*, 121(1), 469-478.

Verdolini, K., & Raming, L. O. (2001). Review: Occupational risks for voice problems. *Log Phon Vocol*, 37-46.

Thank You

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