Respiratory responses to performance situations in low- and high-anxious music students

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INTRODUCTION

Music performance anxiety (MPA) is a major problem for many musicians, especially music students, with potential health- and career-threatening consequences. Whether low- and high-anxious music students differ in their respiratory responses to performance situations is largely unknown. A healthy respiratory system balances random variability warranting flexibility in response to internal and external changes and nonrandom variability ensuring stability. Breathing is a powerful regulator of homeostatic balance and can be controlled voluntarily making breathing modification an accessible intervention goal.

The first goal of this study was to determine whether respiratory measures, self-reported anxiety/tension and breathing symptoms vary as a function of the performance situation (private vs. public performance) and the trait MPA level of the music students. The second goal was to investigate response system coherence by analyzing to what extent self-reported anxiety/tension and breathing symptoms covary with the respiratory responses at the between- and within-person level. We focused in particular on measures of respiratory variability and sighing.

METHODS

Music students (n = 65) varying in their self-rated trait MPA level from low to high performed solo privately and publicly one week apart, while wearing the LifeShirt system to record their respiration. For the 10-min periods before and after each performance, we computed coefficients of variation (CVs), autocorrelations at one breath lag (ARs(1)) and means of minute ventilation (V'_E), tidal volume (V_T), inspiration time (T_I) and expiration time (T_E). CVs are indices of total respiratory variability (sum of random and nonrandom variability). ARs(1) are indices of nonrandom variability. At the end of each 10-min period, the students reported their anxiety/tension and breathing symptoms (shortness of breath/difficulty in breathing deeply enough) on 11-point Likert scales. We analyzed the data with multilevel mixed-effects models.

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RESULTS

Figures. Respiratory and self-reported measures during the private and public sessions for participants with low, moderate and high trait MPA
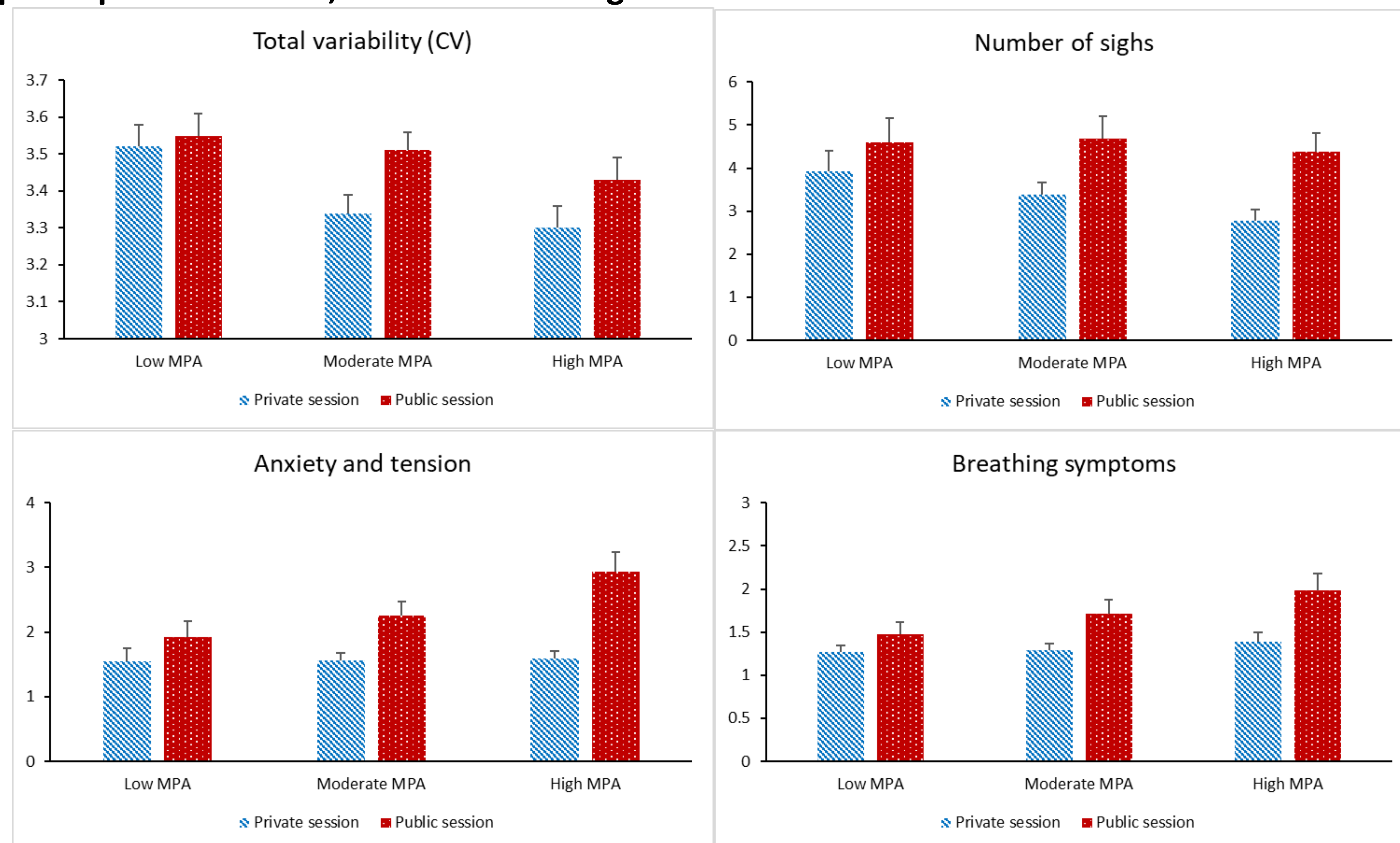
Total variability, number of sighs, anxiety/tension and breathing symptoms were higher during the public session than the private session. This session effect was larger for high-anxious than low-anxious students.

Table. Relationships between self-reported measures and respiratory measures (BS = between-subject; WS = within-subject; * p < .05, ** p < .01)

	Total variability		AR(1) of V'_E		Mean of V'_E & V_T		Mean of T_I		Number of sighs	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	IRR	95% CI
Anxiety/tension (BS)	0.078	0.041	-0.023	0.017	-0.257	0.143	0.002	0.024	1.15	0.98-1.35
Anxiety/tension (WS)	**0.025***	0.012	**-0.019****	0.007	**0.043****	0.015	**0.018****	0.006	**1.07***	1.02-1.12
Breathing symptoms (BS)	0.080	0.060	-0.009	0.024	-0.176	0.211	0.039	0.034	**1.33***	1.06-1.67
Breathing symptoms (WS)	**0.044***	0.020	**-0.038****	0.011	**0.080****	0.025	**0.023***	0.010	1.08	0.99-1.18

At the WS level, increasing anxiety/tension were associated with deeper and slower breathing, higher total variability, lower nonrandom variability AR(1) and more sighing. At the WS, more breathing symptoms were associated with deeper and slower breathing, higher total variability and lower nonrandom variability AR(1). At the BS level, more breathing symptoms were associated with more sighing.

Participant wearing the LifeShirt system

Conclusion

The present findings show that respiratory measures, especially total variability and sighing, are particularly sensitive to the performance situation (private vs. public) and to musicians' trait MPA level. Moreover, they suggest a relatively good coupling between affective experience, breathing-related sensations, and respiratory responses in the context of music performance situations.

Respiratory monitoring can add an important dimension to the understanding of the psychophysiology of music performance situations and MPA and to the diagnostic and intervention outcome assessments of MPA.