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Journal of Psychosomatic Research 70 (2011) 557–564

Journal of Psychosomatic Research

# Hyperventilation complaints in music performance anxiety among classical music students

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Received 28 July 2010; received in revised form 13 October 2010; accepted 18 November 2010

**Abstract**

**Objective:** Despite the importance of respiration and hyperventilation in anxiety disorders, research on breathing disturbances associated with hyperventilation is rare in the field of music performance anxiety (MPA, also known as stage fright). The only comparable study in this area reported a positive correlation between negative feelings of MPA and hyperventilation complaints *during* performance. The goals of this study were (a) to extend these previous findings to the period *before* performance, (b) to test whether a positive correlation also exists between hyperventilation complaints and the experience of stage fright as a problem, (c) to investigate instrument-specific symptom reporting, and (d) to confirm gender differences in negative feelings of MPA and hyperventilation complaints reported in other studies. **Methods:** We assessed 169 university students of classical music with a questionnaire comprising: the State-Trait Anxiety Inventory for negative feelings of MPA, the Nijmegen Questionnaire for hyperventilation complaints, and a single item for the experience of stage fright as a problem. **Results:** We found a significant positive correlation between hyperventilation complaints and negative feelings of MPA before performance and a significant positive correlation between hyperventilation complaints and the experience of stage fright as a problem. Wind musicians/singers reported a significantly higher frequency of respiratory symptoms than other musicians. Furthermore, women scored significantly higher on hyperventilation complaints and negative feelings of MPA. **Conclusion:** These results further the findings of previous reports by suggesting that breathing disturbances associated with hyperventilation may play a role in MPA prior to going on stage. Experimental studies are needed to confirm whether hyperventilation complaints associated with negative feelings of MPA manifest themselves at the physiological level.


*Keywords:* Breathing; Hyperventilation; Musicians; Performance anxiety; Stage fright

## Introduction

Performance anxiety is a widespread phenomenon affecting individuals across a range of activities, such as public speaking, sport, and performing arts like dancing, acting, and music. Music performance anxiety (MPA — also referred to as stage fright) is experienced by a high percentage of professional musicians and music students [1]. A large survey of 2212 professional orchestra musicians showed that 24% of them experienced stage fright as a problem and 16% as a severe problem [2]. Stage fright was the leading severe problem amongst the musicians surveyed.

A standardized definition of MPA is still lacking. There is a consensus that performance anxiety in musicians is characterized by noticeable apprehension about performing, which may or may not impair the quality of the performance [3–6]. Recently, Kenny [4] defined MPA as "the experience of marked and persistent anxious apprehension related to musical performance (…), which is manifested through combinations of affective, cognitive, somatic and behavioral symptoms." The present article concentrates on the affective component of MPA and on self-perceived somatic symptoms, in particular, on self-perceived hyperventilation complaints.

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doi:10.1016/j.jpsychores.2010.11.004

There is evidence in the literature that MPA might be associated with hyperventilation. Performance-anxious musicians have been reported to experience symptoms such as palpitations, perspiration, a dry mouth, trembling, and disturbances in their breathing patterns before and/or during performance [7–10]. Amongst others, these symptoms often occur during hyperventilation problems. Hyperventilation is defined as breathing in excess of metabolic requirements. Overbreathing leads to a drop in the partial pressure of arterial $CO_2$ (hypocapnia) and a rise in the blood pH level (respiratory alkalosis), which can cause cerebral and peripheral vasoconstriction and thereby a deficiency in oxygen supply. Acute hyperventilation also increases neuronal excitability, leading to paresthesia, muscle cramps, or even tetany [11]. Some of the physiological symptoms reported by performance-anxious musicians, whether they are respiratory (e.g., shortness of breath), central (e.g., being confused) or peripheral (e.g., cold hands), may thus be explained by the metabolic changes induced by overbreathing.

However, although hyperventilation has been mentioned occasionally as a manifestation of anxiety during musical performance [5,8], little attention has been paid to the association between MPA and hyperventilation. This is surprising considering that respiratory symptoms, such as shortness of breath, rank high among the symptoms experienced by musicians during performance [9], and given the association between respiration and emotion [12] and, more specifically, anxiety disorders [13], as well as between hyperventilation and anxiety disorders [14].

To our knowledge, only one study has thus far investigated the association between the negative feelings of MPA[1] and hyperventilation complaints [15]. In a questionnaire survey, these authors found a high positive correlation ($r$=.71) between negative feelings of MPA, assessed with the state scale of the Spielberger State-Trait Anxiety Inventory [16], and hyperventilation complaints, assessed with the Nijmegen Questionnaire (NQ) [17,18], *during* performance. The study by Widmer et al. [15] further showed that women scored significantly higher than men in MPA and in hyperventilation complaints, and that, on the basis of the NQ, they were three times more likely than men to be classified as hyperventilators during performance. These findings are in line with other studies showing that women score consistently higher than men in MPA [2,15,19] and in hyperventilation complaints/proneness [14,15,20,21].

No study has yet investigated the association between negative feelings of MPA and hyperventilation complaints *before* performance. The investigation of the pre-performance period is particularly important given that many musicians report that their apprehensions are greatest prior to the performance rather than during the performance itself [5].

[1] When referring to the negative affective component of MPA, we will use the term "negative feelings of MPA" throughout the article.

Although the affective symptoms are central to the experience of MPA, high levels of anxiety do not automatically imply that stage fright is perceived as a problem. We were able to show that there is only a moderate association between the degree of anxiety experienced and the degree to which stage fright is perceived as a problem [22]. Furthermore, no study has yet investigated the association between hyperventilation complaints and the experience of stage fright as a problem. Stage fright may be considered as a problem, particularly when its (physiological) manifestations negatively influence the ability to perform. Since physiological symptoms associated with hyperventilation (e.g., cold hands, stiffness in fingers, difficulty breathing deeply) can impair a musician's ability to perform, it is particularly important to investigate the association between the subjective physiological complaints indicative of hyperventilation and the experience of stage fright as a problem.

Finally, little is known about instrument-specific symptom reporting. Wolfe [10] has provided evidence for instrument-dependent differences in the experience of some physiological symptoms, however, without focusing on respiratory symptoms. Due to the particular importance of respiration for wind musicians and singers, these musicians might be particularly affected by hyperventilation complaints, especially by the respiratory symptoms.

The purpose of the present study was to extend knowledge about the possible role of breathing disturbances associated with hyperventilation in MPA. Specifically, we aimed to extend previous findings by Widmer et al. [15] in two important ways. First, whereas Widmer et al. [15] assessed the association between hyperventilation complaints and negative feelings of MPA *during* performance, we assessed this association *before* performance. We hypothesized that the more musicians score high in negative feelings of MPA before performance, the more hyperventilation complaints they report (Hypothesis 1). Second, we tested whether there is a positive association between hyperventilation complaints and the experience of stage fright as a problem. We hypothesized that the more stage fright is perceived as a problem, the more hyperventilation complaints are experienced (Hypothesis 2). Furthermore, we hypothesized that wind musicians and singers score higher on the NQ than other musicians, particularly on its respiratory subscale (Hypothesis 3). Finally, to confirm findings from previous research, we also investigated whether women score higher than men in hyperventilation complaints and in negative feelings of MPA (Hypothesis 4).

## Methods

### *Sample and procedure*

In spring 2007, all the students in four of Switzerland's French-speaking music universities ($n$=870) were contacted by mail and asked to participate in a questionnaire survey on