Anxiety in Musicians With Focal Dystonia and Those With Chronic Pain

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Abstract: Psychological conditions were studied in 20 musicians with focal dystonia and compared with 20 musicians with chronic pain and 30 healthy musicians using the Freiburg Personality Inventory and the Questionnaire for Competence and Control Orientations. Additional questionnaires focused on perfectionism and anxiety particularly with regard to the dynamics of these psychological features. Musicians with focal dystonia and those with chronic pain more often displayed anxiety than controls. In both patient groups, anxiety was present before onset of the playing-related disorder. Dystonic musicians additionally showed higher levels of perfectionism than controls, which was not observed in musicians with chronic pain. © 2004 Movement Disorder Society

Key words: dystonia; pain; musician; psychology; anxiety; perfectionism

Focal dystonia in musicians, also known as musician’s cramp, is a task-specific movement disorder that presents itself as a painless muscular incoordination or loss of voluntary motor control of extensively trained movements while a musician is playing the instrument.1–5 Musician’s dystonia is highly disabling and in many cases the disorder terminates the career of a sufferer.

Previous studies have focused on psychological conditions in patients with other forms of dystonia. Depressive, anancastic, sensitive, and hysterical traits were observed in patients with writer’s cramp,6 there have been contradicting reports about anxiety in patients with writer’s cramp: anxiety was occasionally observed in patients with writer’s cramp by Gibson7 and Cottraux and colleagues,8 whereas no higher levels of anxiety were seen in such patients compared to normal controls by Harrington and coworkers.9 Obsessive compulsive disorder has been reported in association with idiopathic focal dystonia10 as well as with myoclonus dystonia.11 Anxiety and depression were frequent in patients with cervical dystonia;12 moreover, a high prevalence of social phobia was found in such patients.13 Patients with blepharospasm and those with hemifacial spasm had scores of psychopathology ranging close to normal using the SCL-90R, but phobic anxiety was more pronounced in patients with blepharospasm than in controls and in patients with hemifacial spasm.14

Personality structures have never been investigated in musicians with focal dystonia. The present study was designed to examine psychological conditions in musicians with dystonia and to compare them with healthy musicians and those suffering from chronic pain syndromes. Based on clinical observations, the underlying hypothesis was that certain psychological conditions such as perfectionism and anxieties are predominant in musician’s dystonia and that these features were already present before its onset.

PATIENTS AND METHODS

Patients and Controls

All participants included in the study were able to speak, read, and write German fluently. Patients were recruited from the outpatient clinic of the Institute of Music Physiology and Musicians’ Medicine at the University of Music and Drama in Hannover, Germany. They underwent complete neurological and psychiatric examinations and were diagnosed by at least one of the authors (E.A.). Two groups of patients were included. One consisted of 20 professional musicians who had
been diagnosed with task-related focal dystonias (FD). Of these 20 musicians, 3 were brass players with embouchure dystonias; the other 17 suffered from hand dystonias, which presented in the typical manner as painless cramping of one or more fingers while patients were playing. The individual duration of the disorder was between 3 and 12 years (6.9 ± 2.6 years; mean ± SD) at the time of the study. A total of 12 patients noticed additional dystonic movement patterns in other activities such as writing (5 patients) or on the computer keyboard (4 patients) or in everyday activities; the onset of these additional symptoms took place after the onset of musician’s cramps. Patients with other neurological disorders or secondary dystonias were excluded from the study.

The second sample consisted of 20 professional musicians suffering from chronic pain syndromes (CP) related to playing, with pain localized in the hand and/or arm region (Table 1). The duration of this chronic pain ranged from 6 months to 30 years (4.9 ± 6.9 years) at the time of the study.

A third group consisting of 30 professional musicians was recruited as healthy controls; they were working in German orchestras, music schools, and as freelance professional musicians. By means of questionnaires, they were asked if they were suffering from any kind of ill-health, especially from movement disorders or chronic pain, and those with any somatic complaints or neurological or psychiatric diseases were excluded from the control sample. Further details are given in Table 1.

### Methods

The assessment of psychological conditions was based on self-estimation using the following German inventories: the revised version of the Freiburg Personality Inventory (FPI-R) is a personality questionnaire that consists of 12 bipolar subscales: life satisfaction, social orientation, achievement orientation, inhibitedness, irritability, aggressiveness, strain, somatic complaints, health concern, frankness, extraversion, emotionality. Additionally, the Questionnaire for Competence and Control Orientations (QCC) was used to investigate features such as self-concept of abilities, internal control orientation, others control orientation, chance control orientation. A special questionnaire was developed to assess perfectionistic tendencies with five items on a six-point scale, and six questions were designed focusing on anxiety disorders subgrouped as considerable stage fright, panic attacks, free-floating anxiety, agoraphobia, social phobia, and specific phobias such as acrophobia, claustrophobia, and so on. The respective symptoms were explained to the subjects, and they were asked whether they believed that these anxieties were present or absent. To investigate whether certain psychological conditions were already present before the onset of focal dystonia or chronic pain in the patient groups, a second step was added: subjects were asked to decide whether the particular anxieties had been present or absent before onset of their disorders and whether their attitudes concerning perfectionism were the same or different before and after onset.

The study was conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from all subjects. They were asked to fill out the questionnaires without the presence of other persons, distribution and collection of the questionnaires was carried out by mailing, and precise written explanations were attached. Questionnaires that were not filled out properly were excluded from the study. FPI-R and QCC questionnaires with incomplete data were excluded from the study. FPI-R was developed as a comprehensive personality inventory, and QCC questionnaires with incomplete data were calculated using multivariate analyses of variances (MANOVA). Statistical analyses of the differences (MANOVA). Statistical analyses of the differences of anxiety disorders between the groups was performed using $\chi^2$-tests. $\chi^2$-tests were calculated separately for evaluation of the occurrence of anxiety disorders before and after onset of focal dystonia or chronic pain.

### Statistical Analysis

Differences between groups and gender concerning FPI-R, QCC (primary subscales), and the perfectionism scale were calculated using multivariate analyses of variances (MANOVA). Statistical analyses of the differences of anxiety disorders between the groups was performed using $\chi^2$-tests. $\chi^2$-tests were calculated separately for evaluation of the occurrence of anxiety disorders before and after onset of focal dystonia or chronic pain.

Differences between groups with a $P$ value smaller than 0.05 were considered statistically significant. In the post hoc analyses of the MANOVA, alpha-adjustment for multiple testing was made according to Bonferroni.
Patients suffering from chronic pain syndromes achieved scores (23.4 ± 4.0) tendentially in between the healthy musicians and those with FD. Differences in both directions (CP vs. FD; CP vs. control) were nonsignificant.

Patients were asked to specify whether their attitudes concerning perfectionism were the same or different before and after the onset of their disorders. All patients with FD and 19 of 20 with CP were able to give information about their attitudes toward perfectionism before onset of the disorders. All 20 patients with FD (100%) estimated their attitudes concerning perfectionism as the same before and after onset. In 1 patient with CP, perfectionistic tendencies had increased after onset, and 18 CP patients (94.7%) had experienced no change in this parameter. No difference was seen between perfectionistic tendencies of male and female subjects. For the perfectionism scale, Cronbach’s alpha was 0.72, displaying an adequate internal consistency of the scale.

The QCC (Fig. 3) did not reveal any statistically significant differences between the groups (FD, CP, control) or between male and female subjects.

In the FPI (Fig. 4), follow-up ANOVA revealed significant differences between the groups for the subscales somatic complaints (F(2, 58) = 10.16; P < 0.001) and emotionality (F(2, 58) = 3.55; P < 0.05). Both patient groups showed more somatic complaints than healthy musicians (FD: P = 0.01; CP: P < 0.001). Musicians suffering from CP reached higher scores in the subscale of emotionality compared to healthy musicians (P < 0.05).

Gender differences were observed in two subscales of the FPI-R: in the social orientation subscale, male musicians had higher scores (6.3 ± 1.4) than female musicians.
cians, who reached $5.1 \pm 1.5$ ($F_{(1, 58)} = 11.07; P < 0.01$). Similarly, male musicians had more somatic complaints ($5.0 \pm 1.8$) than female musicians, who had $4.0 \pm 1.8$ ($F_{(1, 58)} = 6.9; P = 0.01$).

**DISCUSSION**

Psychological conditions in musicians with focal dystonia differed from those who were healthy. Anxiety disorders occurred more often in dystonic musicians. Additionally, musicians with focal dystonia had highly perfectionistic tendencies. Those with chronic pain also showed different psychological patterns than healthy musicians; they also more often reported anxiety. In the perfectionism scale, they recorded scores tendentially in between the control group and the dystonic musicians. Taken together, a certain overlap was observed between the control group and the dystonic musicians. Consequently, anxiety disorders occurred more often in dystonic musicians. The question arose whether anxiety was present before the playing-related disorders in both patient groups and whether perfectionism was present in musicians before they developed focal dystonia. Alternatively, both psychological features might reflect psychoreactive symptoms as a consequence of playing-related disorders. We hypothesized that these psychological conditions were already present in musicians before onset of playing-related disorders. A prospective study with the particular aim of assessing psychological conditions in musicians before the development of focal dystonia is not realizable due to a prevalence of focal dystonia between 1:200 and 1:500 in professional musicians with the consequence of a low incidence. A retrospective analysis was the only realizable approach. For retrospective comparison of anxiety disorders before and after the onset of focal dystonia or chronic pain syndromes, state–trait anxiety inventories were not applicable: because the duration of focal dystonia was $6.9 \pm 2.6$ years and duration of chronic pain.

**FIG. 2.** Findings of the perfectionism scale in controls and musicians with chronic pain and those with focal dystonia. Left side: Frequency distribution indicates the percentage of subjects of the respective groups who reached different perfectionism levels. White bars, healthy musicians; grey bars, musicians with chronic pain; black bars, musicians with focal dystonia. Right side: Results of all groups in the perfectionism scale (mean ± standard error). The asterisk indicates $P < 0.05$.

**FIG. 3.** Results of the Questionnaire for Competence and Control Orientations subscales: mean scores of controls and musicians with chronic pain and those with focal dystonia. Test scores scaled from 20 (minimally pronounced) to 80 (maximally pronounced). Differences between groups are not statistically significant. White bars, healthy musicians; grey bars, musicians with chronic pain; black bars, musicians with focal dystonia. c.o., control orientation.
was 4.9 ± 6.9 years at the time of the study, it could not be excluded that anxiety traits detectable by state–trait anxiety inventories might have developed after onset of the respective playing-related problem. The temporal relation between the onset of anxiety traits and the onset of playing-related problems could not be detected using state–trait anxiety inventories. Therefore, a retrospective inquiry was undertaken that was based on personal recollection. Under the given circumstances, this procedure was the only practical approach to obtain the desired information. As a limitation of the study, such retrospective reports are subject to bias and not always reliable. However, in view of the unambiguity and consistency of the reports of all patients with dystonia, we postulate that perfectionism and anxiety have been pre-existent and were not psychoreactive phenomena.

The finding of anxiety in musicians with focal dystonia harmonizes with other reports of anxiety in patients with various forms of focal dystonia,7,8,13,14 although findings in the literature are not unambiguous.9,14 It has been suggested that reduced cortical inhibition may play a role in focal dystonia as well as in anxiety. Transcranial magnetic stimulation (TMS) studies as well as EEG studies provided evidence for decreased cortical inhibition in dystonic patients.20–23 Analogically, a correlation between anxiety-related personality traits and motor cortex excitability was found using TMS displaying a decreased intracortical inhibition being related to trait anxiety.24 A common pathological background of dystonia and associated psychological findings has already been hypothesized previously for other forms of dystonia.10,11 The findings in musicians with CP are in keeping with other reports on chronic pain patients. The association between anxiety and CP has often been described for chronic pain syndromes in different sites.25–27 The emotionality subscale (FPI-R) in which CP-patients had higher scores than the other groups, recorded substantial components of neuroticism,15 which was found to be more pronounced in patients with chronic pain in other studies.28 In both patient groups, the FPI-R showed higher levels of somatic complaints compared to normal controls. The questions for the somatic complaints subscale did not focus on the diseases of the patients specifically, neither on focal dystonia, nor on chronic pain syndromes. The similarity in the findings of elevated somatic complaints scores in both patient groups might be based on a generally more intense perception for somatic sensations in diseased musicians and a more health-focused orientation as an unspecified reaction to the disorders.

As outlined above, an overlap was seen in the inclination toward anxiety between musicians with focal dystonia and those suffering from chronic pain. This overlap may partly be explained by the observation that intensified sensory input as in chronic pain syndromes may precede focal dystonia.1,19,29 Among the sample of dystonic musicians in the present study, chronic pain had preceded focal dystonia in one patient. However, there are other parallels in both focal dystonia and chronic pain. Focal dystonia was found to be associated with a degradation of hand representations in the somatosensory cortex: alteration and fusion of digital cortical representation has been described in musician patients with focal dystonia.30 Similar somatosensory map distortion have been observed also in the cortex opposite the nondystonic hand, possibly as an indicator of a certain susceptibility or predisposition to dystonia in such patients.30 As a parallel finding, cortical reorganization has also been reported in the somatosensory areas of patients with chronic pain.31,32 In musicians, pain syndromes often result from repetitive strain.33 Animal studies have shown degradation of hand representations in monkeys.
with repetitive strain injury resulting in focal hand dystonia.\textsuperscript{34} Taken together, these findings point at certain parallels between musician’s dystonia and pain syndromes in musicians and might partially explain the overlap in some psychological features in both patient groups.

There was a preponderance of male musicians in the sample of patients with focal dystonia. This harmonizes with consistent reports about higher prevalence of musician’s dystonia in men.\textsuperscript{3,5,19,35–37} A preponderance of female musicians in our sample of CP patients is in keeping with other reports of a higher prevalence of chronic pain syndromes in women.\textsuperscript{38} Gender distribution was almost balanced in the sample of normal controls. It is noteworthy that gender differences were seen in only two of all subscales tested in this study. This finding harmonizes with the consistent finding that male and female professional musicians invariably display a tendency to minimize psychological and biological gender differences usually shown by nonmusicians.\textsuperscript{39,40} This phenomenon has been described as psychological androgyny of musicians.\textsuperscript{39} According to the model of Geschwind and Galaburda, such an androgyny might be linked to an increased vulnerability toward various diseases.\textsuperscript{41} Different gender distributions of dystonia and chronic pain might reflect different susceptibilities of male and female musicians toward the respective disorders.

CONCLUSION

Musicians with focal dystonia and those suffering from chronic pain displayed a certain overlap in psychological patterns that may partially be explicable by other parallels in the phenomenology of both disorders. It remains speculative whether musician’s dystonia and anxiety may have a common pathological background as it has been suggested for other forms of dystonia and related psychological findings.

REFERENCES


Impact of Dopamine Transporter SPECT Using $^{123}$I-Ioflupane on Diagnosis and Management of Patients With Clinically Uncertain Parkinsonian Syndromes

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Abstract: Imaging with $^{123}$I-Ioflupane single-photon emission computed tomography (SPECT) is a marker of nigrostriatal neuronal integrity, allowing differentiation of parkinsonism with loss of dopaminergic terminals (presynaptic Parkinson syndrome [PS]) from parkinsonism without nigrostriatal degeneration. This study assessed SPECT imaging in 118 patients with clinically uncertain parkinsonian syndromes (CUPS). In 36% of patients with presynaptic PS and 54% with nonpresynaptic PS, imaging results were not consistent with the initial diagnosis. After imaging, diagnosis was changed in 52% of patients. All patients with a final diagnosis of presynaptic PS had an abnormal image, whereas 94% of patients with nonpresynaptic PS had a normal scan. Imaging increased confidence in diagnosis, leading to changes in clinical management in 72% of patients. Consequently, visual assessment of $^{123}$I-Ioflupane SPECT may have a significant impact on the clinical management of CUPS patients. © 2004 Movement Disorder Society

Key words: parkinsonism; $^{123}$I-Ioflupane; dopamine transporter; SPECT

Traditionally, a Parkinson syndrome (PS) is diagnosed clinically when at least two of rest tremor, bradykinesia and rigidity are present. These signs are present in parkinsonism associated with loss of dopaminergic nerve terminals (presynaptic PS), such as that encountered in Parkinson’s dis-