

Musculoskeletal Problems in Pianists and Their Influence on Professional Activity

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BACKGROUND: Professional musical performance requires static postures and repetitive movements that may cause musculoskeletal problems in performers. Elite pianists are especially at risk for these disorders, which may cause discomfort but also affect their work. The objective of this study was to describe the most frequent musculoskeletal problems observed in pianists, and to explore the influence of these disorders on their professional activities from the perspective of the pianists themselves. **METHODS:** Musculoskeletal problems were defined in accordance with the International Classification of Diseases (ICD-10), and an analysis was conducted of medical records of 183 professional pianists held by a performing arts clinic (Terrassa, Spain). In addition, in-depth interviews were conducted with 20 pianists (6 students, 12 teachers, and 2 performers), followed by content analysis of the transcripts to explore musicians' perceptions. **RESULTS:** We identified a total of 20 different problems, which principally involved the upper body (arms and back). Regardless of occupation or age, all respondents reported having musculoskeletal problems and that these impacted on their professional activity. Interviewees also identified a lack of support or advice on how to prevent these problems. **CONCLUSION:** Musculoskeletal problems, principally those involving the upper body, are very common among pianists and affect their professional activity. It is necessary to include risk prevention information starting in the early stages of musicians' training programs. *Med Probl Perform Art* 2017; 32(2):118-122.

Musical performance is a complex ability that requires the adoption of unnatural static postures and the

repetition of patterns of movement within spatial and temporal constraints.^{1,2} Thus, playing an instrument at a professional level obliges musicians to repeat movements or place their joints in positions that are not habitual in daily life,³ for many hours a day. Musculoskeletal disorders are the most frequent work-related problems among musicians,⁴⁻⁶ although several studies have shown that the prevalence of these disorders differs according to type of instrument.⁷⁻¹⁰ In the case of pianists, these unnatural postures and repetitive movements are of such intensity and duration that some researchers have even likened piano playing to athletic performance.⁸ Pianists form a special risk group for repetitive motion injuries and other musculoskeletal system disorders, which can become chronic, causing severe pain and even disability.¹¹

Studies on the musculoskeletal problems specific to pianists have shown that these are related to the maintenance of fixed positions over many hours of practice¹² and performance of the repetitive movements required to play the instrument,¹³ and that they affect mainly the upper limbs and cervical region.¹²⁻¹⁴ In addition, a systematic review has reported that the prevalence of these problems may vary between 26% to 93% and that comparison between studies is difficult as there is no consensus on the operational definition of playing-related musculoskeletal disorders (PRMDs),⁷ despite the existence of definitions based on musicians' perspectives.¹⁵ In terms of musicians' perceptions of their musculoskeletal problems and the influence of these on their professional activity, some studies have found that musicians consider these problems to be very common, chronic, and disabling and that musicians identify them subjectively.¹⁵ Others have described beliefs among musicians such as "no pain, no gain" in student study samples¹² and a "culture of silence"¹⁶ that deters them from seeking advice on prevention or adequate support when problems emerge.

However, few studies have explored pianists' ideas or perceptions concerning the relationship between their professional activity and their musculoskeletal problems. Only one study, among Italian piano students,¹² has reported that the "no pain, no gain" belief seems to be widespread and that it could exert a strong influence on these students, as they might consider a certain level of

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The authors declare no funding or conflicts of interest related to this study.

Supplemental material appears in the online version of this paper at <https://doi.org/10.21091/mppa.2017.2019>.

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<https://doi.org/10.21091/mppa.2017.2019>

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TABLE 1. Age and Experience of Pianists, by Occupational Level and Gender

	Total (n=183)	Occupation		Sign.	Gender		Sign.
		Professionals (n=103)	Students (n=80)		Females (n=118)	Males (n=65)	
Age	33.57 (9.94)	37.38 (9.72)	28.68 (7.90)	$t=6.51$ $p<0.0001$	32.56 (9.64)	35.42 (10.27)	$t=-1.87$ $p=0.063$
Years of playing	24.70 (10.28)	28.65 (10.60)	19.61 (7.22)	$t=6.54$ $p<0.0001$	23.79 (10.28)	26.35 (10.16)	$t=-1.62$ $p=0.106$
Hrs of practice/day	3.33 (1.84)	3.83 (1.84)	2.68 (1.62)	$t=4.45$ $p<0.0001$	3.16 (1.79)	3.63 (1.90)	$t=-1.66$ $p=0.098$

Data given as mean (SD).

pain to be normal and therefore fail to seek professional help or seek it only after the problem has become chronic. In samples of musicians in general, PRMDs have been described as chronic and disabling health problems identified subjectively by individual musicians.¹⁵

The objective of this study was to identify the most frequent musculoskeletal problems in pianists, based on the World Health Organization's *International Statistical Classification of Diseases and Related Health Problems*, 10th revision (ICD-10),¹⁷ and to describe pianists' perceptions of these problems and the relationship between these and their professional activity.

METHODS

Descriptive Study

This was a retrospective descriptive study based on 183 consecutive medical records held by the Institut de Fisiologia i Medicina de l'Art (Terrassa, Spain). This is a medical center for performing artists with more than 25 years of expertise in this area. The following data were extracted from each medical record: year of birth, sex, occupation (student or professional musician), number of years playing the instrument at the time of consultation, number of hours per day playing the instrument at the time of consultation, and problems diagnosed according to the ICD-10. To describe the sample, we calculated the means and standard deviations (SD) for continuous variables (age, number of years playing, and hours of practice a day) and the distribution percentages for categorical variables (professional/student and sex). For comparison by group, we used Pearson's chi-squared test (χ^2) to compare percentages and the Student's *t*-test for a comparison of means. Results were considered statistically significant when $p<0.05$. All analyses were performed using the IBM SPSS Statistics software, ver. 21.0 (IBM-SPSS, Armonk, NY, USA).

Pianists' Perceptions

A qualitative study was performed by means of semi-structured interviews with a purposeful sample of 20 pianists (6 students, 12 teachers, and 2 performers), recruited from the Conservatory of Music of Alicante.

Sample size was determined by data saturation. Interviews were face-to-face and lasted between approx. 40 and 60 minutes. All participants were informed of the study objective prior to the interview and gave their written informed consent. All interviews were audio-recorded with the prior consent of respondents.

After verbatim transcription of the interviews, data were analyzed employing qualitative content analysis. As a research method, content analysis is a systematic and objective technique for describing and quantifying a phenomenon.^{18,19} Thus, interview transcripts were initially analyzed by a single researcher, who identified, coded, and categorized emerging issues. Subsequently, the remaining researchers analyzed the transcripts and the accuracy of the codes and categories. Discrepancies were resolved by consensus at group meetings. MAXQDA ver. 12.0 software packages (VERBI Software, Berlin, Germany) were used to facilitate analysis.

This study was approved by the Ethics Committee of the University of Alicante (record UA-2016-06-07).

RESULTS

Descriptive Study

Of the 183 medical records studied, 103 (56.3%) corresponded to professionals and 80 (43.7%) to students. No statistically significant differences in distribution by sex were detected between the professional and student groups ($\chi^2=3.99$, $p=0.61$). Neither were differences detected between professionals and students (Table 1) in either age or time variables (number of years playing and hours of practice a day). However, a comparison by sex (Table 1) did reveal significant differences, with males presenting a higher mean age than females and a higher mean time spent playing, both in number of years playing and hours of practice a day.

We identified a total of 20 musculoskeletal problems listed in the ICD-10¹⁷ (see Appendix online). Of these, 17 are listed in Chapter 13, Diseases of the Musculoskeletal System and Connective Tissue; 2 appear in Chapter 6, Diseases of the Nervous System (G24.9 and G56.2), which affect mobility; and 1 concerned inappropriate postures while playing piano and would be classified in Chapter 18 as a symptom or sign not elsewhere classified (R29.8).

TABLE 2. Frequencies of Diseases, by Gender and Occupational Level

ICD-10 Codes	Observed Disorders	Total	Gender		χ^2 (p-Value)	Occupation		χ^2 (p-Value)
			Male	Female		Professional	Student	
M12.5	Traumatic arthropathy	0.5	—	0.8		1.0	—	
M35.7	Hypermobility synd.	7.1	4.6	8.5		3.9	11.3	
M41	Scoliosis	4.9	3.1	5.9		3.9	6.3	
M54.2	Cervicalgia	32.2	27.7	34.7		29.1	36.3	
M54.5	Low back pain	4.4	4.6	4.2		6.8	1.3	
M54.9	Dorsalgia	7.1	4.6	8.5		8.7	5	
M62.4	Muscle contracture	29.5	29.2	29.6		27.1	32.6	
M65.3	Trigger finger	35.5	30.8	38.1		35	36.3	
M65.4	de Quervain tenosynovitis	7.1	4.6	8.5		6.8	7.5	
M67.8	Other specified synovium/tendon disorders	0.5	1.5	—		1.0	—	
M67.9	Disorder of synovium and tendon	2.2	3.1	1.7		2.9	1.3	
M70.0	Chronic synovitis hand/wrist	6.6	7.7	5.9		5.8	7.5	
M70.8	Other soft tissue disorders, overuse	44.3	43.1	44.9		49.5	37.5	
M71.3	Other bursal cyst	14.8	9.2	17.8		12.6	17.5	
M75.1	Rotator cuff synd.	0.5	—	0.8		1.0	—	
M75.4	Shoulder impingement	9.8	10.8	9.3		16.5	1.3	11.82 (0.001)
M77.1	Lateral epicondylitis	4.9	6.2	4.2		3.9	6.3	
G24.9	Dystonia	7.7	20	0.8	21.76 (<0.0001)	7.8	7.5	
G56.2	Ulnar nerve lesion	7.1	1.5	10.2	4.73 (0.03)	10.7	2.5	4.57 (0.033)
R29.8	Other	26.8	18.5	31.4		21.4	33.8	

See Table 2 for ICD-10 codes and definitions.

The most frequently diagnosed disorders were M62.4, M65.3, M70.8, and M54.2, all affecting the upper body (arms and back). Problems related to inappropriate postures (R29.8, 26.8% of the total sample) also appeared with notable frequency.

In general, a comparison by group did not reveal statistically significant differences in the frequency of occurrence of these disorders by sex, occupation (professional/student), number of years of playing, or hours of practice a day. However, differences were found for some low frequency (<10%) disorders. Tables 2 and 3 show frequencies of these disorders by total and group.

Pianists' Perceptions

Following analysis by coding and categorization of units of content identified in the interview transcripts, three main themes emerged: participants' musculoskeletal problems, how these problems affected their activity as a musician or student, and the need for information and advice on injury prevention.

All interviewees reported suffering at least one PRMD. The problems described all affected the upper body (arms and back), especially the cervical region:

*At the moment I have a herniated cervical disc at C6–C7. [E9]
I've suffered pain in the cervical area ever since I was young. [E14]*

the lumbar region:

Low back pain is one of my worst problems, I spend too many hours sitting down, I have a herniated disc and I frequently receive physiotherapy. [E7]

and tendinitis in the shoulder and elbow joints:

On several occasions, I've needed an injection into my shoulder because of supraspinatus tendinitis. [E9]

I often get tendinitis in my left arm, in the elbow area, that nothing but rest can cure. [E2]

In terms of how these problems affected their work as musicians or students, all interviewees indicated feeling that these problems impacted on their activity to a greater or lesser extent, ranging from vague comments:

*... the pain interferes with instrument practice. . . [E14]
I have frequent neck and lower back pain that interferes with my work as a pianist. [E8]*

to reports of needing to stop playing temporarily:

... on several occasions, I've had to cancel works in the program which required certain movements that caused me severe pain in the area. [E11]

I frequently experience intense lower back pain because of a herniated disc, which obliges me to interrupt my practice session. [E20]

The majority of interviewees expressed the need to receive information and advice on preventing musculoskeletal problems related to their work. Some respondents said they had never been informed that an activity such as piano playing could affect their health so seriously:

No one warned me during my training that I might experience such problems . . . and I've never warmed up those parts of the body involved before each practice session. [E17]

and that no one had told them how to prevent injuries:

... nobody ever told me how to prevent injury. . . [E14]

TABLE 3. Frequencies of Diseases, by Hours of Practice and Years of Playing

ICD-10 Codes	Observed Disorders	Total	Hrs of Practice/Day		χ^2 (p-Value)	Years of Playing			χ^2 (p-Value)
			≤3	>3		≤15	16–30	>30	
M12.5	Traumatic arthropathy	0.5	—	1.3		—	—	3.3	
M35.7	Hypermobility synd.	7.1	9.3	3.9		20.0	6.0	3.3	
M41	Scoliosis	4.9	4.7	5.3		20.0	3.8	—	11.60 (0.003)
M54.2	Cervicalgia	32.2	33.6	30.3		35.0	35.3	16.7	
M54.5	Low back pain	4.4	2.8	6.6		—	3.8	10.0	
M54.9	Dorsalgia	7.1	6.5	7.9		15.0	6.8	3.3	
M62.4	Muscle contracture	29.5	31.8	26.3		25.0	33.1	16.7	
M65.3	Trigger finger	35.5	31.8	40.8		40.0	37.6	23.3	
M65.4	de Quervain tenosynovitis	7.1	6.5	7.9		5.0	8.3	3.3	
M67.8	Other specified synovium/tendon disorders	0.5	—	1.3		—	0.8	—	
M67.9	Disorder of synovium and tendon	2.2	0.9	3.9		—	2.3	3.3	
M70.0	Chronic synovitis hand/wrist	6.6	5.6	7.9		15.0	6.0	3.3	
M70.8	Other soft tissue disorders, overuse	44.3	38.3	52.6		30.0	48.9	33.3	
M71.3	Other bursal cyst	14.8	15.9	13.2		30.0	12.8	13.3	
M75.1	Rotator cuff synd.	0.5	0.9	—		—	—	3.3	
M75.4	Shoulder impingement	9.8	7.5	13.2		5.0	9.0	16.7	
M77.1	Lateral epicondylitis	4.9	4.7	5.3		—	6.8	—	
G24.9	Dystonia	7.7	6.5	9.2		—	7.5	13.3	
G56.2	Ulnar nerve lesion	7.1	3.7	11.8	14.50 (0.036)	—	9.0	3.3	
R29.8	Other	26.8	28.0	—		15.0	27.8	30.0	

See Table 2 for ICD-10 codes and definitions.

In the opinion of the participants, advice on prevention should be given from the early stages of training in music schools:

Music schools should provide advice about these muscular problems. [E16]

I believe that if I had received advice from my childhood, during my first courses, I would not have had so many problems. [E8]

DISCUSSION

The aim of this study was to provide new data on the type of musculoskeletal problems that affect pianists and to explore the pianists' perceptions of the impact of these problems on their professional performance or study. There is no consensus in previous studies on an operational definition of musculoskeletal problems,⁸ hindering any comparison of different populations and samples. In the present study, we used the ICD-10 of the WHO,¹⁷ which is the most widely used and accepted tool among professionals for the diagnosis and treatment of diseases and health problems, and which provides a common language that facilitates comparison between different population groups.

Although the diagnostic criteria employed differed from those used in other studies, our results show that the most frequent musculoskeletal disorders in pianists affected the upper part of the body (arms and back), in agreement with the results reported in the literature.^{12–14,20} In addition, although it was not the purpose of this study to explore the factors influencing the musculoskeletal disorders affecting pianists, it should be noted that our data revealed no difference by sex, occupation (professional/student), number of years playing the instrument, or hours

of practice per day. Some studies have indicated that factors such as sex²¹ or number of years playing the instrument²² can influence the occurrence of musculoskeletal problems. It should be borne in mind that this was a quantitative study, not a study of prevalence, since the entire selected sample attended the clinic because of experiencing problems. In this paper, we have described the most common problems. It is therefore possible that the aforementioned factors influence the risk or not of experiencing a musculoskeletal disorder, but not the specific type of problem experienced.

In terms of the pianists' perceptions, interviewees confirmed the data obtained in the quantitative study in that the worst problems were usually experienced in the upper body (arms and back). They also reported a lack of preventative measures throughout their professional careers, including training. This may be related to the social image of the profession of musician, which is perhaps associated with well-being²² and a low risk of occupational disease—so much so that some authors have even identified the belief among piano students that pain is a normal part of the path to becoming a good pianist.¹²

However, pianists felt that their physical problems were caused by their occupation and affected it negatively, and that they did not receive the support necessary to prevent or treat these disorders, which is consistent with the few studies that have addressed this issue.^{15,16,23} In addition, the pianists interviewed also felt it was necessary to know about the risks entailed in their profession and the preventative strategies available, another aspect that has also been mentioned in other studies.^{16,24} Indeed, this need should be addressed from the early stages of training given in music schools. Both the objective data on frequency of muscu-

loskeletal problems and the pianists' perceptions provide grounds for the inclusion of risk and prevention education in training programs.^{24,25} As early as 2003, the USA National Association of Schools of Music was already advising the inclusion of these subjects in the training curricula.^{26,27} Some authors have even suggested that musicians could benefit from adopting a perspective similar to that of athletes,²⁸ in recognizing the risks of their occupation, carrying out suitable exercises to prevent musculoskeletal problems, and seeking appropriate help when necessary. In Spain, although many music schools and conservatoires have practical sessions to improve body awareness (e.g., Feldenkrais or Alexander technique), only a few offer a structured health promotion program including both physical and psychological aspects.²⁹

As indicated earlier, one limitation of this study was that it analyzed only the medical records of pianists who had attended a specialized clinic, and therefore we cannot comment on prevalence but only on the most frequent disorders experienced by those with musculoskeletal problems. We also wish to note that this was a descriptive and exploratory study, and therefore conclusions about causality cannot be drawn beyond the relationship between the data reported and a comparison with other studies. Prospective studies are required to enable an in-depth assessment of the risk factors associated with musculoskeletal disorders in pianists and subsequent design of intervention studies to evaluate educational and preventative measures that might be effective.

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Supplemental material appears in the online version of this paper at <https://doi.org/10.21091/mppa.2017.2019>.

Accepted 4-Feb-2017

Published online 1-June-2017

<https://doi.org/10.21091/mppa.2017.2019>

APPENDIX. ICD-10 Codes for Observed Disorders

Code	Name
M12.5	Traumatic arthropathy
M35.7	Hypermobility syndrome
M41	Scoliosis
M54.2	Cervicalgia
M54.5	Low back pain
M54.9	Dorsalgia
M62.4	Contracture of muscle
M65.3	Trigger finger
M65.4	Radial styloid tenosynovitis (de Quervain)
M67.8	Other specified disorders of synovium and tendon
M67.9	Disorder of synovium and tendon
M70.0	Chronic crepitant synovitis of hand and wrist
M70.8	Other soft tissue disorders related to use, overuse and pressure
M71.3	Other bursal cyst
M75.1	Rotator cuff syndrome
M75.4	Impingement syndrome of shoulder
M77.1	Lateral epicondylitis
G24.9	Dystonia
G56.2	Lesion of ulnar nerve
R29.8	Other symptoms and signs involving the nervous and musculoskeletal systems

Published in: Med Probl Perform Art 2017; 32(2):118–122.
<https://doi.org/10.21091/mppa.2017.2019>