Musculoskeletal health in musicians : epidemiology & biomechanics

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CHAPTER 1

General introduction

BACKGROUND OF THIS THESIS

Musculoskeletal complaints are highly prevalent; they are the most common cause of severe long-term pain and physical disability in the general population.(1–3) Furthermore, musculoskeletal complaints are the main cause of years lived with disability, thereby seriously effecting quality of life.(1,4,5)

During our daily life we are exposed to several risk factors for musculoskeletal complaints: Heavy physical work, high psychosocial work demands, excessive repetition, awkward postures, and heavy lifting are known work-related risk factors for musculoskeletal complaints.(6) Moreover, also our free time activities such as sports, are associated with musculoskeletal complaints.(7) Whether these conditions are considered problematic depends on the functional demands of each individual, as has been formalized by the ICF (International Classification of Functioning, Disability and Health).(8,9) According to the ICF model health problems can be characterised in body structures and functions, activities and participation *(Figure 1)*. The functional demands of musicians are extremely high, as playing an instrument, especially at a professional level, requires optimal musculoskeletal functioning. Also, musicians are typically exposed to several of the earlier mentioned risk factors for musculoskeletal complaints. Therefore, according to the ICF model, a challenging combination of high musculoskeletal demands and consequently a high risk for musculoskeletal complaints exists in musicians.

A HISTORICAL PERSPECTIVE OF PERFORMING ARTS MEDICINE

For a long time, complaining about medical problems by performing artists was considered a taboo.(10) A report in the New York Times in 1981 opened the eyes of both musicians and health care providers. In this article 'When a pianist's fingers fail to obey' the impact of hand problems of two world famous pianists Gary Graffman and Leon Fleisher were described.(11) Many musicians recognized the reported struggle with musculoskeletal problems. Following this article many of them visited the same clinic as these famous pianists did. Subsequently, acquired knowledge on the health problems of these musicians was gathered and published. This marked the start of a new field of medical interest: *Performing Arts Medicine*.(10)

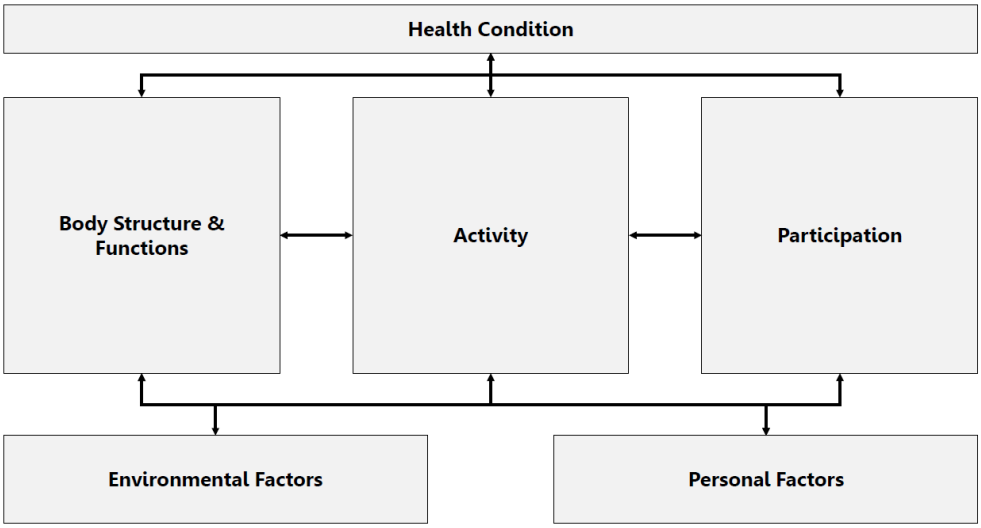

Figure 1: The ICF model (8)

The growing clinical interest was followed by a scientific inquisitiveness into the health of the performing artist. The first large study examining the health of musicians was published in 1988.(12,13) Middlestadt and Fishbein performed a cross-sectional study, in which 82% of the studied professional orchestra musicians in North America reported medical problems at a certain point in time during their careers, and of which 76% had experienced a problem which had affected their ability to perform. In this study, most health problems were caused by musculoskeletal disorders. This publication was followed by other studies addressing musculoskeletal health complaints among musicians, mainly among professional orchestra musicians.(14–19) A wide range of prevalences of musculoskeletal complaints were reported in these studies. However, partly due to varying methodological quality (e.g. heterogeneity of the study population, questionable outcome measures), firm statements concerning the severity of these musculoskeletal complaints of musicians could not be made.

Moreover, despite the generally high prevalence rates of musculoskeletal complaints in musicians, it was unknown if musicians actually had more musculoskeletal complaints than the general population. Apart from two small studies with a weak study design and contrasting outcomes(18,20), no studies comparing musicians with non-musicians were performed. Furthermore, although risk factors for musculoskeletal complaints in the

general population were defined, extrapolation of these risk factors to the musician population remained questionable, even more so when taking the ICF model into account for both patient groups. Remarkably, despite a growing clinical and scientific interest for the health of professional musicians, the musculoskeletal health effect of playing music on an amateur level has not been properly studied at all.(21,22)

Therefore, the main aim of this thesis is to evaluate the prevalence and severity of musculoskeletal health complaints in both professional and amateur musicians. Secondly, factors associated with these complaints are studied, as well as the impact of the complaints on daily functioning as a musician. Thereby the ICF model is used to explore the several domains of musculoskeletal health of musicians.

Knowledge of the epidemiology of musculoskeletal complaints and its risk factors among musicians is an essential step in addressing potential treatment targets and, most important, prevention of these complaints. For that matter, determining the occurrence and severity of these injuries is the first step in a sequence of prevention methods according the approach as described by Van Mechelen.(23) According to this model it is followed by a second step in which the aetiology is established, which is aimed for in the last part of this thesis. This knowledge is essential for improving the health of the musicians by introducing preventive measures.(23)

The evaluation of the musculoskeletal health complaints in musicians in this thesis therefore serves two goals: At first evaluating as a first time study the prevalence of musculoskeletal complaints in professional and amateur musicians in The Netherlands. And secondly, to serve as a wake-up call for musicians, employers and teachers at music institutions, society and last but not least healthcare providers, so they can recognize these musculoskeletal complaints in an early stage with subsequent advice for treatment and prevention. Awareness and knowledge of this subject among these groups of musicians as well as their teachers is essential for prevention and thus improvement of the health of both professional as well as amateur musicians.

THESIS OUTLINE

PART 1: EPIDEMIOLOGY

The first part of this thesis focuses on the epidemiology of musculoskeletal complaints among different groups of professional and amateur musicians. In **Chapter 2** the prevalence of musculoskeletal complaints in a group of professional musicians is studied. In this study musicians are compared to a control group of non-musicians. In **Chapter 3** the results of a systematic review evaluating the prevalence of musculoskeletal complaints among professional musicians are presented. A critical appraisal of the literature, describing the occurrence of musculoskeletal complaints in professional instrumental musicians, is performed. Next, in **Chapter 4** amateur musicians are studied. The prevalence of and prognostic factors for musculoskeletal complaints in amateur musicians playing in local student orchestras are evaluated, as well as several potentially associated risk factors. In **Chapter 5** a sample of amateur musicians are studied; evaluating the association between arm position and playing time with the prevalence of CANS (i.e. Complaints of the Arm, Neck and/or Shoulder not caused by trauma and/or systemic disease). In **Chapter 6** a longitudinal study design is used to evaluate the effect of a sudden increase in playing time on the prevalence musculoskeletal complaints in high level amateur musicians. This study is performed during an intensive rehearsal period of two high-level amateur orchestras. **Chapter 7** comprises a narrative literature review on musculoskeletal complaints in musicians, with a focus on gender differences.

PART 2: IMPACT & ILLNESS PERCEPTIONS

The second part of this thesis focusses on the impact of musculoskeletal complaints and illness perceptions of professional musicians. In **Chapter 8** the impact of CANS on a sample of professional musicians is evaluated, as is healthcare use due to these complaints. Again, musicians are compared to a reference population. In **Chapter 9** illness perception mechanisms of musicians with musculoskeletal complaints are evaluated using a patient perceived outcome score.

PART 3: BIOMECHANICAL ANALYSIS OF VIOLIN PLAYING

The high prevalence of complaints in the shoulder and neck region in violinists, as studied in the first part of this thesis was the main reason to initiate an analysis of this specific

group of musicians in the last part of this thesis. In **Chapter 10** the associations between complaints of the neck and shoulder region, violin fixation force, and muscle activity of the superficial neck and shoulder muscles are studied during playing the violin. In **Chapter 11** the influence of the shoulder rest adjustment on the jaw-shoulder violin fixation force and muscle activity of the superficial neck and shoulder muscles is evaluated in a group of professional violinists.

Finally, in **Chapter 12** the findings presented in this thesis are summarised. **Chapter 13** comprises the general discussion of this thesis in relation to the current status of the literature. Finally, the practical implementation of the knowledge by this thesis is discussed in this last chapter.

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