Performance Related Musculoskeletal Disorders

in Bassoon Players

Paula Brusky

A thesis submitted in partial fulfillment

of requirements for the degree of

PhD in performance

Sydney Conservatorium of Music

The University of Sydney

January 2009
Declaration

I, Paula Brusky, hereby declare that this submission is my own work. It contains no material previously published or written by another person except for properly acknowledged research. This thesis contains no material that has been previously submitted for the award of a degree.

Signed: ______________________________________________ Date: ___________
Acknowledgments

This thesis would not have been possible without the funding provided by the Endeavor International Postgraduate Research Scholarship and the International Postgraduate Award. Additional funding was generously provided by the David Nhilla Dumbrell scholarship. Thanks to the visionary Dean Kim Walker for starting the new PhD in performance degree and to Sydney Conservatorium of Music for the helpful staff and beautiful location.

Numerous people have supported and guided me during my PhD candidature. Thanks to Dr Dianna Kenny for assisting with the creation of the survey and expanding my awareness on the body of literature; to Dr James Renwick for his statistical knowledge; to Dr Peter Dunbar-Hall for supporting my candidature and always looking out for my best interests; and to Mr David McKenzie for his support during the difficult times. Thanks also to the wonderful support staff at SurveyMonkey.com who were very quick with email responses and helped make the online survey a success.

Thanks to all of the survey participants who took the time to complete the online questionnaire. Thanks to all the bassoon players who were interested in the research and encouraged others to participate.

My candidature excelled thanks to the help and support of my friends. A large thank you is required for Dr Helen Mitchell who taught me how to make graphs in EXCEL, use style sheets in WORD, was a willing proofreader, and was always available to listen to my ideas. Thanks to Dr Margaret Osborn who taught me basic statistics. Thanks to
Constable Timothy Scowen for taking me away under the sea when I needed a break. And to Mr Andrew Barnes, my bassoon supervisor and mentor, thank you so much for calming me down during the difficult moments, encouraging me during the tenuous moments, and inspiring me to strive for excellence.

And finally, to my wonderful parents, thanks for not saying “no” when I said I wanted to move across the world for my PhD; for always being supportive; for listening to me complain and rejoice; for worrying alongside me and letting me know I was not alone; for making sacrifices in their lives to give me the best opportunities; for always believing in me; and for their unconditional love.
Abstract

Performance related musculoskeletal disorders (PRMDs) are a frequent reality for practicing musicians. Many aspects of the bassoon make bassoon players particularly susceptible to PRMDs. This thesis explored the prevalence of PRMDs among bassoon players and assessed the frequency, types, and locations of PRMDs. Also identified were treatments used for PRMDs, contributing factors to PRMD development, and the perceptions of the bassoon community regarding PRMDs.

The International Bassoonist Questionnaire was distributed via the World Wide Web (n = 166, 58% male, 42% female). Eighty-six percent of bassoon players reported PRMDs. Pain was the most common PRMD symptom reported (78%). Females reported PRMDs (96%) more frequently than males (78%). Younger bassoon players reported more PRMDs.

Most bassoon players (88%) were attempting to treat their PRMDs. The most common self-administered treatments were rest (60%) and reducing playing time (53%). Bassoonists attributed the cause of PRMDs to “long hours of practice” and “sudden increase in playing time.”

Bassoon players felt strongly that the medical profession did not know how to treat a bassoon related injury. They believed that a knowledgeable teacher was the best resource against the onset of PRMDs even though technical aspects of playing were not identified as significant contributors to PRMDs. The bassoon playing population needs more information about PRMDs in order to develop treatment and prevention strategies.
# Table of Contents

Declaration ................................................................................................................................. i  
Acknowledgments ................................................................................................................... ii  
Abstract ................................................................................................................................... iv  
Table of Contents ..................................................................................................................... v  
List of Appendices ................................................................................................................... ix  
List of Figures ........................................................................................................................... x  
List of Tables ............................................................................................................................ xii

1 Background to the Study ........................................................................................................ 1  
  1.1 The Bassoon – Introduction to a Menace ...................................................................... 2  
  1.2 Research Questions ......................................................................................................... 6  
  1.3 Abbreviations .................................................................................................................. 7  
  1.4 Definitions ........................................................................................................................ 8  
  1.5 Structure of the Thesis ..................................................................................................... 9  

2 Literature Review .................................................................................................................. 10  
  2.1 Historical Development of Performing Arts Medicine ................................................. 11  
  2.2 Types of Injuries Sustained by Musicians ..................................................................... 14  
  2.3 Influential Factors to PRMD Development ..................................................................... 19  
  2.4 Orchestral Musician Studies ............................................................................................ 23  
  2.5 Bassoon Specific Literature .............................................................................................. 25  
  2.6 Conclusion ......................................................................................................................... 32  

3 Methodology ........................................................................................................................ 34  
  3.1 Using the Internet to Distribute a Survey ....................................................................... 34  
  3.2 Ethics .................................................................................................................................. 36
3.3 Establishing the Web Site ................................................................. 36
3.4 Creating the *International Bassoonist Questionnaire* .......................... 39
   3.4.1 Piloting the Questionnaire ......................................................... 46
3.5 Recruiting Participants ..................................................................... 48
3.6 Collecting the Data ........................................................................... 50
3.7 Handling the Data ............................................................................ 50
3.8 Analyzing the Data ........................................................................... 53
3.9 Conclusion ......................................................................................... 55
4 Results – PRMD Frequency, Severity, Location ...................................... 56
   4.1 Demographics of Sample ................................................................ 56
      4.1.1 Gender ................................................................................ 57
      4.1.2 Age ..................................................................................... 57
      4.1.3 Playing Experience ................................................................. 59
   4.2 Injury and PRMD Information .......................................................... 62
      4.2.1 Severity of PRMDs ................................................................. 65
      4.2.2 Frequency of PRMDs .............................................................. 66
   4.3 PRMD Symptoms ........................................................................... 70
      4.3.1 PRMD – Pain ........................................................................ 71
         4.3.1.1 Pain and Gender ............................................................... 73
         4.3.1.2 Pain and Age .................................................................. 74
      4.3.2 PRMD – Tingling .................................................................... 75
      4.3.3 PRMD – Numbness ................................................................. 77
      4.3.4 PRMD – Loss of Dexterity ...................................................... 78
      4.3.5 PRMD – Weakness ................................................................. 80
4.3.6 PRMD – Loss of Flexibility ................................................................. 81
4.4 Injury and PRMD Locations ................................................................. 83
  4.4.1 Body Regions .................................................................................. 83
  4.4.2 Extent of Body Compromise ............................................................ 86
  4.4.3 Specific Locations ........................................................................... 88
4.5 Conclusion ........................................................................................... 97

5 Results – Treatments, Contributing Factors, Perceptions ......................... 100
  5.1 Treatments Used .................................................................................. 100
    5.1.1 Experimenting with Treatments ....................................................... 103
    5.1.2 Professionals Consulted ................................................................. 104
  5.2 Contributing Factors to PRMD Development ...................................... 109
    5.2.1 Contributing Factor Categories ...................................................... 112
    5.2.2 Impact of Gender on Contributing Factors ...................................... 122
    5.2.3 Impact of Age on Contributing Factors .......................................... 126
  5.3 Perceptions of PRMDs ......................................................................... 130
  5.4 Conclusion ........................................................................................ 137

6 Discussion and Conclusion ........................................................................ 140
  6.1 Discussion on Injury and PRMD Symptoms ........................................ 140
  6.2 Detailed Future Studies ........................................................................ 143
  6.3 Gender Inequity .................................................................................. 145
  6.4 Age Considerations ............................................................................. 147
  6.5 PRMD Individuality ............................................................................. 148
  6.6 Treatment Shortcomings ..................................................................... 149
  6.7 New Perspectives ................................................................................ 152
6.8 Conclusion .................................................................................................................. 154

7 References .................................................................................................................... 156
List of Appendices

APPENDIX A: Evolution Of The Bassoon ................................................................. 169
APPENDIX B: Ethics Approval Letter ................................................................. 178
APPENDIX C: Pages From Website ................................................................. 180
APPENDIX D: Paper Survey For Ethics Approval ........................................... 184
APPENDIX E: International Bassoonist Questionnaire .................................. 194
APPENDIX F: Flyer To Recruit Participants ..................................................... 220
APPENDIX G: Journal Article - The Double Reed ......................................... 221
APPENDIX H: Email To Recruit Participants ..................................................... 222
APPENDIX I: Codebook Sample ................................................................. 223
APPENDIX J: Specific Locations Comprising Body Regions ......................... 228
List of Figures

Figure 1: Angle of bassoon while playing.................................................................3
Figure 2: Excerpt from flute EMG survey identifying PRMD body locations.............44
Figure 3: Head and neck region in IBQ....................................................................45
Figure 4: Back, chest, and shoulders region in IBQ.................................................45
Figure 5: Age distribution of sample in years............................................................58
Figure 6: Mean age and range differences between genders ......................................59
Figure 7: Percentage of bassoonists that reported each PRMD symptom...............64
Figure 8: Percentage of each gender that reported PRMDs in each body region .........68
Figure 9: Mean age of players without and with PRMDs for each body region .........69
Figure 10: Percentage of bassoonists that reported pain ...........................................72
Figure 11: Mean and range of pain severity experienced by gender...........................74
Figure 12: Percentage of bassoonists that reported tingling ......................................76
Figure 13: Percentage of bassoonists that reported numbness .................................77
Figure 14: Percentage of bassoonists that reported loss of dexterity .......................79
Figure 15: Percentage of bassoonists that reported weakness .................................80
Figure 16: Percentage of bassoonists that reported loss of flexibility .......................82
Figure 17: Percentage of bassoonists that reported PRMDs in each body region ......84
Figure 18: Percentage of each gender that reported PRMDs in multiple body regions 85
Figure 19: IBQ head and neck region......................................................................89
Figure 20: IBQ back, chest, and shoulders region....................................................91
Figure 21: IBQ legs, hips, and feet region...............................................................96
Figure 22: Means for “time” contributing factors....................................................113
Figure 23: Contribution percentages for “time” factors .........................................114
Figure 24: Means for “physicality” contributing factors .................................................. 116
Figure 25: Contribution percentages for “physicality” factors ........................................... 117
Figure 26: Means for “life” contributing factors ............................................................... 118
Figure 27: Contribution percentages for “life” factors ...................................................... 120
Figure 28: Means for “technical” contributing factors ...................................................... 121
Figure 29: Contribution percentages for “technical” factors .............................................. 122
List of Tables

Table 1: Percentage of bassoonists that reported multiple PRMD symptoms.................65
Table 2: Mean severity for each PRMD symptom.........................................................66
Table 3: Mean age by the number of PRMD symptoms reported ..................................70
Table 4: Percentage of bassoonists that reported PRMDs in multiple body regions ......84
Table 5: Percentage of bassoonists for each “number of body locations” category ....87
Table 6: Mean ages for the “number of body locations” categories .............................87
Table 7: Percentage of bassoonists that reported head and neck locations .................89
Table 8: Percentage of bassoonists that reported back, chest, and shoulder locations....91
Table 9: Percentage of bassoonists that reported right arm locations ........................92
Table 10: Percentage of bassoonists that reported left arm locations ........................92
Table 11: Percentage of bassoonists that reported right hand locations ....................94
Table 12: Percentage of bassoonists that reported left hand locations .......................94
Table 13: Percentage of bassoonists that reported legs, hips, and feet locations .......96
Table 14: Percentage of bassoonists that tried common treatments ............................101
Table 15: Percentage of bassoonists that tried multiple common treatments ..........104
Table 16: Percentage of bassoonists that consulted different types of professionals.....105
Table 17: Percentage of bassoonists that consulted multiple professionals ...............108
Table 18: Factors believed to contribute to the development of PRMDs .....................110
Table 19: Gender differences for contributing factors ..............................................123
Table 20: Age group differences for contributing factors .........................................127
Table 21: Bassoon players level of agreement to perception statements .....................131