Medical Problems of Clarinetists: Results From the UNT Musician Health Survey

Michael Thrasher & Kris S. Chesky
University of North Texas

Information about musicians and music teachers is important for curricular and educational decision making. For example, understanding the medical problems of musicians plays an important role in developing health-conscious pedagogy and effective clinical interventions. Unfortunately, current information only includes a few surveys of full-time orchestra professionals, university and public school students, and clinical case reviews. Furthermore, these studies typically group musicians into broad categories, such as woodwinds, strings, or brass, and provide little insight to instrument-specific problems.

There are unique demands associated with playing the clarinet. When addressing medical issues in the pedagogical literature, authors assert that health risks to clarinetists include musculoskeletal problems of the hands, wrists, forearms, and shoulders, and problems with hearing and the embouchure. There is little agreement, however, regarding what problems are common or serious. For instance, Mazzeo (1989) suggested that nearly all problems of clarinetists are associated with the embouchure and the right hand thumb. Wilson (1990), however, cited thumb problems but added that the only other problem is danger to hearing.

The research literature includes surveys of professional musicians or students but typically describes medical concerns without differentiation by specific instrument type. For example, 71% of woodwind players reported musculoskeletal problems in a study of 660 professional orchestral musicians (Larsson, Baum, Medholkar, & Kollia, 1993). Similarly, in a study of college music students, woodwind players reported frequent pain in the wrists, fingers, back, and neck (Pratt, Jessop, & Nieman, 1992). Fry and Rowley (1989) suggested that cello, clarinet, and flute musicians report upper limb pain more often than do other instrumentalists. Overall, these findings are limited because the unique and varied demands associated with each instrument type cannot be accounted for. Fry (1988) highlighted these contrasts by citing soft palate damage caused by high-pressure demands of oboe performance, shoulder problems related to flute performance, and specific right hand problems associated with supporting a clarinet or English horn. Based on clinical observations, Fry (1988) noted that, among 69 professional clarinetists affected by over-use syndrome, 52% reported problems related to the right hand and/or wrist as well as a high frequency of problems related to the forearm and shoulder. Only two subjects reported problems related to the embouchure. Another report suggested a correlation between TMJ dysfunction and the physical stress levels associated with the clarinet (Betz, 1989); however, Bejjani (1996) suggested that performers of upper strings and some brass instruments experience TMJ syndrome most often.

Fishbein and associates (1988) recognized the relationships between overall health, lifestyle, and medical problems, and noted the need for research that considers a variety of interdependent variables. Furthermore, Mazzeo (1989) acknowledged that symphony and opera clarinetists represent only a small percentage of the total number of active clarinet players and suggested the need for more information regarding all clarinetists.

To overcome the difficulty of accessing and surveying musicians, a unique approach was developed at the University of North Texas that utilizes the World Wide Web (WWW). Following successful pilot studies and research funding from the National Academy of Recording Arts and Sciences, the UNT Musician Health Survey (UNT-MHS) has developed into a viable platform for obtaining information from musicians across the nation and from around the world. To date, over 2,000 musicians have participated in the project. This report is the first to describe data from a heterogeneous sample of musicians who play the same instrument. The purpose of this study is to describe medical problems of clarinetists by examining data collected through the UNT-MHS.

Method

A nonprobability method for creating an accidental sample population was achieved by recruiting subjects through the WWW. The main advantage of this process is the ability to find and recruit musicians from diverse locations and musical backgrounds. A major limitation is the inability to know what specific attributes are present in those who offer themselves as subjects via the WWW. The authors recognize that those who volunteer to take the survey may be atypical of the target population of all musicians in terms of such characteristics as socioeconomic status, motivation, and other correlates of health consciousness.

Following approval by the UNT Institutional Review Board, subjects were recruited through messages posted to Internet links, Internet discussion groups, professional publications, and professional societies and organizations. Subjects were directed to access the survey via the web at: http://www.scs.unt.edu/surveys/msurvey/index.html. Once logged on, standardized instructions prompted subjects through various sections of the survey. Subject participation was considered anonymous. At the end of the survey, subjects were allowed to submit comments with their responses. Data files received over the Internet were downloaded into a master file for periodic preliminary inspection. This step allowed for identification of bogus, duplicate, or faulty data. Following screening procedures, data were merged into a master SPSS file.

The UNT-MHS is divided into five sections and asks questions regarding: (1) demographics, (2) musculoskeletal problems, (3) non-musculoskeletal problems, (4) lifestyle and environment, and (5) feedback and comments (Corns, Edmonds, & Wilson, 1996). The development of the UNT-MHS allows for direct comparison of data to other well-known musician health surveys. The musculoskeletal section seeks information on 16 bilateral body locations. Also, similar to the ICSOM study (Fishbein et al., 1988), the non-musculoskeletal section asks questions regarding incidence and severity of several possible problems. Questions regarding pain severity utilize a modified 5-point graded severity score developed by Fry (1988) that incorporates a measure of functionality and problem duration. The scale is as follows:

Grade 1: Pain while playing; should be consistent rather than occasional; pain ceases when not playing.

Grade 2: Pain while playing; slight physical signs of tenderness; may have transient weakness or loss of control; no interference w/other uses of this location.

Grade 3: Pain while playing; pain persists away from instrument; some other uses of this location cause pain; may have weakness, loss of control; loss of muscular response or dexterity.
Grade 4: As for Grade 3; all common uses of the location cause pain (housework, driving, writing, turning knobs, dressing, washing, etc.) but these are possible as long as pain is tolerated.
Grade 5: As for Grade 4; including loss of use of location due to disabling pain.

Results

Extracted from the UNT-MHS master database, 324 subjects (females = 155, males = 169) were selected for this analysis. Subjects were included if they indicated clarinet as their primary (most-played), secondary (second most-played), or tertiary (third most-played) instrument. Subjects' mean age was 34.8 years (*SD* = 14.8; range = 12 to 77 yrs). The subjects averaged 4 years of formal college music instruction (*SD* = 3.2; range = 0 to 16 yrs) and an average 11.3 years of professional musical activity (*SD* = 12.7; range = 0 to 53 yrs). Subjects' average annual salary was $34,975. Questions pertaining to lifestyle indicated that subjects traveled away from home approximately three days each month (*SD* = 4.1), and exercised about three and a half hours per week (*SD* = 3.0). Half indicated that they followed a combination diet consisting of well-balanced, vegetarian, and fast food/restaurant. Thirty-four percent identified their diet as well-balanced, 5.7% reported vegetarian, and 9.2% reported fast food/restaurant. Subjects described their work environments as moderately stressful (63%), highly stressful (13.2%) or little to-no-stress (23.8%).

Table 1
Percentages of Reported Non-Musculoskeletal Problems

Problem	Male	Female	Total	Problem	Male	Female	Total
Eyestrain	**34.6**	**49.0**	**43.5**	Respir. Allergies	**21.1**	**22.6**	**21.8**
mild	32.7	44.5	38.3	mild	14.6	14.8	14.7
severe	1.8	4.5	3.1	severe	6.4	7.7	7.1
Headache	**28.7**	**58.8**	**43.0**	Acute Anxiety	**19.3**	**23.3**	**21.2**
mild	21.1	36.8	28.5	mild	18.1	18.1	18.1
severe	7.6	21.9	14.4	severe	1.2	5.2	3.1
Fatigue	**35.7**	**49.7**	**42.4**	Blackouts/Dizzy	**12.9**	**17.1**	**20.0**
mild	32.2	36.8	34.4	mild	12.3	26.5	19.0
severe	3.5	12.9	8.0	severe	.6	.6	.6
Stage Fright	**25.8**	**43.3**	**34.1**	Hearing Loss	**23.4**	**15.5**	**20.0**
mild	24.0	34.8	29.1	mild	21.6	14.8	18.4
severe	1.8	8.4	4.9	severe	1.8	.6	1.2
Weight Problems	**23.4**	**36.8**	**30.0**	Asthma	**13.5**	**20.7**	**17.0**
mild	19.3	24.5	21.8	mild	9.9	17.4	13.5
severe	4.1	12.3	8.0	severe	3.5	3.2	3.4
Depression	**24.0**	**31.0**	**27.6**	Mouth Lesions	**15.8**	**16.8**	**16.3**
mild	15.2	22.6	18.7	mild	14.6	14.8	14.7
severe	8.8	8.4	8.6	severe	1.2	1.9	1.5
Sleep Disturbance	**22.2**	**29.1**	**25.0**	Earaches	**9.9**	**21.9**	**15.7**
mild	19.3	23.9	21.5	mild	7.0	17.4	12.0
severe	2.9	5.2	4.0	severe	2.9	4.5	3.7

Chest Discomfort	**14.1**	**16.8**	**15.5**	Malocclusion	**17.5**	**9.7**	**14.1**
mild	13.5	14.2	13.8	mild	15.8	7.1	11.7
severe	.6	2.6	1.5	severe	1.8	2.6	2.1
TMJ Syndrome	**6.4**	**23.2**	**14.5**	Loss of Seal	**10.0**	**15.5**	**12.1**
mild	5.8	18.7	12.0	mild	8.2	12.9	10.4
severe	.6	4.5	2.5	severe	1.8	2.6	2.1
Acquired Dental							

The survey determined rates of occurrence for nonmusculoskeletal problems. For each problem, the subjects' choices included no problem, mild problem, and severe problem. Table 1 shows the percentages of subjects reporting nonmusculoskeletal problems. The most common problems included eyestrain, headache, and fatigue, followed by stage fright, weight problems, and depression. More than 40% of females reported a mild or severe problem with eyestrain, headache, fatigue, or stage fright. Over 20% of females reported severe problems with headaches. The percentages of females reporting problems were typically higher compared to males; however, more males than females reported problems with hearing loss and acquired dental malocclusion.

Table 2
Percentages of Subjects Reporting Musculoskeletal Problems

Left Side Upper Extremity

	grade	Male	Female	Total
Finger		**15.3**	**25.9**	**20.0**
	1	9.9	12.9	11.3
	2	1.2	6.5	3.7
	3	2.9	5.2	4.0
	4	.0	.6	.3
	5	1.2	.6	.9
Hand		**14.6**	**25.2**	**20.0**
	1	7.6	13.5	10.4
	2	1.8	4.5	3.1
	3	4.1	3.2	3.7
	4	.6	3.2	1.8
	5	.6	.6	.6
Wrist		**14.6**	**26.5**	**20.0**
	1	7.0	10.3	8.6
	2	3.5	4.5	4.0
	3	2.9	5.2	4.0
	4	1.2	5.2	3.1
	5	.0	1.3	.6
Forearm		**5.9**	**16.8**	**11.1**
	1	4.1	6.5	5.2
	2	.0	4.5	2.1
	3	1.8	5.2	3.4
	4	.0	.6	.3
Elbow		**5.3**	**7.1**	**6.0**
	1	2.3	3.2	2.8
	2	.0	.6	.3
	3	.6	2.6	1.5
	4	2.3	.0	1.2
	5	.0	.6	.3
Shoulder		**15.8**	**24.6**	**20.0**
	1	9.4	11.0	10.1
	2	2.9	5.8	4.3
	3	2.3	5.8	4.0
	4	1.2	1.9	1.5
Neck		**15.3**	**26.5**	**21.0**
	1	7.6	9.7	8.6
	2	2.3	7.7	4.9
	3	4.7	4.5	4.6
	4	.6	4.5	2.5
Upper Back		**5.9**	**20.7**	**13.0**
	1	2.3	8.4	5.2
	2	1.8	6.5	4.0
	3	1.8	4.5	3.1
	4	.0	.6	.3
	5	.0	.6	.3

Right Side Upper Extremity

	grade	Male	Female	Total
Finger		**19.9**	**42.0**	**30.0**
	1	14.0	16.8	15.3
	2	2.9	12.9	7.7
	3	2.3	10.3	6.1
	4	.0	1.3	.6
	5	.6	.6	.6
Hand		**17.5**	**42.0**	**29.0**
	1	7.0	16.1	11.3
	2	7.6	9.7	8.6
	3	1.8	11.0	6.1
	4	.6	3.9	2.1
	5	.6	1.3	.9
Wrist		**25.0**	**51.4**	**37.2**
	1	12.3	17.4	14.7
	2	5.3	11.0	8.0
	3	6.4	11.6	8.9
	4	1.2	9.7	5.2
	5	.0	.6	.3
Forearm		**17.6**	**30.4**	**23.0**
	1	5.8	9.0	7.4
	2	5.3	8.4	6.7
	3	4.1	8.4	6.1
	4	1.8	3.9	2.8
	5	.6	.6	.6
Elbow		**6.5**	**15.5**	**10.5**
	1	2.9	5.2	4.0
	2	2.3	2.6	2.5
	3	1.2	4.5	2.8
	4	.0	2.6	1.2
Shoulder		**15.8**	**25.2**	**20.0**
	1	5.8	7.1	6.4
	2	5.8	5.2	5.5
	3	2.3	6.5	4.3
	4	1.8	5.8	3.7
Neck		**18.7**	**30.4**	**24.3**
	1	8.8	7.7	8.3
	2	4.1	8.4	6.1
	3	4.1	6.5	5.2
	4	1.8	7.1	4.3
Upper Back		**10.6**	**27.1**	**18.5**
	1	6.4	10.3	8.3
	2	2.3	7.1	4.6
	3	1.8	5.2	3.4
	4	.0	3.2	1.5
	5	.0	1.3	.6

Subjects reported several upper-extremity musculoskeletal problems. Table 2 shows the percentages of subjects reporting problems with various bilateral locations. Specific locations on

the right side of the body were identified as leading problem areas. Most notably, over 30% reported right wrist or finger problems. Similar to nonmusculoskeletal problems, females reported musculoskeletal problems at a higher rate compared to males. For instance, over 40% of females reported problems with right fingers or hand compared to less than 20% of males. Similarly, over 50% of females reported problems with right wrist compared to only 25% percent of males. Subjects described the severity of their problems using the modified five-point grading scale developed by Fry (1988). Over 10% of females reported problems at Grade 3 or higher for right wrist, fingers, and hand. This means that they experience pain while playing, the pain persists away from the instrument, other uses cause pain, and they may have weakness, loss of control and loss of muscular response or dexterity.

Discussion

The most common nonmusculoskeletal problems reported by clarinetists included headache, fatigue, and eyestrain. The rates of occurrence, as well as the severity levels, for these problems were higher among females than among males. These problems have been identified in other studies, but to a lesser degree. Shoup (1995), for instance, found that eyestrain (15.8%) and severe headaches (14.8%) were the two leading nonmusculoskeletal problems reported by 425 junior high and high school aged instrumental music students. The higher rates of occurrence found in the present study may be associated with several factors including clarinet-specific demands or differences in age and years of performing experience.

The musculoskeletal problems reported on the right side of the body may be associated with clarinet specific demands placed on the right wrist. Approximately 40% of the clarinetists reported a problem in this area. Whereas the right hand and fingers were reported as problem sites, subjects specifically identified the right wrist more often than any other site. These findings agree with previously published reports. In Manchester's (1988) study of 132 university-level music students, woodwind players reported more right than left side symptoms.

Females reported higher rates of occurrence for musculoskeletal problems compared to males. In all categories in which more than 10% of the total population reported a problem, rates of occurrence among females were higher than males. These finding are consistent with previous reports. For instance, Zaza (1992) calculated that gender was the best predictor of injury in 300 university instrumental music students. Furthermore, in a study of secondary school-aged musicians, Lockwood (1988) reported that 68% of females identified problems compared to only 17% of males.

In summary, findings for this study should be interpreted with caution. Generalizations to the total population of clarinetists cannot be made due to the accidental sampling procedures used. The lack of randomization and the reliance on Internet-based collection procedures introduce unknown factors that may not be accounted for in this analysis. Future research will continue to refine and determine the utility of Internet-based survey techniques. Regardless of its limitations, this study confirms the need for further investigation regarding the medical problems of clarinetists. The identification of headaches, eyestrain, and fatigue raise concerns that have not appeared in the clarinet literature. Furthermore, findings strongly support the previously voiced concerns related to the right wrist, fingers, and hand. The dramatic contrasts between male and female musicians also warrants further investigation.

This study suggests several trends that demand attention from today's clarinet players, teachers and designers. First, those charged with the instruction of the next generation of clarinetists must recognize the magnitude and danger of the problems identified in this study. The problem

of clarinet-related medical conditions is not a myth. Unfortunately, many choose to dismiss physical pain or even encourage pain as a natural part of performance. For example, Shoup (1995) found that 44% of high school musicians believed in playing through pain, adhering to a "no pain, no gain" philosophy. Newmark and Hochberg (1987) reported that almost 7% of musicians suffering from pain actually chose to increase their playing schedules as a form of treatment, assuming that pain resulted from insufficient practice. Second, players must develop an open-minded approach when considering new and innovative ideas about clarinet pedagogy, playing technique, and instrument design. As early as 1987, Fry suggested that professors of clarinet critically review the traditional loading of the clarinet on the right thumb. Furthermore, writers such as Farmer (1979) and Mazzeo (1989) have described alternative means of supporting the weight of the instrument. Third, players should actively encourage instrument designers and manufacturers to develop a responsible and sensitive approach to clarinet design. Finally, the community of experienced clarinet players must take the lead on these issues. Through the development of trained artist-scholars with the prerequisite skills as performers, inquirers, and problem-solvers, significant contributions can be made to the overall understanding of the various aspects of clarinet performance. The authors propose to continue such endeavors through the University of North Texas Musician Health Survey and other tools with the intention of helping all to gain greater insight into the art of playing the clarinet.

This research is sponsored in part through a grant from the National Academy of Recording Arts and Sciences. Special thanks to Steve Corns for assistance in data management. Correspondence regarding musicians' health issues and future research is encouraged by the authors and may be addressed via email to Dr. Thrasher at thrasher@wf.net or to Dr. Chesky at kchesky@music.unt.edu.

References

Bejjani, F. J., Kaye, G. M., & Benham, M. (1996). Musculoskeletal and neuromuscular conditions of instrumental musicians. *Archives of Physical Medicine and Rehabilitation, 77*, 406-413.

Betz, S. (1989). Are you a victim of TMJ dysfunction? *The Clarinet, 16*(2), 44-47.

Corns, J. S., Edmund, D., & Wilson, S. (1996). World Wide Web research in performing arts medicine: The University of North Texas Musician Health Survey. In K.S. Chesky, K.S. and B. Rubin (Eds.), *Applications of Medicine in Music* (pp. 13-18), University of North Texas.

Farmer, G. J. (1979). Use of the clarinet neckstrap. *Woodwind World-Brass and Percussion,* June 1979, 8-9.

Fishbein, M., Middlestadt, S. E., Ottati, V., Straus, S., & Ellis, A. (1988). Medical problems among ICSOM musicians: Overview of a national survey. *Medical Problems of Performing Artists, 3*, 1-8.

Fry, H. J. H. (1987). Overuse syndrome in clarinetists. *The Clarinet, 14*(3), 48-50.

Fry, H. J. H. (1988). Patterns of over-use seen in 658 affected instrumental musicians. *International Journal of Music Education, 11*, 3-16.

Fry, H. J. H., & Rowley, G. L. (1989). Music related upper limb pain in school children. *Ann Rheum Dis, 48*, 998-1002.

Larsson, L., Baum, J., Mudholkar, G. S., & Kollia, G. D. (1993). Nature and impact of musculoskeletal problems in a population of musicians. *Medical Problems of Performing Artists, 8*, 73-76.

Lockwood, A. H. (1988). Medical problems in secondary school-aged musicians. *Medical Problems of Performing Artists, 3*, 129-132.

Mazzeo, R. (1989). Mazzeo musings. *The Clarinet, 16*(2), 7-9.

Manchester, R. A. (1988). The incidence of hand problems in music students. *Medical Problems of Performing Artists, 3*(1), 15-18.

Newmark, J., & Hochberg, F. H. (1987). "Doctor, it hurts when I play": painful disorders among instrumental musicians. *Medical Problems of Performing Artists, 2*, 93-97.

Pratt, R. R., Jessop, S. G., & Niemann, B. K. (1992). Performance-related disorders among music majors at Brigham Young University. *International Journal of Arts Medicine, 1*(2), 7-20.
Shoup, D. (1995). Survey of performance-related problems among high school and junior high school musicians. *Medical Problems of Performing Artists, 10*, 100-105.
Wilson, H. L. (1990). Hearing loss and the clarinet. *The Clarinet, 18* (1), 22-25.