



## Peak Performance:

# Understanding and Managing the Physical Challenges of Flute Playing

NFA Convention, New Orleans, USA  
August 2013  
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## Background

- Playing-related musculoskeletal disorders (PRMDs) among flutists have been documented in a range of studies since the 1980s (e.g. Fishbein, 1988; Fry, 1986, 1987, 1988)
- Studies have consistently shown that flutists typically suffer from PRMDs in areas such as the **neck, shoulders, middle and upper back, as well as the wrists and hands** (Fain, 2009; Fortune, 2007; Lonsdale, 2011; Norris, 1996; Spence, 2001; Thompson, 2008)
- Several recent studies indicate that those musicians playing in positions involving elevation of the arms and/or with body asymmetry may be more susceptible to pain in the neck, shoulders and upper back.
- Gender may also be a factor, with female musicians being more likely to suffer from pain in these areas than males.

# Aim of Presentation

To outline what the implications of recent research on playing position and pain statistics may be for teachers and performers, in terms of practising, rehearsing and teaching the flute.

## The Unique Playing Position

- Asymmetrical
- Against gravity
- Elevated arms
- Hands away from the trunk
- Impossible to keep all joints in neutral position (as advised by ergonomists)





# Asymmetrical and Elevated Arm Positions

- Asymmetrical and awkward positioning is a **known contributor to injury** (Dawson, 2008; Lederman, 2003; Llobet, 2007 and others)
- Nyman et al (2007, p.370) found that **musicians playing in an elevated arm position** experienced a higher prevalence of neck-shoulder pain than those working in a more neutral position. (n=235, but only 10 flutists)
- Wahlström et al (2009) found that **female music teachers who play in asymmetric postures** "reported significantly more symptoms in the neck, shoulders, and upper back than male teachers". (Asymmetric group: n=22, but only 3 flutists). Also, **teachers who played with an asymmetric posture** "had significantly more musculoskeletal disorders than music teachers with a symmetric playing posture (p.113).

# Gender, Type of Instrument and Pain

- Roach (1994) found that "the likelihood of pain at a specific site varied depending on the instrument played" (p.125).
- Roach reported that female instrumentalists "were 1.9 times more likely than men to report upper-body joint pain in general. They were 3.6 times more likely to report upper-back pain and 2.8 times more likely to report shoulder pain than were the men" (p.127). (No flutists in the study)

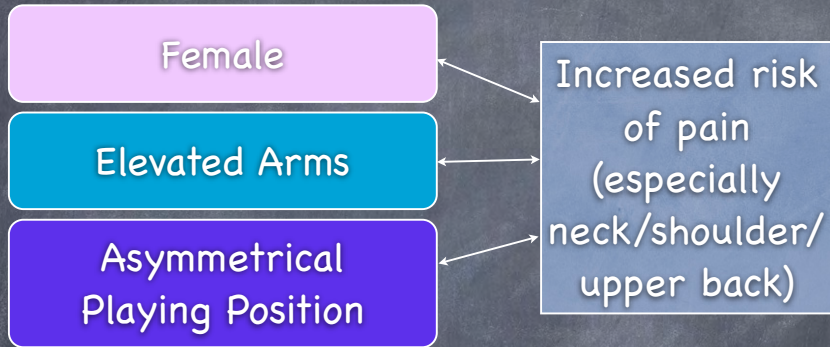
# Gender and Pain

- (Lonsdale, 2011): Gender was not a significant factor across the total sample of those who were currently suffering from discomfort or pain.
- However, gender was a significant factor when comparing the various types of pain in particular musculoskeletal sites. For example, women were significantly more affected by aching pain than males in the arms (110/317 or 34.70%), neck (123/283 or 43.46%), shoulder (141/318 or 44.34%) and middle/upper back (105/316 or 33.23%).
- Other types of pain females suffered significantly more from than males were "burning" pain in the arms, radiating, numbness and tingling pain into the fingers, as well as sharp pain into the wrists and neck.

## Fotiadis et al (2013)

- ③ PRMDs in professional orchestral musicians in Greece
- ③ "Independent t -test analysis revealed statistically significant differences according to gender, with women experiencing higher muscular discomfort in the neck and shoulders area compared to men, whereas no other differences were noted in the other five body areas examined." (p.92)
- ③ "Musculoskeletal disorders appear more commonly in female than male musicians, with certain groups of musicians, such as string instrumentalists, being more vulnerable to injury than others." (p. 94)





(Lonsdale, 2011; Nyman, 2007; Roach, 1994; Wahlström, 2009)

IF THIS IS THE CASE, WHY DOESN'T THE TRADITIONAL FLUTE LITERATURE ADDRESS THE PROBLEM?



Let's look at some history

# Mid-18th Century

Powell (2002, p.110) states that "In England as in the rest of Europe, the flute was almost exclusively the province of men. Women performed on fashionable ladies' instruments such as the harpsichord, piano or English guitar in the early 1760s, and later on the harp. Performing in public on male instruments, as Marianne Davies did on the flute at this time, was a highly radical act".

# 1939, The West Australian, Perth, Australia

Dr Artur Schnabel:  
"There are exceptions to every rule...but I do not like returning to age of the Amazons. Women have their proper place in life and I do not think that that place is the concert platform..."

**WOMEN AND MUSIC.**  
**Dr. Artur Schnabel's Striking Opinions.**  
From Our Special Correspondent.  
SYDNEY, July 28.—Dr. Artur Schnabel, noted pianist, has left Sydney for Perth via Melbourne, where he will give a chamber music recital with the Sydney String Quartet. He will return to Sydney from Perth instead of proceeding direct to Europe and give a final recital in Sydney. His arrival in the Eastern States has been the most phenomenal of all "returning home" events.  
Dr. Schnabel, the great virtuoso, the concert platform he is completely devoid of questions and he sits at the piano on the comfort of a chair sporting the conventional piano stool. His first performance in the States in Perth has been the platform. His ideas are constructive and revolutionary. He has his own ideas on women's place in the world.  
I asked him on the subject of women artists. I asked him whether he considered that great women composers of the past were missed and what the future were for women in the future. Dr. Schnabel was thoughtful but emphatic: "There are exceptions to every rule," he explained, "but I do not see the prospect in the age of the Amazons. Women have their proper place in life and I do not think that that place is the concert platform—that provides the creative compensation for men."  
**Cooking An Art.**  
"I believe that the latest civil progress is the ultimate achievement of women in such spheres. Their job is that of fundamental creation and every man may be allowed some compensation? It is to women we look to take care of love, beauty and harmony—the essentials of life with the modern world is no ready to be abandoned. And I believe that cooking is not so much an art as it is a woman's life skill."  
"Man has to go out and make money, draw blood and face the brutality of the world. True feminism means the freedom of the woman and every woman's work should be made by his brother. Any other theory would make the world infinitely worse than it is. It is from women that men have to derive the fundamentals of civilization and love, and it is through them, perhaps, that we must learn to find the courage of non-participation in those who are really very ignorant."  
"Women should be the strongest force in the world today. For they are the fundamental creators of everything in the world. Life, music—everything. They express their art best through listening that old tradition of romance, beauty and love. It is they who enable more men to go on as the interpreters of their creation."  
**"A Lovelike Age"**  
"Men," stated Dr. Schnabel, "are still living in the lovelike age and we must return to beauty—the real fundamental beauty of life, not the artificial beauty of pinked eyebrows and painted lips. The art of cooking? Why? How much more do I enjoy cooking than typing letters and sitting on a job in the office?"  
And I left Dr. Schnabel that he might enjoy someone else's creative efforts in the knowledge that really he would have much preferred to have cooked the meal himself instead of granting interviews to newspaper men. But I also will accept as found the romance and beauty for which he yearned to the men who, who accepted her own brilliant career that she might better be able to keep him—the vital element of his own dream. He found the courage of non-participation in those which are really very ignorant.



# 1940s

"...for the war effort of the 1940s drastically altered the employment pattern. It depleted the ranks of men and thereby made possible the entrance of female players of all instruments into the major symphony orchestras, as well as the orchestras in opera, radio and the movie and recording industries, from which they had formerly been excluded." (Neuls-Bates, 1986, p.363)

## 1946, The West Australian Perth, Australia

"No ban will be placed on appointment of women examiners to the Australian Music Examinations Board."



### Municipal Band To Admit Talented Female Players

The Hagerstown Municipal Band has decided to admit women to the organization, for the first time in its history. Dr. Peter Boys, conductor of the band, said that the decision was reached by band members this week, as part of the group's plan to encourage musical talent among the younger musicians.

Although the Hagerstown Municipal Band has been operating at full strength, Dr. Boys said that it is likely that the female musicians of Hagerstown might provide the band with additional members, particularly in its woodwind section.

He said that talented female musicians who play the flute, clarinet, saxophone, or French horn are in a particularly good position to augment the band's musical resources.

However, Dr. Boys emphasized that the band is also looking all the time for talented young male musicians. For instance, it could use a Sousa trombone player right now, and young ladies don't normally take up that particularly large instrument.

Naturally, since the Hagerstown Municipal Band plays most of concert caliber, prospective new members, male or female, should be musicians of advanced ability.

Dr. Boys said that the Hagerstown Municipal Band has never had a member of the female sex. On one or two occasions, young ladies have accompanied the band during the trying-out period that is provided for prospective members, but none of them remained in the organization.

Interested persons may telephone Dr. Boys at his residence or attend any rehearsal of the local band. The band rehearses each Monday at 8 p.m. in the band room at South Hagerstown High School.

Dr. Boys pointed out that all prospective members of the band are in on rehearsal for some weeks, while they get acquainted with the band and the band gets acquainted with them. Those who like band participation and fit in with the band's musical requirements are then made regular members.

Incidentally, Dr. Boys isn't concerned about the problem of having female as well as male musicians under his baton. Al

# 1958, The Daily Mail, Hagerstown, USA

“The Hagerstown Municipal Band has decided to admit women to the organization, for the first time in its history.”

“Needle Pointing”



by Alice Bunker

# 1972, The News Palladium, Michigan, USA

First female musician in the 102 year history of the Michigan State University Marching Band.

THE NEWS-PALLADIUM, MICHIGAN, MONDAY, OCT. 15, 1972

**Girl Liberates All-Male MSU Marching Band**

By Alice Bunker

...and other news items...

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1980s-1990s:

## Key studies about flute playing-related pain

- Flutist health largely ignored in the literature until the 1980s
- Some of the earliest studies to include flutists were undertaken in the 1980s by Dr Hunter Fry in Australia (Fry, 1986,1987,1988). Fry (1986, p.54) stated that flutists “are vulnerable to overuse anywhere in the upper limb and in the cervical, upper thoracic, and lumbar spines.”

Specific flute studies were conducted in the 90s:

- 1991 NFA Survey (Norris, 1996): investigating the prevalence of neuromusculoskeletal disorders in attendees at the National Flute Association Convention in Washington (n = 420 flutists)
- Flute Health Survey (Spence, 2001): a questionnaire on musculoskeletal and non-musculoskeletal problems, distributed at the 1999 Texas Flute Festival

## History

- ③ The modern flute was made and many method books were written for it during a time when instrument makers, performers and teachers of the flute were mostly male.
- ③ Many of the key flute methods, instruction books and studies were written by flutists such as Francois Devienne, Charles Delusse, Benoit Berbiguier, Joseph-Henri Altes, Paul Taffanel, Philippe Gaubert, and Marcel Moyse (Powell, pp.210-223).
- ③ Rockstro (pp.550-645) lists many other eminent flutists from 1640-1868, all men, such as Louis Hotteterre, Jean Baptiste Loeillet, Pierre Buffardin, Johann Joachim Quantz, Michel Blavet, Johann Tromlitz, Jean Tulou, Jules Demersseman, Anton Fuerstenau, Louis Drouet, Friedrich Kuhlau, Kaspar Kummer, Charles Nicholson, Theobald Boehm, Heinrich Soussmann, Paul Calmus, Vincent Dorus, Giulio Briccialdi, and Robert Pratten.





## Questions to consider:

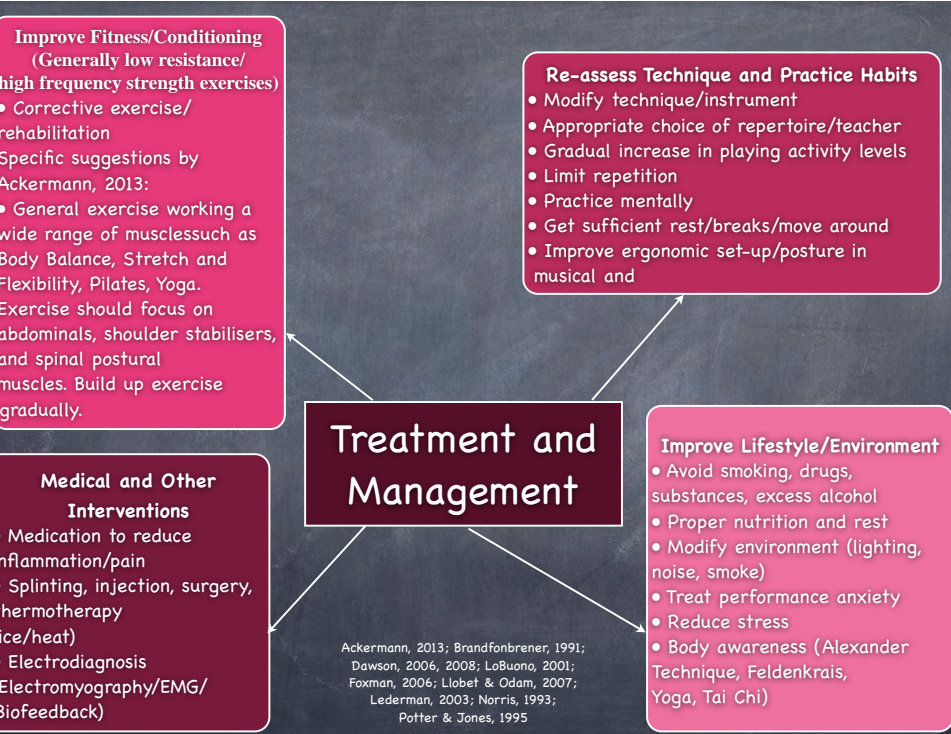
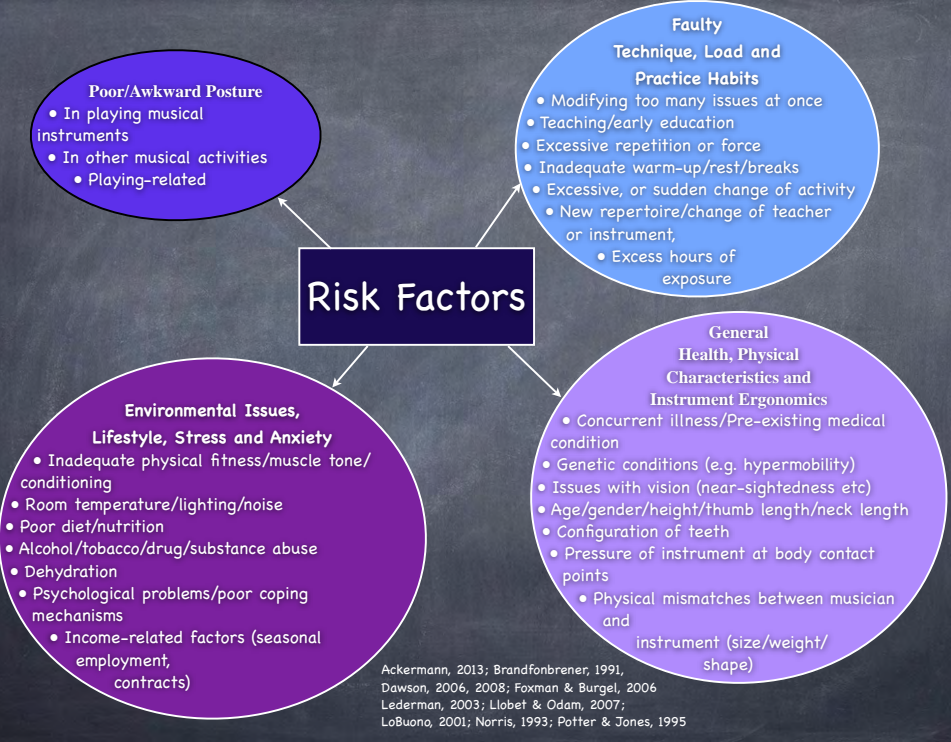
Should women practice or train differently to men?

Should children commence learning on small flutes?



This has not yet been tested, but be flexible and cautious in your approach to prescribing training programmes for different players.

Performing Arts Medicine,  
Ergonomics and  
Exercise Science





# On Maintaining Fixed Posture

"Maintaining a fixed posture for prolonged periods can lead to the development of some postural muscle groups at the expense of those that move the joints in the opposite direction. This leads to an undesirable reinforcement of the postural asymmetry, which can only be corrected by strengthening the weaker muscle groups." (Watson, 2009, p.40)

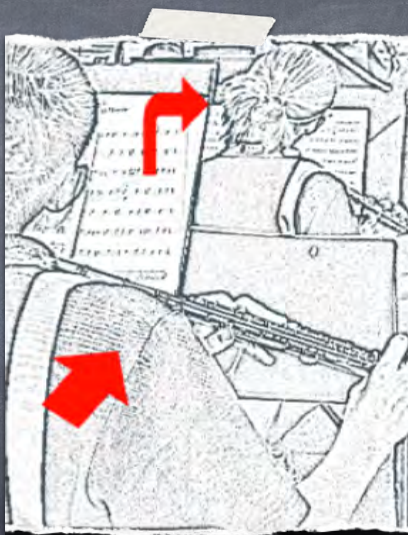
- Avoid practicing to the point where the muscles are completely fatigued by taking adequate breaks, resting, and aiming to use different muscle groups during the session (Llobet, 2007, pp.24-25).
- Prioritize stability and control and correct positioning at any stage of learning music, to avoid unnecessary physical tension (Dawson, 2008, p.25).
- Stretching as a preventative strategy (Horvath, 2009, p.117; Llobet, 2007, p.92; Watson, 2009, p.86)
- Exercise programs which counter-balance the flute playing position. Llobet (2007, p.97-98) suggests that musicians correct playing-related postural imbalances through physical regular activity that does not work the body in a similar way to the muscles used when playing (e.g. walking, running, rowing, skating, trekking, stair walking and dancing).

# Application of Ergonomics

- Joints must be in a neutral position (not possible with all joints)Keep the work close to the body (not possible with many flutes)
  - Avoid excessive reaches (hard to avoid, except with curved head joints)
  - Avoid carrying out tasks above shoulder level (hard to avoid, except by allowing neck to laterally bend)
  - Avoid bending forward
  - A twisted trunk strains the back
  - Sudden movements and forces produce peak stresses
  - Alternate postures as well as movements
  - Limit the duration of any continuous muscular effort
  - Prevent muscular exhaustion
  - More frequent short breaks are better than a single long one.
  - Limit the energy expenditure in a task
  - Rest is necessary after heavy tasks
  - Take account of differences in body size
  - Alternate sitting with standing and walking
  - The heights of the seat and back rest of the chair must be adjustable
  - Limit the number of adjustment possibilities
  - Provide proper seating instructions
- (Summarized from Dul, 2008, pp. 5-41)

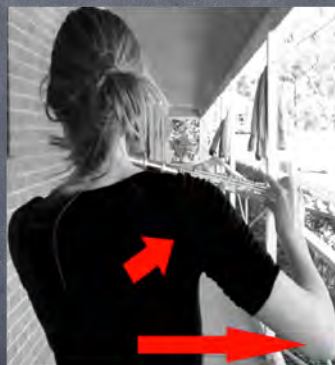


Physical mismatches between musician and instrument (size, weight, shape) - often cited as a risk factor for playing-related musculoskeletal disorders (e.g. Brandfonbrener, 1991; Dawson, 2008; Foxman, 2006; Ledermann, 2003; Llobet, 2007 and others)



## Avoid unnecessary movement

- Jutting chin forwards/dropping chin
- Excessive use of jaw
- Raising shoulders, wrists or elbows
- Rolling shoulders forward
- Head tilting
- Bending wrists
- Straightened fingers; slapping keys (Debost, 2002; Lonsdale, 2011)







# Application of Exercise Science Principles

- ④ Musicians and athletes have been compared a lot in the literature (e.g. Edmund-Davies, 2008; Fain, 2009; Llobet, 2007; Paull, 1997, Toff, 1996) but athletes tend to prepare more strategically for the possibility of injury
- ④ Periodization is one method used to avoid injury and could be worth considering for musicians (training in cycles, including initial emphasis on stability and control, rest and recovery, as well as adequate physical preparation for a variety of playing situations)
- ④ E.g. Ease beginners into practicing, emphasizing stability and control before duration; full rest days; alternating hard vs easy days; alternatively playing vs non-playing activities like score preparation, listening to recordings etc.

# Ideas for Teaching Beginners

- ④ Teach beginners to schedule breaks not just 'practice, practice, practice'.
- ④ Alternate playing with:
  - ④ Theory/musicianship/composition tasks
  - ④ Rhythm/clapping games
  - ④ Aural exercises
  - ④ Listening to recordings or watch YouTube videos
  - ④ Study general knowledge/musical background
  - ④ Stage etiquette (bowing, entrance and exit to the stage)

# Developing Stability and Control

## Sample Daily Home Practice Schedule for Beginners (Over 52 weeks)

5 - 10 minutes x 4 - 5 times per week

10 - 15 minutes x 4 - 5 times per week

15 - 20 minutes x 5 - 6 times per week

20 - 25 minutes x 5 - 6 times per week

25 - 30 minutes x 5 - 6 times per week

## Ideas for Professionals

- ③ Schedule full rest days after heavy playing periods
- ③ Alternate playing with: Studying accompaniment scores; listening to recordings; marking up parts (score preparation); working on finger technique only, not actually playing;
- ③ Light vs. heavier load practice days
- ③ Word hardening: Varying practice session lengths based on anticipated intensity of performances (Horvath, pp. 169-170).
- ③ Alternating concert flute with piccolo or alto (mimicking real situations)
- ③ Visualisation techniques (mental practice)



# Counterbalancing the Asymmetrical Flute Playing

- ③ Rest/breaks
  - ③ Physical activities using opposite muscle groups to flute playing
  - ③ Massage, trigger point therapy
  - ③ Alternate playing activities with non-playing activities (e.g. score study, listening to recordings, theory etc)
- (Dawson, 2008; Llobet, 2007; Lonsdale, 2011 and others)

## Implications for Flute Teachers

- ③ Be aware of and acknowledge various types of playing-related physical problems
- ③ Be aware of of risk factors to injury
- ③ Understand prevention and management strategies
- ③ Emphasize stability and control in the earliest stages before duration
- ③ Avoid prescriptive advice for every student. Tailor instruments, practice and technical advice for individual students
- ③ Don't give advice which is outside of your training and qualifications (i.e. refer students to medical and allied health professionals when technical issues have been addressed.)

# Practicing and Rehearsing

- ③ Take breaks and rest
- ③ Counterbalance the playing position
- ③ Alternate playing with non-playing activities (e.g. listening to recordings)
- ③ Use earplugs where appropriate
- ③ Ensure appropriate seating arrangements
- ③ Create a healthy playing environment by addressing poor lighting, smoke, airconditioning.
- ③ Use earplugs

## Limitations

- ③ These suggestions are based on the performing arts medicine, ergonomics and exercise science literature. Further scientific tests need to be conducted regarding potential benefits of periodization, for example to flute practice.
- ③ Further studies investigating pain, gender and flutists are necessary to provide a clearer understanding of issues relating to playing position and injury prevention.



# Conclusions

- Studies around the world have consistently shown that flutists suffer from playing-related physical problems in anatomical sites such as the neck, shoulders, upper back, wrists and hands.
- Teachers and players need to be aware of the contributing factors for injury, and implement prevention and managing strategies in their studio teaching, rehearsal and practice situations.
- While the flute playing position is not ideal, there are ways of optimizing this position, by avoiding unnecessary and excessive movements. Similarly, flutists can optimize practice and rehearsal situations to create safer working situations.

Thank you for listening

• Questions?

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