

Looking at Musicians' Health through the "Ages"

This month's editorial is based on a presentation that I did at the International Congress on Music Physiology and Musicians' Medicine, which was held in Germany in late March.¹ Organized by Drs. Claudia Spahn and Bernard Richter, it brought together musicians, teachers and performing arts medicine professionals from all over the world in the medieval/modern city of Freiburg. Freiburg dates back to around 1100, and the original walled city is still present. An excellent example of modern Freiburg is the musician's clinic that Drs. Spahn and Richter have created: it offers state-of-the-art diagnosis, treatment, and rehabilitation to both vocal and instrumental musicians from southwestern Germany and beyond.

Stimulated by some recent articles published in *MPPA*,^{2,3} I attempted to review what we know about the pattern of performance-related musculoskeletal disorders (PRMDs) among instrumental musicians over the lifespan. For the purposes of this review, I have not made any attempt to do a rigorous critique of the methods used in each study, but there are some key definitions and terminology that are relevant.

First, we need to keep in mind how the PRMDs are counted. The three standard methods to measure the occurrence of events over time in a defined population are cumulative prevalence, point prevalence, and incidence.⁴ *Cumulative prevalence* refers to the number of individuals who have or have ever had the condition of interest at a particular point in time; it can be expressed as a percentage of the defined population, or a larger denominator can be used when looking at a rare condition. *Point prevalence* is the number of individuals who have the condition of interest currently; it is

expressed in the same units as cumulative prevalence. *Incidence* is the number of individuals who have developed the condition in a defined period of time (usually a year); it is expressed as x cases per y population per year. All three have been used in various studies of PRMDs.

The other key item that is important to note is the variable being measured. In most studies of PRMDs, a survey of musicians asks them if they are having pain related to playing their instrument. Some studies also ask about other symptoms as well. Alternatively, one can look at health-care-seeking behavior that is prompted by a PRMD. A third option is to examine time lost from practice and performance due to a PRMD. Again, all three have been used in various published studies, which makes direct comparisons of one study to another difficult to impossible. Even more problematic is that studies diverge widely on the wording of the questions used in the surveys. Since even small differences in terminology can produce significant variation in the results, this adds to the difficulty of drawing conclusions from the studies published to date.

Keeping those caveats in mind, let's start by looking at PRMDs in the youngest instrumental musicians. One of the recent articles that piqued my interest in this topic was written by Ranelli et al., from the December 2008 issue of *MPPA*.² They collected data from 731 primary and secondary school students studying music in Australia, ages 7 to 17 yrs old. The cumulative prevalence of symptoms was 50% in the youngest students and 80% in the oldest. The cumulative prevalence of disability was 18 to 20% in the youngest vs 30 to 45% in the oldest,

and girls had a higher frequency of disability than did boys. Furthermore, the timing of the increase in symptoms differed between boys and girls (see Figure 1, in which I have reformatted the figures from the original article). In both genders, the year at which the prevalence rate began to increase noticeably coincided with the average age of peak increase in height velocity (“growth spurt”) for that gender. Ranelli et al.’s is the only study that I could find that has measured PRMDs in the preadolescent population.

Several studies have looked at PRMDs in the younger to middle adolescent population. Dr. Hunter Fry^{5,6} did two surveys of music students at the high school level in the 1980s. In one of them, he studied 98 music students in Australia who were practicing less than 500 hrs/yr on average (about 10 hrs/wk), and 56% of them reported having had performance-related pain on at least one occasion (cumulative prevalence). He also studied 169 music students in Great Britain who were practicing about 1000 hrs/yr (20 hrs/wk); 71% of them reported ever having had playing-related pain (again, cumulative prevalence). Overall, these figures are somewhat higher than those reported in the Ranelli paper. These two studies point out the importance of measuring the "exposure rate" when collecting data on the occurrence of PRMDs: there appears to be a correlation between the number of hours spent playing an instrument and the risk of developing a PRMD.

Shifting our attention to the university student population, we find three relevant studies that have measured cumulative prevalence of symptoms. In the last issue of *MPPA*, Dr. Brandfonbrener³ reported on 330

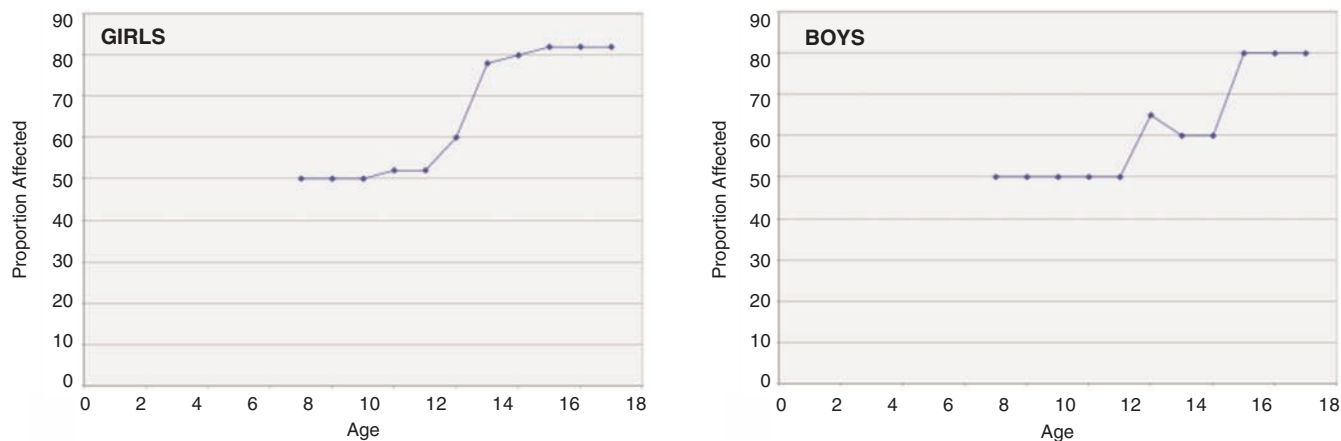


FIGURE 1. Increase in PRMD symptoms by age for girls (left) and boys (right). Data from Ranelli et al.²

entering freshman music majors in a US university (including some voice majors): 75 to 80% of them had already had a PRMD. In a 2002 report, Dr. Spahn⁷ surveyed 197 music students in Germany (also including some voice students); their cumulative prevalence of PRMD was 68%. In another report, Guptill⁸ collected data from 108 university student ensemble members in the US; 88% of them had had a PRMD. Taking into account the fact that voice students should be at lower risk for a PRMD, it appears that university students have a somewhat higher rate of PRMDs than do younger students. Unfortunately, we do not have good data on the exposure rate for the university students, but clinical experience would indicate that it is over 1000 hrs/yr for most of them.

We also have some data on other measures of PRMDs in university music students. Zaza⁹ reported on the cumulative prevalence of inability to practice or perform among 300 Canadian music students (including voice) who were practicing about 800 hrs/yr; 43% of them had had at least one episode of temporary disability. Fortunately, only 15% of them had been unable to practice or perform for more than 1 week. Another study by Dr. Fry¹⁰ reported the point prevalence of PRMDs among 1249 music students in Australia to be 9%.

The only “long-term” incidence data come from a university-level program in upstate New York.¹¹ Over 20 years, the

rate has been approximately 8.5 injuries/100 performance majors/year. Women have had a higher rate of PRMD than men, as measured by the number of visits to the student health service for specified musculoskeletal diagnoses. Those playing the harp and guitar have the highest injury rate; those playing the piano and other strings have an intermediate injury rate; and those playing wind instruments, organ, and percussion tend to have lower injury rates. Peak injury rates occur early in the first semester and in the middle of the second semester.

Although we have no data on the cumulative prevalence of PRMDs among adult/professional orchestra musicians, we do have point prevalence data. The 1988 ICSOM survey of 2212 symphony orchestra musicians in the US, by Fishbein et al.,¹² showed that 82% of respondents had pain at the time of the survey. Dr. Fry also did a study of the point prevalence of PRMDs in eight symphony orchestras in Australia, Great Britain, and the US.¹³ Participants were averaging 30 hrs of practice, rehearsal, and performance per week, and 64% of them had pain when surveyed. Caldron et al.¹⁴ surveyed 378 symphony orchestra musicians in the US who were averaging 25 hrs/wk, and 59% of them reported pain at the time of the survey. The cumulative prevalence data on adults are limited to two relatively recent reports. Buckley and Manchester¹⁵ gathered data on 111 bluegrass music

camp attendees in the US who played about 200 hrs/yr, and 65% of those over age 18 had had performance-related pain. Furuya¹⁶ studied 203 female Japanese pianists, who had a 77% cumulative prevalence of pain related to playing that instrument.

So, what conclusions can we draw from these reports of PRMDs over the age span of a career as an instrumental musician? The purist would say “none,” since no two studies asked exactly the same questions or collected data in the same way. But as long as we keep these caveats in mind, I think it is useful to describe the association between stage of career and likelihood of injury. The cumulative prevalence of PRMDs appears to start at a relatively high level among the youngest performers and gradually increases over the lifetime of a performance career (Figure 2). As mentioned earlier, adolescence may be a time of particularly high risk, and increased time spent playing the instrument appears to increase the risk of symptoms at all ages. But when we look at point prevalence, we see that it is relatively low in university students—based on a single study¹⁰—and very high in professional adult instrumentalists^{12–14} (Figure 3). So as performers age, it appears that they suffer injuries more frequently and/or it takes them longer to recover.

This same phenomenon has been studied in both dance and sports. Increasing age is generally considered to

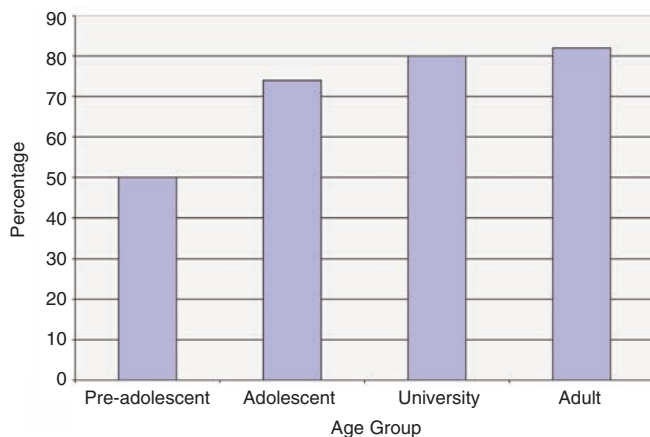


FIGURE 2. Cumulative prevalence of PRMDs by age group: pre-adolescent,² adolescent,^{5,6} university,^{3,7,8} and adult.³²

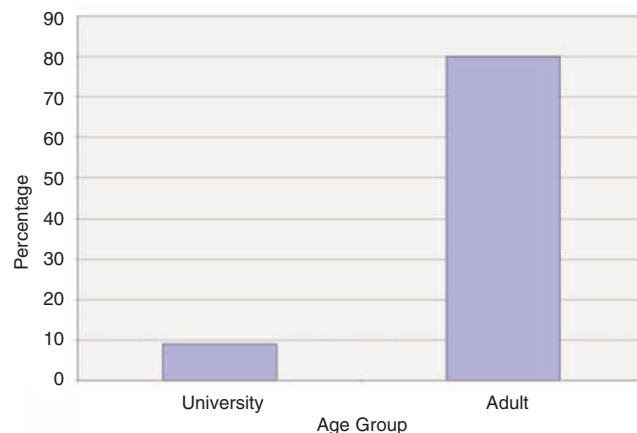


FIGURE 3. Point prevalence of PRMDs in university students¹⁰ vs professional adult instrumentalists.¹²⁻¹⁴

be a risk factor for injury in ballet throughout the performing career (teens through 30s).¹⁷ Increasing age is generally considered to be a risk factor for injury in sport as well, but the role of decline in physical performance is unclear. Sport injuries are usually measured per 1000 hrs of exposure to the activity.¹⁸ By way of comparison, an unpublished study reported that 60% of competitive swimmers are injured each year, mostly due to repetitive motion.¹⁹

What should we do? Future studies should use standard definitions of terms and standardized questionnaires. Injury data from multiple sites should be reported to a central office. We should measure hours of exposure to playing the instrument (or singing or dancing) using a standardized format. And we should do more longitudinal studies of defined cohorts that will give us better point prevalence and incidence data on a variety of populations.

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