

# Suffering for one's art: Performance related musculoskeletal disorders in tertiary performing arts students in music and dance

**Dianna T. Kenny<sup>1,2</sup>, Justine Cormack<sup>2</sup>, and Rosemary Martin<sup>2</sup>**

<sup>1</sup> Australian Centre for Applied Research in Music Performance,  
Faculty of Arts, University of Sydney, Australia

<sup>2</sup> National Institute of Creative Arts and Industries,  
University of Auckland, New Zealand

The study reports the results of an intake questionnaire assessing point prevalence of performance related musculoskeletal disorders (PRMD) and pain in 151 tertiary level performing arts students in music and dance. Forty percent reported having received a medical diagnosis for a condition related to playing their instrument or performing their dance style. The most common diagnoses for music students were repetitive sprains and strains such as tennis elbow, carpal tunnel syndrome, tendonitis, tenosynovitis, and muscle tightness, including temporomandibular joint syndrome, tight embouchure, muscle spasm, numbness, and cramping. Sixty-four percent of the dance students had serious injuries such as broken bones, joint dislocations, cruciate ligament and meniscus tears and strains, other muscle tears, and sprains/strains in biceps, hamstrings, and ankles, tightening in hamstrings and hips, and bunions. Only 27% of the total sample reported no current pain from a PRMD; 11.3% reported suffering daily or almost daily from a PRMD. Given the high injury rates among performing arts students, injury surveillance systems may be a cost effective way to identify high risk injuries in specific cohorts, and to apply appropriately specific management and prevention strategies for musicians and dancers during their training in order to assist in the development of sustainable careers.

*Keywords:* performance related musculoskeletal injury; musicians; dancers; tertiary students; injury surveillance

Musicians and dancers (secondary, tertiary, and professional) are at high risk of strain and injury in the execution of their art (Barton *et al.* 2008). Approximately half of professional musicians and music students experience significant symptoms (Norris 1993, Zaza 1998) with a point prevalence of performance related musculoskeletal disorders (PRMD) ranging from 39% to 87% in adult musicians and from 34% and 47% in secondary students (Zaza 1998). Musculoskeletal injury is also the most frequent medical problem among classical and modern dancers (McBryde *et al.* 2007), with 97% of all dancers surveyed sustaining injuries over an eight month period (Ostwald *et al.* 1994). Overuse injuries account for 60-76% of all dance injuries (Bronner *et al.* 2003). Potential risk factors associated with developing PRMD in musicians include gender (females at greater risk; Barton *et al.* 2008), years of playing, instrument played (string and keyboard players at greater risk; Bruno *et al.* 2008), playing-related physical (long hours, over-practicing) and psychological stressors (self-pressure/academic), lack of preventative wellness behaviors (taking breaks), and previous trauma (Wu 2007). This study reports the results of a PRMD questionnaire to provide information regarding the point prevalence of PRMD and pain experienced by tertiary level performing arts students in music and dance as a basis for subsequent targeted preventive action.

## METHOD

### Participants

The sample comprised 151 students, aged from 17-50 years, with a mean age of 21.44 years (SD=5.9); 109 (72%) music and 42 (28%) dance students—54 (36%) males and 97 (64%) females—attending the National Institute of Creative Arts and Industries, University of Auckland, in March 2009. These numbers represented 48% (music) and 79.2% (dance) of the total cohort. Students completed a comprehensive questionnaire at the commencement of the academic year.

### Materials

*Performance related musculoskeletal variables:* Performance related musculoskeletal disorders (PRMDs) were defined as “any pain, weakness, numbness, tingling or any other symptoms that interfere with your ability to play your instrument/perform your dance routines at the level to which you are accustomed. This definition does not include mild short-lived aches or pains.” The following variables were selected as the dependent measures of PRMDs:

- PRMD frequency: assessed on a 10-point Likert scale (0=never, 10=daily)
- PRMD severity (worst ever): assessed on a 10-point Likert scale (0=no pain, and 10=worst imaginable)
- Current pain or injury from any cause
- PRMD duration of symptoms (in days): students indicated the duration of a current PRMD if they had one
- Pain severity for pain right now
- Pain severity for pain at its most severe

*Body Mass Index (BMI):* BMI is a measure of body fat based on height and weight that applies to adult men and women. People may be categorized into four weight groups based on their BMI as follows: underweight: <18.5, normal weight: 18.5-24.9, overweight: 25.0-29.9, obese:  $\geq 30.0$ . Students were assessed for BMI to ascertain whether there were any differences in PRMD and pain according to weight.

## **Procedure**

Ethics approval for the study was granted by the University of Auckland Human Participants Ethics Committee. The study was introduced to students in the first lectures of the semester through brief presentations to class groups by the lecturers and researchers. Participation information sheets were distributed to all eligible students, and those who were interested were invited to attend classes set aside for the completion of the surveys.

## **RESULTS**

*Demographics:* There were 151 students [109 (72%) music and 42 (28%) dance students; 54 (36%) males and 97 (64%) females; mean age=21.44 years (SD=5.9), range 17-50 years]; 52 students (34%) were in their first year, 54 (36%) in second year, 27 (18%) in third year, 1 in fourth year (0.7%), and 17 (11%) were postgraduate students; piano students (24%), guitar (13%), violin (9%), saxophone (9%), cello (6%), drums (6%), trumpet (6%), viola (6%), flute (5%), and clarinet (5%). The remainder was studying double bass, French horn, trombone, tuba, and bassoon. The majority of dance students were studying contemporary (38%) or hip hop (29%), then jazz (14%), classical (7%), cultural (7%), tap (2%), and ballroom (2%). Of the total group, 63 (40%) reported having received a medical diagnosis for a condition related to playing their instrument or performing their dance style. Of the 109 music students, 37 (33%) reported one or more diagnoses from medical practitioners that comprised mainly repetitive sprains and strains (tennis elbow, car-

Table 1. PRMD and pain factors and descriptive and F-statistics by group.

		<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Max</i>	<i>Min</i>	<i>F</i>	<i>Sig</i>
PRMD frequency	Music	109	2.79	2.84	0	10	2.997	0.086
	Dance	42	3.71	3.21	0	10		
	Total	151	3.05	2.97	0	10		
PRMD severity	Music	109	3.00	2.60	0	8	1.583	0.210
	Dance	42	3.62	2.97	0	10		
	Total	151	3.17	2.71	0	10		
Pain severity now	Music	48	2.79	2.09	0	8	0.374	0.543
	Dance	27	3.11	2.31	0	8		
	Total	75	2.91	2.16	0	8		
Pain most severe	Music	48	6.25	2.10	2	9	5.852	0.018
	Dance	27	7.33	1.33	4	10		
	Total	75	6.64	1.92	2	10		
Pain duration of symptoms	Music	48	388.92	472.77	1	1680	0.003	0.960
	Dance	27	395.33	613.33	2	2184		
	Total	75	391.23	523.58	1	2184		

pel tunnel syndrome, tendonitis, tenosynovitis, and muscle tightness, including temporo-mandibular joint syndrome, tight embouchure, muscle spasm, numbness, and cramping). Of the 42 dance students, 27 (64%) reported medical diagnoses that included serious injuries such as broken bones, joint dislocations, cruciate ligament and meniscus tears and strains, other muscle tears, and sprains/strains in biceps, hamstrings, and ankles, tightening in hamstrings and hips, and bunions. Thirteen students (8.6%) reported that they had undergone surgery that they believed had an impact on their ability to play music or dance. Three nominated abdominal surgeries (appendectomy, bowel, and caesarean section), one had surgery for the removal of a cancerous tumor and the remainder nominated limb surgeries on broken bones in arms and fingers, and knee reconstructions. On the 10 point scale for PRMD frequency, where 10 represents daily occurrence, 27% (n=40) of students reported no current PRMD; 23.8% rated their PRMD frequency as 5 or higher, of whom 17 (11.3%) reported daily or almost daily occurrence of a PRMD. Forty-four students (22.5%) rated their PRMD severity above 5, and 10 students (6.6%) rated their PRMD severity to be as close to or actually the worst severity that they could imagine. Seventy-five students (50%; 48 (44%) music students and 27 (64%) dance students) reported experiencing a current

Table 2. PRMD and pain factors and descriptive and F-statistics by gender.

		<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Max</i>	<i>Min</i>	<i>F</i>	<i>Sig</i>
PRMD frequency	Male	54	2.04	2.53	0	10	10.331	0.002
	Female	97	3.61	3.05	0	10		
	Total	151	3.05	2.97	0	10		
PRMD severity	Male	54	2.20	2.31	0	10	11.443	0.001
	Female	97	3.71	2.78	0	9		
	Total	151	3.17	2.71	0	10		
Pain severity now	Male	24	2.33	1.97	0	7	2.530	0.116
	Female	51	3.18	2.22	0	8		
	Total	75	2.91	2.16	0	8		
Pain most severe	Male	24	5.67	2.08	2	9	10.177	0.002
	Female	51	7.10	1.68	2	10		
	Total	75	6.64	1.88	2	10		
Pain duration of symptoms	Male	24	187.75	302.98	1	1008	5.667	0.020
	Female	51	486.98	578.16	1	2184		
	Total	75	391.23	523.58	1	2184		

pain, 11.3% of whom reported suffering daily or almost daily pain. Fifty-three percent (n=40) said that their current pain was caused by playing their instrument/dancing. Seventy-two percent (72%; n=54) indicated that their current pain had a negative impact on their ability to play their instrument/dance.

*Subgroup analyses:* Subgroup analyses were conducted to ascertain whether PRMD and pain patterns were related to group (music or dance), gender, or body mass index (BMI<18.50 or >18.50). Dance students recorded higher mean ratings than music students for the most severe pain ever experienced (see Table 1). With the exception of current pain severity, females reported higher mean ratings on all the other PRMD and pain factors (see Table 2). Fifteen percent (n=22) of students were underweight, 70% (n=104) were of normal weight, 12% (n=18) were overweight, and 3% (n=5) were obese. Chi square analysis indicated that there were no differences in the proportions of underweight, overweight, or obese students by group or sex, and no relationship between BMI and any PRMD or pain measure.

## DISCUSSION

Findings confirmed high injury rates and PRMD prevalence of performing arts students; dancers (64%) had double the rates of musicians (33%); 53% reported that their current pain was caused by their instrument/dancing. No significant differences were found between instrument groups or dance styles in terms of PRMD and pain prevalence. Females reported higher rates of PRMD and pain. BMI was not associated with either PRMD or pain. These results reinforce the need for injury management programs and injury prevention education to support sustainable careers in the performing arts. Translational research, development, and implementation are needed in both educational and professional contexts to address the unacceptably high prevalence of PRMD in performing arts students (Wynn Parry 2004).

### Address for correspondence

Dianna Kenny, University of Sydney, PO Box 170, Lidcombe, New South Wales 1825, Australia; *Email:* d.kenny@usyd.edu.au

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