

Practicing perfection: The physical costs of practice in tertiary music and dance students

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Despite the many physical demands involved in practice in music and dance, little attention has been paid to the impact of practice on the musculoskeletal system of young performers. We, therefore, assessed whether the amount of daily practice and the practice and rehearsal routines of tertiary music and dance students were related to the frequency and severity of reported performance related musculoskeletal disorders (PRMD) in 109 music and 42 dance (36% males) from The National Institute of Creative Arts and Industries, University of Auckland. Music students practiced, on average, 156 minutes per day, compared with 107.5 minutes for dance students. Music students spent an average of 401 minutes and dance students spent an average of 369 minutes per week rehearsing with others. Contrary to prediction, linear regression analyses showed no relationship between PRMD frequency, severity or duration, and any of the practice factors assessed. Although excessive practice is frequently cited by performing artists as one of the contributors to PRMD, this study did not confirm a relationship between practice and PRMD in this sample. It is possible that the amount of practice (2.6 hours per day in music students and 1.8 hours for dancers) fell below the threshold for a pain inducing practice period, particularly as these students reported taking rest breaks after 48 (dancers) and 60 (music) minutes' practice. Further research is needed to assess the relationship between PRMD and practice.

Keywords: practice; practice routines; musicians; dancers; performance related musculoskeletal disorders

Tertiary students in music and dance practice for many hours per day over many years, often commencing in early childhood, to perfect their art, with the hope that the years of practice will gain them a place in a leading orchestra or dance company. To achieve this goal, dancers and musicians place their bodies under tremendous stress on a regular basis, with pain and injury often being considered an occupational hazard (Brandfonbrener 2003, Bruno *et al.* 2008, Garrick and Lewis 2001, Hoppmann 2001, Hoppmann and Reid 1995, Kelman 2000). However, despite the many physical demands involved in practicing music and dance, little attention has been paid to the impact of practice on the musculoskeletal system. Systematic reviews of literature (Bragge *et al.* 2006, Wu 2007) have identified practice as a risk factor, citing long hours and over-practicing as contributors to injury, in particular the development of overuse syndromes. Hoppman and Patrone (1989) showed that longer daily practice time was significantly related to development of musculoskeletal problems, and Zetterberg *et al.* (1998) found that practice hours were related to problems in the neck and upper extremity of musicians. Bejjani *et al.* (1996) observed that overuse syndrome occurs in up to 50% professional symphony orchestra musicians and 21% music students. Morse *et al.* (2000) found that “the relationship of hours played to pain is complex, and may well be affected by risks from non-music jobs, which are very common among amateur musicians” (p. 85). Musculoskeletal injury is the most frequent medical problem among classical and modern dancers (Milan 1994, Ostwald *et al.* 1994, McBryde *et al.* 2007). Ostwald *et al.* (1994) revealed that over an eight month period, 97% of all dancers surveyed had sustained injuries. Overuse injuries account for the majority (60-76%) of all dance injuries and these are most likely to occur when fatigued or overworked (Bronner *et al.* 2003). However, there are no studies assessing the relationship between musculoskeletal disorders and practice in dance. This study assessed whether amount of daily practice and practice and rehearsal routines of tertiary music and dance students were related to frequency, severity, and duration of reported PRMDs.

METHOD

Participants

The sample comprised music and dance students in all years who were attending the National Institute of Creative Arts and Industries, University of Auckland, in March 2009. The sample comprised 151 students, 109 (72%) music and 42 (28%) dance students. These numbers represented 48% (music) and 79.2% (dance) of the total cohort. There were 54 (36%) males and 97

(64%) females. They ranged in age from 17-50 years, with a mean age of 21.44 years ($SD=5.9$). Students completed a comprehensive questionnaire at the commencement of the academic year.

Materials

A comprehensive questionnaire was developed to explore the relationship between practice and performance related musculoskeletal disorders in this population. The variables of interest in this paper are described below.

Practice variables: Six variables were selected as the dependent measures of practice as follows: (1) days per week of practice, (2) hours/minutes practice in one day, (3) length of practice before taking a rest, (4) time in minutes, weekly, rehearsing with others, (5) length of rest break before resuming practice, and (6) total practice, calculated using the algorithm: (days per week of practice \times minutes practice in one day \times rehearsal time).

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 or dance at the level to which you are accustomed. This definition does not include mild short-lived aches or pains.” Three variables were selected as the dependent measures of performance related musculoskeletal disorders as follows: (1) PRMD frequency ($n=151$): rated on a 10-point Likert scale (never=0, daily=10), (2) PRMD severity (most ever) ($n=151$): rated on a 10-point Likert scale (no pain=0, worst imaginable pain=10), and (3) PRMD duration of symptoms (in days) ($n=75$): students rated the duration of a current PRMD if they had one.

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 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

Descriptives, practice variables: Music students practiced, on average, 5.83 days per week ($SD=1.23$, range=2-7 days). Dance students practiced on average 3.64 days per week ($SD=1.87$, range 1-7 days). Music students practiced,

on average, 156 minutes (SD=73.67, range=45-360 mins) per day, compared with 107.5 minutes (SD=71.1, range=30-300 mins) for dance students. This difference was statistically significant ($F_{1,149}=13.42$, $p=0.001$). Music students reported practicing on average for 61.1 mins (SD=40.4, range=0-240 mins); dance students practiced on average 47.9 minutes (SD=32.4, range=0-120 mins) before taking a break. This difference fell just short of significance ($F_{1,149}=3.6$, $p=0.06$). Music students reported that they took, on average, a 19 min rest (SD=29.8, range=0-240 mins) compared with dance students, who broke for an average of five minutes (SD=4, range=0-15 mins) before resuming practice. This difference was statistically significant ($F_{1,149}=9.1$, $p=0.003$). Music students spent an average of 401.2 mins per week (SD=308.2, range=0-1800 mins) rehearsing with others; dance students spent an average of 368.9 mins (SD=380.4, range=0-1800 mins) rehearsing with others. This difference was not statistically significantly different ($F_{1,149}=0.287$, $p=0.59$). Data on “total practice” were available for 147 students. The mean total involvement in some form of weekly practice was 1180 mins per week (19.67 hours) [SD=673.2 mins (11.2 hours), range=60-2880 mins (1- 48 hours)].

Descriptives, performance related musculoskeletal variables: Music students’ average rating for PRMD frequency was 2.79 (SD=2.84, range=0-10), PRMD severity was 3.0 (SD=2.60, range=0-8), and duration of symptoms for the 48 reporting a current PRMD was 388.9 days (SD=472.8 days, range=0-1680). For dance students, PRMD frequency was 3.8 (SD=3.2, range=0-10), PRMD severity was 3.7 (SD=2.9; range=0-10), and duration of symptoms for the 27 reporting a current PRMD was 401.6 days (SD=632.96 days, range=2-2354).

Analyses: A series of linear regression analyses were conducted to assess the association between practice and rehearsal routines and frequency, severity, and duration of PRMDs. Because they were assessed on different scales, the dependent measures were converted to Z scores prior to analysis. The dependent variables were PRMD frequency, severity, and duration, and the independent variables were minutes practiced per day, length of rest breaks between practice sessions, amount of rehearsal time per week, and total practice. As predicted, there was a significant relationship between the amount of practice and length of rest breaks before resuming practice ($R^2=0.56$), with longer practice sessions tending to be followed by longer rest breaks. The relationship between PRMD frequency and PRMD severity was also significant and in the expected direction ($R^2=0.48$, $F_{1,149}=136.7$, $p=0.001$). However, contrary to prediction, there was no relationship between PRMD frequency, severity, or duration, and any of the practice factors assessed. For the dependent variable total practice, there was no relationship

between practice and any of the PRMD variables ($R^2=0.83$, $F_{1,149}=1.26$, $p=0.29$). Inspection of the standardized Beta coefficients indicated that the strongest relationship was between PRMD severity and total practice ($\beta=.26$, $t=1.58$, $p=0.12$). Because of the very great differences in amount of weekly practice in this sample, two groups were created by median split into “practiced less than 1080 minutes per week” (52.4% of sample) and “practiced more than 1080 minutes per week” (47.6% of sample). One way analysis of variance (ANOVA) was conducted on these groups with PRMD duration, frequency, and severity as the dependent variables. There were no significant differences on any of these three variables between low and high practice groups: PRMD duration ($F_{1,73}=0.33$, $p=0.07$), frequency ($F_{1,145}=0.12$, $p=0.73$), and severity ($F_{1,145}=0.97$, $p=0.33$). This analysis was run separately for musicians and dancers, and again there were no significant differences between high and low music or dance practitioners and PRMD outcomes.

DISCUSSION

Contrary to prediction, there was no significant relationship between practice and PRMD frequency, severity, or duration in this sample. It is likely that the amount of practice fell below the threshold for a pain-inducing practice period. For those students suffering PRMDs, practice may act as a risk factor or contributor in exacerbating their injuries, although may not necessarily be the root cause of their injury. A number of factors not assessed in this study may contribute to the relationship between practice and PRMDs. These include correct performance technique, technically correct practice, physical characteristics, and level of fitness of participants and work history. Further research is needed to assess the relationship between PRMD and practice.

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