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Research

Soreness during non-music activities is associated with playing-related musculoskeletal problems: an observational study of 731 child and adolescent instrumentalists

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KEY WORDS

Instrument playing
 Musculoskeletal problems
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ABSTRACT

Question: Is exposure to non-music-related activities associated with playing-related musculoskeletal problems in young instrumentalists? Is non-music-activity-related soreness associated with playing-related musculoskeletal problems in this group of instrumentalists? **Design:** Observational study using a questionnaire and physical measures. **Participants:** 859 instrumentalists aged 7 to 17 years from the School of Instrumental Music program. **Results:** Of the 731 respondents who completed the questionnaire adequately, 412 (56%) experienced instrument-playing problems; 219 (30%) had symptoms severe enough to interfere with normal playing. Children commonly reported moderate exposure to non-music-related activities, such as watching television (61%), vigorous physical activity (57%), writing (51%) and computer use (45%). Greater exposure to any non-music activity was not associated with playing problems, with odds ratios ranging from 1.01 (95% CI 0.7 to 1.5) for watching television to 2.08 (95% CI 0.5 to 3.3) for intensive hand activities. Four hundred and seventy eight (65%) children reported soreness related to non-music activities, such as vigorous physical activity (52%), writing (40%), computer use (28%), intensive hand activities (22%), electronic game use (17%) and watching television (15%). Non-music-activity-related soreness was significantly associated with instrument playing problems, adjusting for gender and age, with odds ratios ranging from 2.6 (95% CI 1.7 to 3.9) for soreness whilst watching television, to 4.3 (95% CI 2.6 to 7.1) for soreness during intensive hand activities. **Conclusion:** Non-music-activity-related soreness co-occurs significantly with playing problems in young instrumentalists. The finding of significant co-occurrence of music and non-music-related soreness in respondents in this study suggests that intervention targets for young instrumentalists could include risk factors previously identified in the general child and adolescent population, as well as music-specific risk factors. This is an important consideration for the assessment and management of the musculoskeletal health of young musicians. [Ranelli S, Straker L, Smith A (2014) Soreness during non-music activities is associated with playing-related musculoskeletal problems: an observational study of 731 child and adolescent instrumentalists. *Journal of Physiotherapy* 60: 102–108].

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Introduction

Activities of childhood and adolescence, such as vigorous physical activity, computer use and playing musical instruments, contribute to physical, cognitive and social development.^{1,2} Positive and adverse health outcomes are associated with activity participation and may be influenced by levels of exposure. Musculoskeletal soreness has been reported with high exposures to: physical activity participation;³ use of information and communication technology such computers and electronic games;⁴ television viewing;^{3,5} writing or other intensive hand activities such as needlework or handicraft.⁶ Subsequently,

position statements and evidence-based guidelines for children have been developed to ensure safe physical activity participation⁷ and wise computer use.¹

Learning a musical instrument is a common activity amongst children and adolescents. In 2005, 20% (520 500) of Australian children aged 5 to 14 years played a musical instrument outside of school hours.⁸ Learning music promotes positive cognitive, social, emotional and physical development in children and contributes to positive life-long learning experiences.⁹ However, playing a musical instrument is associated with rates of up to 67% of children having playing-related musculoskeletal problems,¹⁰ which is similar to the rates of adult musicians.^{11–13}

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The musculoskeletal problems of musicians include tendinopathies, nerve compression syndromes and focal dystonia, and are thought to have multiple risk factors.¹⁴ These include: intrinsic factors (age, gender, psychosocial); extrinsic music-related factors (type of instrument, music exposure); extrinsic non-music-related factors (participation in activities of daily living, physical activity or computer use), with interactions between intrinsic and extrinsic factors (playing posture is influenced by physical attributes of instrument). There is limited research on playing-related musculoskeletal problems in children and adolescents, despite evidence that the development of musculoskeletal disorders commonly begins in adolescence.¹⁵ Emerging evidence suggests that age,^{16,17} gender,^{13,16} psychosocial factors,^{11,18} instrument type,^{11,12,14,16,19,20} music exposure,^{16,21} and playing posture¹⁴ contribute to musculoskeletal problems in young instrumentalists. However, the relevance of participation in non-music activity is unclear.

Whilst a few instrumental studies have reported on non-music activity exposure in adults,^{11,21-23} only one has examined the association with playing problems. Zaza¹² found no association between instrument playing problems and non-music activity participation – categorised as leisure activities (hobbies, physical activity), activities of daily living (house cleaning, child care, outside chores) and computer use – amongst 278 professional and tertiary music students.

Only three studies have reported on non-music activity exposure in young instrumentalists or soreness from these activities,²⁴⁻²⁶ but none have investigated the relationship between either exposure to non-music-related activity or non-music-activity-related soreness with playing problems. In a cross-sectional survey of 425 music students, Shoup²⁶ found similar rates of playing problems in students who did and did not exercise. Dawson²⁴ reviewed the medical notes of 148 music students seen in a medical clinic over a five-year period and reported that 30% of the hand and upper extremity problems were due to sports-related trauma. In a cross-sectional study of 517 adolescent non-music and music students, Fry and Rowley²⁵ found that 71% of music students reported hand pain related to music playing and 6% reported hand pain from other activities such as pushing, lifting or carrying weights; 26% of non-music students reported hand pain due to writing. However, the music students were not questioned with regards to writing-related hand pain and therefore the relationship between writing-related hand pain and playing problems was not investigated.

Playing-related musculoskeletal problems and their risk factors need to be better understood in young instrumentalists. Therefore, the research questions for this study were:

1. What is the level of child instrumentalists' participation in non-music activities within the last month and do these differ by gender or age?
2. What is the experience of non-music-activity-related soreness of child instrumentalists within the last month and does this differ by gender or age?
3. Is there an association between non-music-activity exposure within the last month and playing problems, after accounting for any age and gender differences?
4. Is there an association between reports of non-music-activity-related soreness within the last month and playing problems, after accounting for any age and gender differences?

Method

Design

A cross-sectional questionnaire and anthropometric measures survey were conducted between August and December 2003. The

questionnaire used in this study was *The Young People's Activity Questionnaire*,²⁷ which was modified by the addition of music-specific questions²⁸ and also contained general questions regarding the music student's age, gender and year at school. The questionnaire is presented in Appendix 1 (see the eAddenda). Questions regarding non-music activities covered watching television, use of computers and electronic games, vigorous physical activities, and intensive hand activities such as art and hand writing. The questions evaluated frequency of participation (nil, monthly, weekly, 2 to 3 times a week, daily), duration of each episode (< 30 minutes, 30 to 60 minutes, 1 to 2 hours, 2 to 5 hours, > 5 hours) and the soreness related to each non-music activity (nil, monthly, weekly, 2 to 3 times a week, daily) within the last month. The questionnaire focused on the experience of playing-related musculoskeletal problems within the past month, which were categorised as symptoms or disorders, as detailed under *Outcome measures* below. For both music-related and non-music-related activities, children indicated the location of their symptoms on a body diagram. Findings on the prevalence, frequency and impact of playing problems,¹⁰ the influence of age, gender and music exposure on playing problems,^{16,18} and the location of playing problems and associated risk factors²⁹ are published elsewhere.

The questionnaire was completed in a scheduled music class with the supervision of the instrumental teacher and took approximately 20 minutes to complete. Height was measured using a wall tape and a digital scale measured weight. One author (SR) performed anthropometric measures and was present during questionnaire completion to answer queries.

Participants

The School of Instrumental Music program in Perth, Western Australia, had 1274 students enrolled at the time of data collection. Due to examinations, career events or industrial action by educators, 350 students were unavailable. Of the remaining 924 students, 65 declined to participate, so a total of 859 students were given the questionnaire to complete. Because some questions pertaining to the experience of playing problems were unanswered, 128 questionnaires were deemed incomplete. Therefore, 731 students (460 females) aged 7 to 17 years completed the questionnaire and survey appropriately. The school selection process ensured a representative range of instrument types, socioeconomic areas and age groups, as presented in Figure 1. Further details of the cohort are reported elsewhere.¹⁸ All instrumental classes at the selected schools were sampled, with no exclusion criteria.

Outcome measures

Primary outcome: Respondents could indicate playing-related musculoskeletal symptoms (ie, the experience of mild aches and pains, experienced during and following playing, that may or may not affect performance). These were elicited by the question: 'In the last month, did you feel any soreness anywhere when you played a musical instrument?'

Secondary outcome: Respondents could also indicate playing-related musculoskeletal disorders (ie, the experience of pain, weakness, lack of control, numbness, tingling or other symptoms that interfered with the ability to play the instrument as usual). These were elicited by the question: 'Did you feel any instrument-playing-related soreness, tingling or weakness that stopped you from playing your instrument as well as you usually play?'

The definitions that were used for disorders best determine rates of serious problems in adults.¹² However, symptoms were chosen as the primary outcome because symptoms in children should be acknowledged early, so that the relevant risk factors can

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