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ARTICLE

The perceived influence of the one-on-one instrumental learning environment on tertiary string students' perceptions of their own playing-related discomfort/pain

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Abstract

This article draws on qualitative data collected over a five-year period as part of a longitudinal mixed methods research project at a tertiary music institution in Australia. Forty tertiary string students consistently identified factors specific to the one-on-one instrumental teaching environment as influencing their perceptions as to the nature and causes of their playing-related discomfort pain. Student perceptions of individual teacher's attitudes to pain and injury, experiences with regards to asking and receiving advice and the perceived influence of the first instrumental teacher are discussed using six examples. The paper concludes with several recommendations for instrumental music teachers and music institutions.

Keywords: Pain; injury; perceptions; learning environment

Introduction and literature review

In recent decades, it has become evident that a disturbing number of musicians experience playing-related pain and injuries at some stage of their musical development. A study of Australian professional orchestral musicians showed that 84% had experienced pain or injuries that interfered with playing their instrument and/or participating in rehearsals/performances (Ackermann, Driscoll, & Kenny, 2012). Similarly high figures of pain and injury have been replicated around the globe (Leaver, Harris, & Palmer, 2011; Sousa et al., 2016), including in studies of tertiary students (Brandfonbrener, 2009; Steinmetz et al., 2012; Ioannou & Altenmüller, 2015) and school-aged children (Nawrocka et al., 2014; Vinci, Smith, & Ranelli, 2015).

To date, a large number of risk factors for pain and injury have been identified. Some of these, including age, gender, hypermobility and genetic predisposition, have been deemed beyond the control of the individual. However, a large proportion of them, including factors related to the learning environment, playing techniques, playing/practicing habits and non-musical activities, can also potentially be modified (Fry, 1987; Farewell & Zaza, 1997; Wu, 2007; Brandfonbrener, 2010; Wood, 2014).

Many of the identified risk factors for playing-related pain and injury relate to habits and attitudes that may form in one-on-one teaching environments. These environments foster relationships which are complex, variable and can continue outside of the lesson situation. This is particularly the case in higher educational situations where the boundaries between teaching, professional and social contexts may be unclear (Gaunt, 2011).

In some contexts, it has been shown that students have a variety of experiences with their music studio teachers in higher education (Schmidt, 1989a, 1989b; Gaunt, 2011; Carey & Grant, 2015;

Burwell, 2017). Similarly, injured music students (who primarily seek advice from their instrumental tutors) also report a variety of experiences (Persson, 1996; Williamon & Thompson, 2006; Guptill, 2011; Wood, 2014; Ioannou & Altenmüller, 2015). Injured musicians are more likely to seek help from health professionals who have been recommended by teachers and colleagues. Unfortunately, they may also feel these teachers and health professionals lack the appropriate knowledge to assist them (Guptill, 2011).

It has been generally recommended that preventative and health knowledge be integrated into music curriculums, and that teachers at all levels receive better education. (Zaza, 1992; Chesky, Dawson, & Manchester, 2006; Williamon & Thompson, 2006; Ginsborg et al., 2009; Guptill, 2011; Wood, 2014; Ioannou & Altenmüller, 2015; Rickert, Barrett, & Ackermann, 2015). However, to date, there has been limited research closely examining the perceived influence of the one-on-one teaching environment on playing-related pain and injury. This article reflects on data from a longitudinal Australian research project based at Queensland Conservatorium Griffith University (QCGU) that investigated tertiary string student perceptions as the nature and causes of their own playing-related discomfort/pain, including the one-on-one tertiary learning environment. The data analysed shows a clear relationship between a students' perception of their one-on-one instrumental teacher and their experience of playing-related discomfort/pain, and subsequently of the students' experience of the general tertiary learning environment.

Methodology

The research study involved a mixed methods methodology, (as defined by Creswell, 2014, p. 228) combining both qualitative and quantitative methods of data collection and analysis. Research participants included 40 Bachelor of Music string students (violin, viola, cello and double bass majors) who entered the B.Mus. programme at an Australian Tertiary Institution in 2007 and 2008. Due to attrition of 11 from the B.Mus. programme, the number of participants decreased to 29 (14 violinists, 4 violists and 11 cellists) of whom 17 took 8 semesters to complete their programmes. Despite this, the participation rate remained extremely high, with no less than 86% of eligible students taking part in any round of data collection.

Students participating in the research completed twice yearly questionnaires and interviews for the duration of their four-year programme (a maximum of eight per student). These questionnaire/interviews contained standard and established pain measurement tools, including Fry's Overuse Injury Scale (Fry, 1986, p. 51) and the McGill Pain Questionnaire (Melzack, 1975, pp. 280–281). They also consisted of a number of base questions that were modified and adapted to each individual's circumstances. A total of 181 questionnaire/interview sessions were held over the five years of data collection. Three focus groups were also held at various times to provide further insight.

The data collected were analysed in two stages. Stage one involved basic quantitative analysis of the data obtained using Microsoft Excel and analysis of the qualitative component of the data according to the general recommendations of Creswell (2014). From this analysis, a summary of each of the 40 original cases was constructed. Five key domains were identified: the learning environment, orchestra, practice, technique and other influencing factors. Six particular cases were also selected for further in-depth analysis.

The second stage of the data analysis involved looking beyond these domains and conceiving a hierarchical structure that adequately represented emerging themes. Recurring ideas/themes were identified on a microlevel and subsequently grouped together logically based on broader themes identified in other literature of playing-related pain as well as general literature. The methodology and results of the two separate stages of data analysis are discussed in detail in Waters (2018, 2019, 2020).

This article focuses on the perceived influence of students' experiences with their one-on-one instrumental music teacher on their perceptions of playing-related discomfort/pain. Examples are used to demonstrate three key areas – the perceived influence of student perceptions of individual

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teacher's attitudes to pain and injury; student experiences with regards to asking and receiving advice from their teachers and the perceived influence of their first instrumental teacher.

Discussion

Student perceptions of individual teacher's attitudes to pain and injury

Gaunt (2011) and Carey and Grant (2015) found that tertiary music students generally had diverse perceptions of their one-on-one instrumental teachers. Similarly, the data collected in this research project showed that students had a variety of perceptions of their teachers. It is noteworthy that student perceptions of the same teachers were not necessarily consistent across the cohort of students and that, in some cases, there were widely different perceptions of a particular teacher's attitudes to pain and injury.

As was also the case in Wood (2014) and Ioannou and Altenmüller (2015), some students perceived that particular teachers were very understanding, approachable and actively encouraged strategies for preventing playing-related injury. Examples of such strategies included incorporating a physical warm-up before playing and/or taking breaks during practice. However, other teachers may have been perceived as having different priorities.

Unfortunately many students in this research admitted that they would continue to play through pain and injury. In the context of other research (including that by Fry, 1987; McCready & Reid, 2007; Park, Guptill & Sumsion, 2007; Wood, 2014; Rickert et al., 2015), this finding is unsurprising. However it is striking that many believed their teachers were in agreement with this practice, even though they had not discussed the matter with them directly. Students whose teachers did not discuss injury and preventative strategies on a regular basis seemed more likely to assume that their teacher had the same pre-existing beliefs that they did. This lack of discussion may have accounted for some of the widely different perceptions of the same teachers' attitudes.

The following three examples have been selected to show a range of student perceptions of their one-on-one instrumental teachers taken from this research project. Pseudonyms have been adopted in the discussion below to protect the identity of the participants.

Example 1

This example considers a teacher who was generally perceived by research participants as being approachable, understanding and actively encouraging of preventative strategies for playing-related discomfort/pain. The teacher held additional classes for her students each week during which they would incorporate and reinforce perceived healthy strategies, such as stretching and warming up. At various times, this teacher had special health professionals (including a practitioner of Alexander Technique and a physiotherapist) who come in to give advice. These classes were mentioned specifically in the interviews by nearly all of this teacher's students as being particularly beneficial.

> I try [to stretch before playing] . . . Going to class this morning and doing it really you realise . . . how much . . . a difference it makes if you do . . . some. (Gary, Semester 4)

> I don't have that [pain] any more . . . because [the teacher] has, gotten us on to . . . Alexander Technique and stuff. (Jill, Semester 4)

It is encouraging that as a direct consequence of the workshops, students like Gary and Jill began to adopt perceived preventative strategies, including stretching and using Alexander Technique in other playing situations. Similar usage, higher satisfaction and positivity were associated with Alexander Technique in Hagglund (1996); Spahn, Richter, and Zschocke (2002); Andersen, Roessler, and Eichberg (2013); Wilson, Dougherty, and McKeown (2014) and Wood (2014).

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It is also encouraging that students who participated in these regular physical warm-ups perceived that they experienced less discomfort/pain as a result. The perceptions of these students are in line with the research by Rardin (2007) who found that high school string students reported less pain after participating in an injury prevention programme including warm-ups.

Example 2

This example considers differing student perceptions of the same instrumental teacher. Authors including Gaunt (2009, 2011) and Carey and Grant (2015) have noted a range of differing experiences of one-on-one instrumental tuition from and between tertiary teachers and their students. A large body of other research has also investigated teacher–pupil relationships, focusing on student outcomes (Creech and Hallam, 2010). However, to date, this situation has not been widely considered in relation to playing-related injury.

As in the previous example, the teacher in question also held additional classes for his students each week. However, these reportedly did not emphasise the importance of healthy preventative strategies, such as stretching and physical warm-ups. In this case, there were also a wide variety of perceptions of the teacher's attitudes to pain and injury. For example, Mark and Wendy consistently stated in an interview situation that they believed the teacher had a very proactive and logical approach to preventing/dealing with playing-related pain. They both discussed their experiences with him and found his advice (including advice regarding practice) to be very helpful.

> [The teacher] said that, 'If it's real pain . . . something's wrong pain, to stop . . . but if it's, just, your hand's not used to it . . . then keep going because you have to, make it used to it', which is what I was doing with the strengthening exercises. (Wendy, Semester 3)

Yet other students had a completely different perception of the teacher. Erin said that she bought up her experiences with the teacher but found that not only did he have little useful advice, she perceived that he was not very interested in what she had to say.

> [The teacher] is a bit like . . . I don't know I don't think he's ever experienced any pain from playing cello so he is just like 'Alright everyone gets it so it's okay', sort of thing . . . he is not really focused on . . . that sort of aspect. (Erin, Semester 7)

Sam offered the opinion that this particular teacher was only an effective teacher of the most talented students. This student then went on to state his own opinion that the most talented students did not have any problems with playing-related pain.

> He's [the teacher's] good at teaching . . . talented students . . . they don't have any problems . . . but . . . I don't think he's good at teaching, students who has got problems. (Sam, Semester 6)

Whilst Mary said

> I could, but I don't think it's necessary [to discuss my pain with the teacher], I'm sure . . . he's got pains too. (Mary, Semester 4)

Significantly, the perceived characteristic traits of these students seemed very similar to their perceptions of this teacher. During an interview, Mark and Wendy came across as logical, confident, studious and sensible with regards to many aspects of their lives. Erin came across as more easy-going in general and Sam identified having many problems with anxiety and insecurity in everyday life and music performance. Mary, on the other hand, was a very high achiever

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who consistently stated that she believed pain was a normal part of playing a string instrument. The variation between these students' attitudes and approaches aligns with Andersen et al. (2013) who found that individual musicians established their own personal philosophy of prevention and treatment of pain based on factors such as personal experience.

Example 3

This example considers the similar experiences of two viola students who studied with the same teacher. Anna and Rachel both reported suffering significant playing-related injuries throughout their programme. They both found their teacher to be sympathetic up to a point. (She had reportedly experienced pain herself and was concerned that it was not normal.) However they found she had little constructive advice as to how to treat or prevent it. They also perceived that, although this teacher was sympathetic to their experiences and tried to say the right things, she was unwilling to make any modifications to lesson structure or scheduling that they perceived were directly impacting on the severity of their discomfort/pain. The following quotations from Anna highlight some of the issues she experienced.

> She [the teacher] is not here every second week . . . so, we have a lesson . . . two days, in one week and no lesson, next week which makes it really hard because . . . I experience a lot of pain. (Anna, Semester 5)

> My teacher said it's [the pain] definitely a real worry . . . but . . . she . . . is like, 'You have to practise anyway'. (Anna, Semester 3)

Rachel was fortunate in that midway through her programme she was able to find another teacher with whom she was much more satisfied. The following quotation from her is remarkably similar to that obtained from an injured student in Wood (2014).

> I find it much better . . . my old, other teacher . . . she has, suffered . . . from pain . . . and I found . . . she was very concerned about me but . . . wasn't getting anything done . . . but with, my new teacher . . . she has also had injuries . . . from playing . . . she is a lot more direct and to the point and, she knows how to fix it, straight away. (Rachel, Semester 6)

From this point on, Rachel perceived that the severity of her discomfort/pain was easing. Her perception of the learning environment and one-on-one teaching situation also improved and she displayed a much more positive outlook.

Unfortunately, Anna who perceived no option but to continue with the same individual teacher retained the perception that the learning environment was not very flexible, and that staff did not have her best interests at heart. Creech and Hallam (2010) noted that the absence of a healthy student–teacher relationship could have a negative impact on general musical development. Unfortunately, a recurring theme among participants in this research was that those who perceived negative experiences with the individual one-on-one teacher (such as Anna) were more likely to transfer this perception to other learning environments such as orchestral and chamber music rehearsals. They were also more likely to perceive that the relationships in these environments had a negative impact on their musical development.

Student experiences with regards to asking and receiving advice from their teachers

As was also found to be the case in Pratt, Jessop and Niemann (1992); Williamon and Thompson (2006); Wood (2014) and Ioannou and Altenmüller (2015), students in this research primarily sought advice from their instrumental teachers rather than medical professionals. It is encouraging (and a point of difference from Ioannou and Altenmüller) that instrumental tutors generally

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advised affected students to seek medical advice when problems persisted. Regardless, those in this research who sought help from health professionals were largely dissatisfied with the treatment/diagnosis given.

The perceived general reaction to students discussing their pain with their teachers, after initial understanding and a recommendation to seek advice from a health professional, included advice such as regulating and taking breaks during practice, stretching and using ice or heat. In most instances, students initially tried to follow the general advice received. However, most students were unable to maintain recommended behavioural changes, such as taking breaks during practice and stretching, over an extended period of time. A number of students said that they were dissatisfied with the lack of practical advice they received from the instrumental teachers and gave similar opinions to those recounted in Rickert et al. (2015). However, as in the research by Park et al. (2007), there were other students who believed that following their teachers' instructions prevented them from developing ongoing pain and/or injury.

In some cases, students also perceived discrepancies between what their teacher said would or should occur and what actually happened in the musical learning environment. One commonly seen example was where the teacher recommended stretching or reducing the length of time playing but was then unable to implement that recommendation in the lesson environment. As was also the case in Ioannou and Altenmüller (2015), students in this research commented that they were often unable to implement advice from their teachers and/or health practitioners in other learning environments such as orchestral rehearsals.

Unfortunately, something which also became clear through the ongoing interviews was that it was very common for students to stop discussing their playing-related pain with their instrumental teacher, particularly when it did not resolve. It has been noted that it is important for students to be able to seek help from their instrumental teachers without fear of repercussions (Cooper, Hamman, & Frost, 2012). Unfortunately, there were some instances in this research where students felt that this was not the case. Those affected believed that they were treated differently or excluded from certain aspects of the Bachelor of Music programme, such as orchestral rehearsals or their instrumental lessons, when teachers knew the extent of their discomfort/pain. This was consistent across many teachers of different instruments regardless of whether they were full-time or sessional staff, was more likely to occur among those students experiencing severe ongoing problems and may have been one reason why some students chose to downplay their problems.

Example 4

This example considers the experiences of Donna, a violinist, who developed a ganglion (lump) in her left hand during the second year of her programme. Donna learned from a teacher who was generally perceived as promoting preventative strategies, as well as being understanding and accommodating to students with injury. Donna was originally quite open with this teacher about her ongoing issues with pain and reportedly spent much time with this teacher analysing issues of technique and posture. She was referred to and consulted numerous doctors and specialists over the years, and at one stage was considering surgery. Unfortunately though, she perceived that she did not receive effective treatment and, as was also the case in Park et al. (2007); Wilson et al. (2014); Wood (2014) and Ioannou and Altenmüller (2015), expressed much dissatisfaction with the treatment and perceived lack of understanding she received.

As her injury persisted, Donna highlighted some issues she was experiencing as a result of her honesty with her teacher and so, over time, she stopped discussing her injury as openly. For example, she complained that she was being completely excluded from orchestral rehearsals, her instrumental lessons and her performance exam, when all she wanted was some special consideration for her circumstances. Her experiences are in line with researchers who theorised that

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perceived consequences such as these may result in a student being less open with their instrumental teacher (Fry, 1987; Cooper et al., 2012).

By the conclusion of her programme, Donna perceived that her teacher was beginning to lose patience with her.

> I've talked about it a bit with [my teacher] I think she's kind of given up on me a little bit I, don't blame her . . . I don't really, practise that much and then [my teacher] gets upset with me because I am not practising . . . but then I can't . . . [RESEARCHER: 'Does she know, the extent of the problem . . . '?] Of course I downplay it a bit, [laughs] . . . I hate people who are dramatic. (Donna, Semester 6)

By this stage, she had taken off the splint that she was wearing as part of her treatment as it was not effective. Because the visible sign of injury had disappeared; the student's perception was that her teacher thought that the problem had been solved. Donna had virtually given up hope that the issues could be resolved. Unfortunately, as with other injured students including Anna, discussed previously, by the end of her participation in this research, this particular student was conveying a negative perception of her overall learning environment.

Example 5

This example details the experiences of Robert, a violist, who suffered from increasing pain and eventual injury throughout his Bachelor of Music programme. As was the case of injured tertiary music students in Fry (1987), this young man tried to conceal his condition for as long as possible so that playing could be continued. General themes including suffering, fear, avoidance and distrust of health professionals (similar to those identified in research by Zaza, Charles and Muszynski, 1998; Wilson et al., 2014) were prevalent in this case.

Robert practised extremely long hours each day, was adamant that he needed to push himself to extremes and appeared to be highly motivated. A similar desire to excel was also recorded in McCready and Reid (2007). Over time, it became apparent that Robert was very concerned about other people's perception of him as a player and musician. This may have been one reason why he was so reluctant to discuss his experiences with other musicians, his teachers or family.

> I only mentioned it, once [to my teacher] I didn't want to, keep coming into lessons . . . going, 'Hey' like before I say anything . . . 'I'm feeling really . . . bad today' . . . It's like I am making an excuse . . . to play badly or something. (Robert, Semester 6)

As was also the case of injured musicians in a study by Wilson et al. (2014), Robert perceived that, if he was tough, he would be able to 'soldier on' through the pain. As a result of his behaviours, however, by the conclusion of his programme, Robert was suffering from constant severe discomfort/pain while playing that was also impacting on his ability to undertake some other everyday activities. He had sought treatment from a recommended physiotherapist as well as a general physician and had been advised that he needed to take an extended break from playing due to a torn tendon. Yet he perceived that this was not possible for him, stating concerns (such as limiting progress) and coping strategies (such as using predictability to endure pain) in line with those identified by McCready and Reid (2007) and Andersen et al. (2013). His inaction in dealing with his injury and concealment of it from others is similar to that noted in the papers by Rickert et al. (2012); Rickert, Barrett, and Ackermann (2013, 2014a, 2014b, 2015) and Wilson et al. (2014).

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The perceived influence of the first instrumental teacher

As was also the case in Howe and Sloboda (1991) and Smith (2008), participants in this research project generally attributed great importance and positivity to their early childhood music teachers. Most believed their very first instrumental teacher had played a vital role in setting them up with their current playing techniques and habits. However, for the most part, students also associated what they perceived as being 'incorrect' playing techniques with these formative lessons.

Unfortunately, many participants in this research perceived having received little or no education in their formative years regarding practice habits and their role in preventing playing-related discomfort/pain. This finding supports those of Britsch (2005); Raymond, Romeo, and Kumke (2012) and Arnason, Arnason, and Briem (2014). Several students were subsequently able to link an initial increase in discomfort/pain in the first semester of their studies at this institution to the correction of perceived 'incorrect' playing techniques such as poor posture and inefficient bow holds.

A number of students in this research also perceived that there were a set of unique issues experienced by teachers in group situations. These included the teacher perhaps not being a specialist on the instrument, and the teacher being unable to give as much one-on-one attention as he or she has several students to attend to. The follow-on effect to this was a perceived difficulty to maintain constant attention to each student's posture and technique. The *National Review of School Music Education* (Pascoe et al., 2005) recommended that every Australian student participated and engaged in continuous sequential developmental music education programmes (p. 20). This is unsurprising given the large body of research that highlights the benefits of teaching music to children (Brenner, 2009; Rauscher and Hinton, 2011). However, the experiences of some students in this research suggest that there may be some long-term adverse consequences for students whose early learning experiences are less than ideal.

Six of the 40 students in this research project specifically mentioned their early learning experiences in a school group situation as impacting on their past and present playing-related pain. It must also be noted that 3 of the 15 cello students specifically mentioned learning from a violin specialist in a school group situation as setting them up with what they perceived to be an incorrect technique. These students reportedly then spent the following years and much of their studies at university attempting to correct these techniques.

Example 6

This example considers the experiences of injured violist Rachel and injured violinist Susie. Rachel, who began learning in a group situation, was certain that she could trace the origins of her later problems with playing-related pain and injury back to her initial music lessons. When she first arrived at university, her career aspirations all focused around playing and performing on the instrument. However, after experiencing serious pain and injury in the first year of her programme, she reconsidered her career options. Eventually, she decided to change her focus to classroom music and other subjects. Rachel stated this was specifically because of her own experiences of playing-related pain and injury, as the following quotation shows.

> I don't feel that I'm, ready or capable to . . . enter a . . . school education . . . instrumental . . . system because . . . I don't, know how to play the cello . . . the bass . . . and I don't want to teach a child . . . if I can't play the instrument I don't, want to inflict, harm . . . I guess . . . because I came from . . . school system and, were I to start with a private teacher I might not have . . . some of the . . . injuries that I have had . . . I'm, considering classroom music. (Rachel, Semester 7)

Susie, a violinist, also perceived a link between her playing-related pain and injury and habits learned in these formative years. In her case, she was reportedly encouraged to practise long hours, never receiving any advice regarding matters such as practice breaks. She also claimed that she was

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taught a rigid posture which encouraged tension. Unfortunately, she too went on to have very severe problems with playing-related pain and injury and identified these factors as being very detrimental to preventing pain. As with Rachel, this particular student also did not want other young players to have an experience similar to her own. However, rather than giving up teaching the instrument altogether, she believed the best way to do this was for her to continue teaching beginner string players in what she perceived to be a more appropriate manner. A desire to 'break the cycle' of musicians' injuries by providing information on prevention and health promotion to their students was also noted by injured musicians in the study by Guptill (2011).

Summary

It is clear that students in this research had a variety of perceptions of their teachers' attitudes to pain and injury. This is not unexpected in light of more recent available research into playing-related pain and injury which demonstrates similar variety among tertiary music students (Wood, 2014; Ioannou & Altenmüller, 2015). However, the extent of the variation among perceptions of the same teacher in this context was new and somewhat unexpected.

It is noteworthy that the largest variations in student perceptions of the same teachers were evident where the teacher placed less emphasis on incorporating and discussing preventative strategies into everyday learning situations such as lessons and workshops. In these instances, it seemed that student perceptions of their teachers' attitudes to pain and injury were being largely shaped by their own pre-existing attitudes and beliefs. This finding is in line with Schmidt (1989b) and Schmidt and Stephans (1991) who found that student personality characteristics influenced the way that teacher behaviours were perceived.

Gaunt (2009, 2011) noted a general tendency for tertiary music students to mirror individual teacher attitudes and opinions regarding aspects such as appropriate social interaction outside of the lesson situation. She also noted that students may be unable to instigate changing teachers or articulate difficulties with learning due to the dynamics of power within the relationship. There were several instances where students in this research identified similar difficulties with changing teachers and/or raising concerns, both general and specific to injury. Unfortunately, in these cases, most of the students perceived no options other than continuing to learn with those teachers without addressing their concerns.

This study confirmed the findings of researchers such as Lopez and Martinez (2013) and Ioannou and Altenmüller (2015) who found that students primarily ask for advice about the nature and causes of playing-related discomfort pain from their one-on-one instrumental teacher. However, it also revealed the extent to which students perceive that their first instrumental teacher plays an important role in establishing good/bad playing habits that may impact on later experiences of playing-related pain. This may particularly be the case for students who begin learning in a group situation. However, as noted by Fry (1987, p. 39), it is important to keep in mind that 'bad teaching' and 'misuse' do not themselves explain the higher levels of pain and injury among tertiary music students. Such statements may cause teachers to become defensive and result in students further concealing their symptoms, rather than looking to work together to find positive solutions.

Recommendations

The findings from this research draw attention to a number of issues that institutions and teachers may not have appreciated sufficiently and perhaps deserve their consideration. Recommendations commonly mentioned in the literature include educating staff and students about preventive practices, encouraging safe and sensible methods of practice and providing a understanding and supportive learning environment for injured students (Fry, 1987; Zaza, 1993; Quarrier, 1995;

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Hagglund, 1996; Spahn et al., 2002; Hildebrandt & Nubling, 2004; Dawson, 2006; Foxman & Burgel, 2006; McCready & Reid, 2007; Barton & Feinberg, 2008; Palac, 2008; Ginsborg et al., 2009; Ioannou & Altenmüller, 2015). The research discussed in this article supports these general recommendations but more specifically recommends that

1. Teachers should be more aware of these issues and, if they are willing to do so, should be open about their own experiences and how they have dealt with the challenges of pain and injury in the past.
2. Teachers should try to incorporate discussions regarding prevention, the nature and causes of playing-related pain/injury into student lessons on a regular basis. It is extremely important that their words and actions are consistent and able to be applied across multiple learning environments including ensemble rehearsals.
3. Teachers should work at having positive relationships with individual students. They may need to take into account and modify teaching methods depending on the individual student's personality and learning style. If, for some reason this is not possible, the student should ideally be referred on to a new teacher as soon as possible.
4. All music teachers should be prepared to answer questions about playing-related pain and injury and able to refer students to appropriate literature and health practitioners. This includes early learning educators who should be given appropriate advice and information about playing-related pain and injury so that they can pass it on to their students to encourage healthy playing habits.

Conclusion

In the absence of the recommended training for one-on-one instrumental teachers (or as a supplement to it), tertiary institutions have a responsibility to provide preventative education to students. Participants in this research expressed a willingness to be educated further about the nature and causes of playing-related pain. A similar willingness was also reported by Lopez and Martinez (2013), Ioannou and Altenmüller (2015) and Rickert et al. (2015). At the same time, it must be pointed out that there were several voluntary sessions held during the five-year period of data collection that looked at various issues to do with playing-related pain and injury and, as was also the case in Park et al. (2007), very few of the students actually attended.

One way to get higher attendance rates at such educational workshops is to make them components of a compulsory course or subject. Some institutions abroad and in Australia that have taken steps in this direction in recent years include the University of Friedberg in Germany; the High Conservatory of Music in Salamanca, Spain; the Conservatory in Trondheim, Norway; Ohio University of Music; Eastman School of Music/University of Rochester and the University of Western Australia. It is now also part of a compulsory course at Queensland Conservatorium Griffith University and there is an elective course on Musician's Health.

Barton and Feinberg (2008) found that participation in such preventative programmes benefited first-year music students. Similarly, Voltmer, Spahn and Zander (2010) found that participation in a preventative programme increased music students' psychological health, (although there was no change in pre-existing physical symptoms); Lopez and Martinez (2013) found that tertiary music students who participated in a preventative course increased their awareness and decreased the frequency of injury; Hildebrandt and Nubling (2004) found that music teachers and their students benefited from further training in musicophysiology.

In light of these findings, the time seems right for other music educational institutions in Australia and around the world to also take additional steps to integrate such knowledge and

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learning into their core curriculum. Their students will be educating the next generation of musicians and it seems essential that issues surrounding playing-related pain and injury are addressed in a more effective manner.

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