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Music performance anxiety and self-efficacy in young musicians: Effects of gender and age

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ABSTRACT: Performance anxiety affects many musicians and numerous studies have been conducted on music performance anxiety (MPA) in young performers. However, few studies have examined how age-related changes in MPA and self-efficacy may be affected by gender[1] as young musicians age. This study examined the extent to which gender moderates the relationships between MPA, age and self-efficacy in young musicians (aged 7-17 years). The results of statistical analyses indicated that while gender does not moderate the relationship between age and MPA, age had a significant main effect on MPA, such that MPA increased with age. There was no significant difference between males' and females' levels of self-reported MPA. There were no significant main effects of age or gender on self-efficacy, or an effect of gender on the relationship between age and self-efficacy. A strong negative relationship between self-efficacy and MPA indicates that students with low levels of self-efficacy are more likely to have high levels of MPA. This has important implications for practice, as teachers could potentially target self-efficacy as a way of helping to buffer young musicians against negative effects of MPA.

KEY WORDS: music performance, self-efficacy, gender, children, adolescents

[1] The term gender will be used throughout to mean biological sex (male/female), assigned to individuals at birth.

Public performance from an early age is part of a musician's education and comes in various forms, including auditions, recitals, exams and festivals. Due to these demands, which are often a central component of music education, young performers have been shown in numerous studies to experience music performance anxiety (MPA: Boucher & Ryan, 2011; Nusseck, Zander, & Spahn, 2015; Patston & Osborne, 2016). However, despite the growing body of literature on MPA in children and adolescents, little is known as to how age and gender interact to affect the severity of MPA (Ryan, 2004, 2005). Similarly, while self-efficacy has been researched extensively in young musicians (McPherson & McCormick, 2006; Ritchie & Williamon, 2011a, 2012), few studies have examined age-related changes in self-efficacy potentially attributable to gender (Hendricks, Smith, & Legutki, 2015; Hewitt, 2015).

Music performance anxiety

The DSM-V describes social anxiety disorder as "a marked, or intense, fear or anxiety of social situations in which the individual may be scrutinized by others" (American Psychiatric Association, 2013, 300.23). The DSM-V also includes a specifier for performance-only social anxiety, which is when individuals have performance-related fears that typically impair their professional lives, but do not fear or avoid non-performance situations. While the recent inclusion of a performance-only specifier in the DSM-V recognizes general performance anxiety as a clinical diagnosis, Kenny offers a more comprehensive definition specific to music, stating that MPA is:

> The experience of marked and persistent anxious apprehension related to musical performance that has arisen through underlying biological and/or psychological vulnerabilities and/or specific anxiety-conditioning experiences. It is manifested through combinations of affective, cognitive, somatic, and behavioural symptoms. It may occur in a range of performance settings, but is usually more severe in settings involving high ego investment, evaluative threat (audience), and fear of failure. It may be focal (i.e. focused only on music performance), or occur comorbidly with other anxiety disorders, in particular social phobia. It affects musicians across the lifespan and is at least partially independent of years of training, practice, and level of musical accomplishment. It may or may not impair the quality of performance (Kenny, 2011, p.61).

Musicians with MPA can suffer from a variety of cognitive, somatic, and behavioural symptoms of anxiety including: worry, disruptions in concentration, memory problems, interfering negative thoughts, increased heartbeat, sweating, shaking, numbness, dry mouth, shortness of breath or changes in breathing, muscle tension, and avoidance behaviours (Brandfonbrener & Lederman, 2002; Hallam, Cross, & Thaut, 2009; Kesselring, 2006). Different symptoms can have varying degrees of influence on performance (Miller & Chesky, 2004; Yoshie, Shigemasu, Kudo, & Ohtsuki, 2009) and the multidimensional anxiety theory explains the cognitive and somatic dimensions of performance anxiety further.

Multidimensional anxiety theory

Martens, Burton, Vealey, Bump, and Smith (1990) presented a multidimensional framework of anxiety that addresses two dimensions of competitive sports anxiety. Within this framework, cognitive and somatic anxiety are defined as two distinct and partially independent components of competitive performance anxiety. Martens and colleagues define cognitive anxiety as "negative expectations and cognitive concerns about oneself, the situation at hand, and the potential consequences" (p. 120), and somatic anxiety as "the

physiological and affective elements of the anxiety experience that develop directly from autonomic arousal" (p. 121). In other words, somatic anxiety is how the individual perceives his or her physiological symptoms, such as increased heart rate, that stem from the autonomic nervous system's fight or flight response. The third factor presented in the framework is self-confidence, which refers to the individual's global perception of confidence, and is thought to influence levels and types of anxiety.

Miller and Chesky (2004) and Yoshie and colleagues (2009) used the Competitive State Anxiety Inventory-2 (CSAI-2) to measure cognitive anxiety, somatic anxiety, and self-confidence in musicians in order to test multidimensional anxiety theory in relation to MPA. Miller and Chesky (2004) observed two distinct components (cognitive and somatic) of anxiety across different performance situations, and Yoshie and colleagues (2009) found that cognitive anxiety and somatic anxiety had different relationships with performance quality. The results indicate that cognitive anxiety had a negative relationship with technical performance accuracy while somatic anxiety had no significant relationship with performance accuracy. Both studies help demonstrate the existence of multiple dimensions of performance anxiety and provide support for the application of a multidimensional anxiety framework to MPA.

Music performance anxiety in young musicians

The occurrence of MPA in adult and university level musicians is well documented in the music literature (e.g. Fishbein, Middlestadt, Ottati, Strauss, & Ellis, 1988; Kenny, Driscoll, & Ackermann, 2014; Liu, 2016). These studies indicate that MPA is one of the most prevalent non-physical problems among professional and university level musicians, influenced by various internal (perfectionism, self-efficacy, etc.) and external (evaluations, performance type, etc.) factors. Numerous studies have also examined MPA[2] in adolescent musicians. Leblanc, Jin, Obert, and Siivola (1997) conducted one of the earliest studies with teenage participants, using self-report measures, heart rate monitors, and teacher evaluations to measure MPA in three different performance settings. Leblanc and colleagues (1997) found anxiety to be a prevalent problem for teenage musicians, particularly when performing before an audience. Other studies have also found that adolescent musicians often struggle with high levels of MPA and that various factors such as musical genre (Thomas & Nettelbeck, 2014), trait anxiety (Nusseck et al., 2015), and perfectionism (Patston & Osborne, 2016) can influence MPA in young musicians. The prevalence of MPA in adolescent musicians is consistent with the development of the capacity for formal operational thought, which occurs as children move from the concrete operational phase (typically 7-12 years old) to the formal operational phase (adolescence to adulthood), according to Piaget (1970). Cognitive changes during this stage of development include increases in retrospection and self-evaluation, and formal operational thinking often develops in areas of particular interest to the adolescent. During this stage, adolescents develop the ability to imagine they know what other people are thinking, which sometimes leads to anxiety (Kenny, 2000). While the development of this capacity helps explain the MPA experienced by adolescent musicians, the absence of formal operational thought does not exclude younger children from experiencing MPA. Boucher

[2] The term MPA is used throughout where studies investigated MPA as a whole rather than differentiating between the components of anxiety. Where these components have been studied independently, the terms behavioural anxiety, cognitive anxiety, somatic anxiety, and measured physiological arousal will be used.

(2008) observed that three and four-year old children exhibit stress responses, increased cortisol secretions, and behavioural symptoms of anxiety on performance days. Other studies have also found that children can experience MPA on stage (Boucher & Ryan, 2011; Cose-Giallella, 2010; Kenny & Osborne, 2006; Ryan, 2004, 2005).

Music performance anxiety and gender

Research investigating MPA and gender suggests that males and females may experience MPA differently. Kenny, Davis, and Oates (2004) investigated the effect of gender on MPA by having 32 opera singers complete self-report measures. Although there were no significant differences between males' and females' levels of MPA, subsequent studies using self-report measures have shown that the latter experience higher levels of MPA compared to their male counterparts (Coskun-Senturk & Cirakoglu, 2017; Kenny et al., 2014; Orejudo, Zarza-Alzugaray, Casanova, Rodriguez-Ledo, & Mazas, 2017). By contrast, Tamborrino (2001), Stephenson and Quarrier (2003), and Robson and Kenny (2017) did not find differences between the genders in self-reported MPA. This may be due to the nature of the measures used. The measure used in Tamborrino's (2001) study was not designed specifically to test MPA. The scores obtained in the study conducted by Robson and Kenny (2017) were for self-reported MPA when playing in ensembles, which has been shown to evoke less MPA compared to solo performance (Nicholson, Cody, & Beck, 2015; Ryan & Andrews, 2009). Although these studies did not find an effect of gender on scores for self-reported MPA, Robson and Kenny (2017) found gender to be a significant predictor of MPA. Gender differences were also found when examining the relationship between anxiety sensitivity, which is the tendency of an individual to react to the symptoms of arousal by experiencing fear, and MPA in university musicians (Stephenson & Quarrier, 2003), such that the relationship was stronger in females.

Studies examining the effect of gender on MPA in adolescent musicians also show that females report higher levels of MPA (Nusseck et al., 2015; Rae & McCambridge, 2004; Sarbescu & Dorgo, 2014). Leblanc and colleagues (1997) measured MPA using a self-designed Personal Performance Anxiety Report and found that females scored higher on the scale than males immediately after performances. They used heart rate monitors to measure the physiological symptoms of anxiety and found gender to be a significant predictor of heart rate during performance. While heart rate monitors measure physiological arousal, as opposed to somatic anxiety, it is still worth noting these results, as Hardy and Parfitt (1991) have shown that physiological arousal, according to heart rate, can follow a similar course to somatic anxiety. Similarly, Osborne, Kenny, and Holsomback (2005) tested adolescent musicians using the Music Performance Anxiety Inventory for Adolescents (Osborne & Kenny, 2005), and found that females scored higher for MPA than males.

However, studies of MPA in younger musicians, including investigations of the role of gender, have indicated more complex patterns of MPA. Boucher (2008) found no significant differences between male and female three- and four-year olds' self-reported anticipatory stress, cortisol levels, or symptoms of behavioural anxiety. Similarly, Errico (2012) found no significant differences between male and female fourth- and fifth-grade students' scores for MPA. However, an investigation of physiological arousal, behavioural anxiety, and MPA in sixth-grade students suggested differences between the ways in which young male and female musicians experience MPA. While girls experienced more anticipatory anxiety before performances, as indicated by increased heart rate, the boys' heart rates exceeded those of the girls during performances. Boys also displayed more anxious behaviours before and

during the performances, indicating higher levels of behavioural anxiety (Ryan, 2004).

A subsequent study conducted by Ryan (2005) used the State-Trait Anxiety Inventory for Children to investigate anxiety as experienced in relation to performance in elementary-school students[3]. The study found no difference between boys' and girls' self-reported anxiety in the third and fourth grades but found that fifth-grade boys reported higher levels of overall anxiety on both regular (i.e. non-performance) and performance days. Sixth-grade girls also reported a significant increase in overall anxiety levels on performance days. However, boys did not report a similar increase until the seventh grade. The results of these studies suggest an interaction between age and gender, whereby gender has a greater influence on MPA in young musicians at certain ages. Patston and Osborne (2016) examined the effects of age and gender on self-reported MPA scores in male and female adolescent musicians aged 12-19 years. While both age and gender had significant main effects on MPA scores, no interaction was found between the two variables. However, this study only investigated adolescent musicians and it is possible that the inclusion of child musicians might have produced a different pattern of results.

Self-efficacy

Another factor known to influence MPA is self-efficacy. The most common definition states that self-efficacy reflects the degree in which people believe in their abilities to perform behaviours necessary for the successful completion of a task (Bandura, 1982). According to Bandura's self-efficacy theory (1977), personal expectations of efficacy are based on four sources of information: enactive mastery experience, vicarious experiences, verbal persuasion, and physiological or affective states. Information from these sources can influence an individual's perceived feelings of self-efficacy for any given task. The fourth source of efficacy, physiological or affective states, is of particular importance when discussing the relationship between self-efficacy and anxiety. Bandura (1982) proposed that perceptions of self-efficacy affect emotional responses, such that individuals' perceived levels of arousal or anxiety when performing a task affects their belief in their ability to complete the task successfully. The relationship works in the opposite direction as well, so that an individual's belief in his or her ability to execute a task successfully can influence the level of anxiety experienced in relation to that task (Bandura, 1977). People with low efficacy expectations typically experience higher levels of anxiety or stress, while people with stronger efficacy expectations generally experience lower levels of anxiety or arousal (Bandura, 1977, 1982; Bandura, Reese, & Adams, 1982).

The relationship between self-efficacy[4] and MPA has been well-documented in music literature on adult musicians (Orejudo et al., 2017; Papageorgi et al., 2010; Ritchie & Williamon, 2011a, 2012). In Sinden's (1999) study, 138 university students completed self-report measures representing four personality characteristics related to MPA. The results indicated that lower levels of self-efficacy were associated with higher levels of MPA. Of the characteristics examined, low self-efficacy and poor self-esteem had the highest influence on MPA. Craske and Craig (1984) tested Bandura's self-efficacy theory (1977) with 40 university students and found similar results. The students performed in two conditions: alone and in

[3] The participants were children aged 3-13 at a junior school for pre-kindergarten through seventh-grade students.

[4] The term self-efficacy is used throughout to refer to task self-efficacy where the task is music performance, except where specified otherwise.

front of an audience of five judges. All participants showed a decrease in self-efficacy levels when performing in front of an audience, establishing a correlation between high levels of anxiety and low levels of self-efficacy.

Studies conducted with younger musicians found evidence of a similar relationship between MPA and self-efficacy (Hendricks et al., 2015; McPherson & McCormick, 2006; Zelenak, 2015). Using self-report measures, Hendricks and colleagues (2015) and McPherson and McCormick (2006) investigated the effect of self-efficacy on MPA. The results of both studies indicate that high levels of self-efficacy can help lower MPA and are conducive to successful performance outcomes. One implication of these findings for music teachers is that helping students gain greater confidence in their abilities could have a positive effect on performance quality and MPA.

Self-efficacy in young musicians

Studies with adult and younger musicians suggest that self-efficacy can vary according to performance context (Hendricks et al., 2015) and may be influenced by a variety of factors including musical training (Bugos, Kochar, & Maxfield, 2016; Ritchie & Williamon, 2011b), self-reflective abilities (Miksza & Tan, 2015), and self-talk (Clark, Lisboa, & Williamon, 2014). However, the extent to which age-related changes in self-efficacy occur, and when they occur in young musicians remains unclear. Fisher (2014) investigated singing self-efficacy in sixth- to eighth-grade male choristers, and McPherson and McCormick (2006) investigated self-efficacy in students aged 9-19 who were learning piano, string, brass and woodwind instruments. Fisher's results showed a negative relationship between self-efficacy and years of choral experience and McPherson and McCormick's results showed a negative relationship between self-efficacy and grade level of performance examination[5] (McPherson & McCormick, 2006). These results suggest a possible decrease in self-efficacy with age, as older students typically play at higher, more challenging grade levels as they gain experience. In White's (2010) study, high school students completed the Generalized Self-Efficacy Scale, which assesses self-efficacy in the general adult population, and found a positive correlation between age and general self-efficacy. Hewitt (2015) and Zelenak (2015) compared the scores of middle and high school music students on self-reported self-efficacy measures and found no significant differences between the self-efficacy scores of the two age groups. More research is needed to understand the effects of age on self-efficacy in young musicians.

Self-efficacy and gender

The results of some studies investigating the effect of gender on adult and university musicians' self-efficacy indicate that males have higher levels of self-efficacy than females (Egilmez, 2015; Miller & Chesky, 2004; Wehr-Flowers, 2006), while other studies found no significant differences between levels of self-efficacy in males and females (Kreutz, Ginsborg, & Williamon, 2009; Ritchie & Williamon, 2011a; Sinden, 1999). Gender differences in self-efficacy may depend on the performance setting. Comparing males' and females' self-efficacy in two conditions, a baseline-laboratory session in which participants did not perform and immediately prior to a performance in front of a jury, Abel and Larkin (1990) found no significant difference between the conditions. There was no significant difference between males' self-efficacy at baseline and just before performance, but females showed significant

[5] The participants had taken performance examinations administered by the Australian Music Examinations Board.

increases in self-efficacy from baseline to performance. Neilson (2004) also investigated gender differences in scores for self-efficacy, and found an interaction between gender and degree programme. Males in performance and church music programmes of study had higher self-efficacy scores than females in the same programmes, but females studying music education had higher self-efficacy scores than males studying music education.

Similarly, self-efficacy research with young musicians provides conflicting results. When investigating primary school children, Leung (2008) found that males have higher levels of self-efficacy than females. However, with young musicians it is more common for results to indicate no significant differences between genders (Clark, 2010; Randles, 2006; White, 2010) or for females to report higher levels of self-efficacy (Randles, 2010; Ritchie & Williamon, 2011b). Studies of self-efficacy with young, as well as adult, musicians suggest that performance setting may influence gender differences. Hendricks and colleagues (2015) collected self-efficacy scores from high school musicians over the course of a three-day music festival. Findings revealed a significant interaction effect between gender, orchestra (level), and time, such that females in the higher and lower orchestras showed significant increases in self-efficacy at different times during the festival. Whilst male students had significantly higher levels of self-efficacy prior to audition and at the first rehearsal, this was no longer the case once the midpoint of the festival had been passed (Hendricks et al., 2015).

The findings of research indicate that gender may moderate the relationship between age and self-efficacy in young musicians. When comparing males' and females bias scores on measures of self-efficacy, Hewitt (2015) found a significant interaction between gender and school grade level. Bias scores measured how underconfident or overconfident a participant was before performing. Participants completed a self-efficacy measure prior to the performance, producing a score that was then subtracted from a performance score measured by the Woodwind Brass Solo Evaluation Form to calculate a bias score. Females tended to be less confident than males in middle school but more confident than males in high school. Although the bias scores used in Hewitt's study differ from typical self-efficacy scores, the results warrant further research into the effect of gender on the relationship between age and self-efficacy in young musicians.

Research questions

The purpose of the present study was to examine the relationship between MPA and self-efficacy in young musicians and investigate the extent to which the effect of gender changes the relationship between MPA and age in young musicians. Additionally, this study aimed to extend previous research by examining whether gender influences changes in self-efficacy as young musicians age. Based on the review of literature, this study asked three research questions:

1. What is the relationship between MPA and self-efficacy in young musicians aged 7-17 years?
2. To what extent does gender moderate the relationship between age and MPA, as measured by the Music Performance Anxiety Inventory for Adolescents (Osborne & Kenny, 2005)?
3. To what extent does gender moderate the relationship between age and self-efficacy, as measured by the Self-Efficacy for Musical Performing – Children's Version Ritchie & Williamon, 2011b)?

METHOD

Participants

The study was approved by the Research Ethics Board of the researcher's home institution. A total of 134 students between the ages of 7 and 18 took part in this study. They were required to be between the ages of 6 and 17 and currently taking piano lessons from either a music school or a private piano teacher, have had a minimum of one year of consecutive piano lessons, and be fluent in English. Piano teachers from music schools and private studios were contacted via email and, once a school director or piano teacher had expressed interest, selected respondents and parents of respondents received letters of invitation and completed consent forms. Of the 43 music schools or private music studios contacted, 25 chose to participate. The number of students participating per teacher ranged from one to eight, with an average of five respondents per teacher. After data collection it was found that seven respondents had to be excluded from the study because their ages fell outside the required range, they failed to report their age and/or gender, or they had not had at least two experiences of giving performances. Analysis was then carried out of data from a total of 127 respondents (72 female, 55 male).

Measurements

Two questionnaires were administered: the Music Performance Anxiety Inventory for Adolescents (MPAI-A: Osborne & Kenny, 2005) and the Self-Efficacy for Musical Performing – Children's Version (Ritchie & Williamon, 2011b: see Appendices). Respondents or their parents/caregivers also completed a third questionnaire to provide demographic information including age, ethnic background, performance experience and practice habits.

Music Performance Anxiety Inventory for Adolescents (MPAI-A)

The Music Performance Anxiety Inventory for Adolescents (MPAI-A) is a self-report measure validated for use with young people aged 12-19 years (Osborne & Kenny, 2005, Osborne et al., 2005). While it has not been validated for use with a younger population, it has been used in several studies investigating children as young as seven years old (Nusseck et al., 2015; Patston & Osborne, 2016; Su, Luh, Chen, Lin, Liao, & Chen, 2010). Its 15 questions aim to assess the cognitive, somatic, and behavioural effects of MPA. Respondents use a seven-point Likert scale to answer each question, where 0 represents no perceived symptoms of anxiety and 6 represents extremely high levels of anxiety. Cronbach's alpha was .91, indicating that the measure is internally highly consistent and therefore strongly reliable. Item 10 of the scale is reverse-scored (Osborne et al., 2005).

Self-efficacy for Musical Performing - Children's Version

The Self-Efficacy for Musical Performing – Children's Version evaluates primary school-aged children's beliefs in their ability to perform music. Respondents are asked to imagine themselves in a past performance situation and answer the questions accordingly. The questionnaire has nine items, each one answered using a seven-point Likert scale, where 1 represents "Not at all sure" and 7 represents "Completely sure" (Ritchie & Williamon, 2011b). While the protocol does not state explicitly that it is suitable for use with teenagers, comparison of this version of the questionnaire for children with the version for adults (Ritchie & Williamon, 2011a) shows that the two scales ask the same questions, albeit using

different types of language. The wording of the Self-Efficacy for Musical Performing – Children's Version measure is not overly childish and was therefore used for both teenagers and children in this study. Cronbach's alpha was .87, indicating that the measure is internally consist and strongly reliable. Items 3, 4, 6, and 8 are reverse-scored (Ritchie & Williamon, 2011b).

Demographic questionnaire

The demographic questionnaire was based on existing questionnaires used at the researcher's home institution. The information collected included age and gender and was used to check that respondents met the inclusion criteria.

Procedure

Piano teachers expressing interest in the study received a package containing consent forms for parents and students, and all the questionnaires. Once informed consent was obtained from parents and assent was given by students, respondents completed the MPAI-A followed by the Self-Efficacy for Musical Performing – Children's Version. Some respondents or their parents contacted the researcher directly. In these cases, the questionnaires were administered by the researcher at the respondent's school or home. When the researcher was not able to administer the questionnaires personally, piano teachers were contacted personally by the researcher to explain the process of administering the questionnaires to students and instructed to administer them at the studio or music school at convenient times. The researcher and/or teachers were present to help respondents understand and complete the two questionnaires, a process that took each respondent approximately 20 minutes. While respondents were completing the two questionnaires, parents completed the demographic questionnaire. In some cases, teenage respondents completed the demographic questionnaire themselves. The researcher met with parents when she had administered the questionnaires to respondents and made herself available via email to clarify any questions. She collected completed questionnaires from schools and studios, other than those that were sent by post to her home institution. In total 134 sets of questionnaires were collected and data analysis was run on 127 of them using the program Statistical Package for Social Sciences (SPSS 24).

RESULTS

What is the relationship between MPA and self-efficacy in young musicians?

Exploratory data analysis indicated that all assumptions of normality were met. A bivariate correlation analysis of scores on the MPAI-A and Self-Efficacy for Musical Performing measure was run to assess the relationship between MPA and self-efficacy. A statistically significant moderate negative relationship was found between MPA and self-efficacy in young musicians, r =-.48, p<.01, with scores for MPA explaining 23% of the variation in self-efficacy scores.

To what extent does gender moderate the relationship between age and MPA in young musicians?

A hierarchical multiple regression analysis was run to assess the effect of gender as a moderator of the relationship between age and MPA. Age was measured as a continuous variable in the moderation analyses. Table 1 provides sample characteristics of the respondents included in the analysis.

Table 1. MPAI-A and SEMP descriptive statistics by age and gender

	MPAI-A				SEMP			
	N				*N*			
	Female	Male	Female Mean (SD)	Male Mean (SD)	Female	Male	Female Mean (SD)	Male Mean (SD)
All Ages	72	55	44.39 (17.19)	38.80 18.49)	70	54	48.64 (6.74)	49.85 (7.83)
Children	38	32	39.61 (15.69)	35.03 (18.13)	38	31	49.74 (6.85)	50.39 (8.32)
Adolescents	34	23	50.00 (16.78)	44.04 (18.07)	32	23	47.34 (6.47)	49.13 (7.25)
7	3	1	27.33 (10.02)	--	3	1	46.33 (10.50)	--
8	2	3	23.00 (2.83)	33.33 (22.14)	3	3	53.33 (4.04)	48.67 (4.04)
9	7	5	39.14 (15.93)	31.00 (22.92)	7	5	46.86 (3.24)	45.00 (9.38)
10	5	10	44.20 (15.02)	36.80 (14.85)	6	10	47.00 (7.27)	51.00 (8.43)
11	10	4	35.60 (15.91)	40.00 (32.71)	9	4	52.11 (7.88)	50.75 (12.92)
12	11	9	47.82 (14.76)	33.67 (14.46)	10	9	51.20 (6.76)	52.11 (8.24)
13	14	5	48.00 (17.50)	29.20 (20.19)	13	5	47.62 (5.92)	51.80 (6.98)
14	6	5	49.17 (8.95)	44.80 (10.35)	5	4	49.80 (8.32)	52.75 (5.56)
15	6	5	59.17 (19.28)	53.00 (17.85)	6	5	45.00 (4.90)	44.80 (5.97)
16	8	5	46.13 (21.10)	54.40 (4.45)	8	5	47.13 (7.72)	47.20 (6.38)
17	0	3	--	35.33 (27.39)	0	3	--	54.67 (7.02)

Preliminary analyses indicated that all assumptions of normality, linearity, and collinearity were met. There was no evidence that gender moderates the relationship between age and MPA in young musicians, $F(1, 123) = .25$, $p = .62$ (see Table 2).

Table 2. Moderation analysis using hierarchical regression to predict MPA

	B	*SE*	*β*	*t*
Constant	38.88	2.29		17.00
Age	1.91	.87	.27	2.20*
Gender	5.44	3.04	.15	1.80
Age x gender interaction	.60	1.20	.06	.50
R^2	.002			
F	.25			

Note: N=127. *$p < .05$

As such, the interaction term was dropped from the model. The new model indicated a statistically significant positive linear relationship between age and MPA, $b = 2.23$, $SE = .60$, $p < .01$. However, the new model showed that females did not have statistically significantly higher scores of MPA compared to males, $B = 5.43$, $SE = 3.03$, $p = .08$ (see Table 3).

Table 3. Multiple regression analysis predicting MPA

	B	*SE*	*β*	*t*
Constant	38.89	2.28		17.06
Age	2.23	.60	.31	3.74*
Gender	5.43	3.03	.15	1.80
R^2	.12			

Note: N=127. *p < .05

A two-way ANOVA was conducted to examine the effects of gender and age on MPA, with age being measured as a categorical variable. Age was divided into two groups for the analysis: children (ages 7-12) and adolescents (ages 13-17). These groups correspond with Piaget's concrete operational and formal operational developmental phases (see Table 1). Assumptions of normality were met, and data representing outliers were adjusted to a new value that equalled ±1 of the closest normal data point. There was a statistically significant main effect of age, $F(1,123) = 9.99$, $p < .01$, $\eta^2_p = .075$, such that MPA increased from childhood to adolescence, but no main effect of gender, $F(1,123) = 2.92$, $p = .09$, $\eta^2_p = .023$, nor interaction between age and gender, $F(1,123) = .05$, $p = .82$, $\eta^2_p = .00$.

To what extent does gender moderate the relationship between age and self-efficacy in young musicians?

A hierarchical multiple regression analysis was run to examine the effect of gender as a moderator of the relationship between age and self-efficacy in young musicians. Table 1 provides sample characteristics of the respondents included in the analysis. Assumptions of normality were met, and data representing outliers were adjusted to a new value that equalled ±1 of the closest normal data point. There was no evidence that gender moderates the effect of age on self-efficacy scores, $F(1, 120) = .58$, $p = .45$ (see Table 4).

Table 4. Moderation analysis using hierarchal regression to predict self-efficacy for musical performing

	B	*SE*	*β*	*t*
Constant	49.85	.99		50.33
Age	.18	.38	.06	.47
Gender	-1.21	1.32	-.08	-.92
Age x gender interaction	-.39	.51	-.10	-.76
R^2	.005			
F	.58			

Note: N=124. *p < .05

The interaction term was therefore dropped from the model. The new model did not indicate a significant linear relationship between age and self-efficacy, $B = -.04$, $SE = .26$, $p = .89$. Nor did females provide statistically significantly lower scores for self-efficacy than males, $b = -1.21$, $SE = 1.32$, $p = .36$ (see Table 5).

Table 5. Multiple regression analysis predicting self-efficacy for musical performing

	B	*SE*	*β*	*t*
Constant	49.85	1.00		50.42
Age	-.04	.26	-.01	-.14
Gender	-1.21	1.32	-.08	-.92
R^2	.007			

Note: N=124. *p < .05

A two-way ANOVA was conducted to examine the effects of gender and age on self-efficacy scores, with age being measured as a categorical variable (see Table 1). All assumptions of normality were met. There were no main effects of age, $F(1,120) = 1.91$, $p = .17$, $\eta^2_p = .016$, or gender, $F(1,120) = .85$, $p = .36$, $\eta^2_p = .007$, nor a significant interaction between age and gender, $F(1,120) = .19$, $p = .67$, $\eta^2_p = .002$.

DISCUSSION

The present study asked three questions: 1) What is the relationship between MPA and self-efficacy in young musicians? 2) To what extent does gender moderate the relationships between age and MPA, and 3) age and self-efficacy?

First, a significant negative relationship was found between MPA and self-efficacy, indicating that MPA increases as self-efficacy decreases in young musicians. In other words, the more anxious performers feel, the less likely they are to believe that they will be able to play well. This finding confirms those of previous studies including those of Hendricks et al. (2015), Ritchie and Williamon (2011b), and Zelenak (2015). These in turn are congruent with the predictions of Bandura's (1977) self-efficacy theory which proposes that self-efficacy beliefs are influenced by enactive mastery experience, vicarious experiences, verbal persuasion, and – particularly – physiological or affective states that include anxiety and arousal as sources of information affecting the individual's task self-efficacy. That is, Bandura argued that a person's belief in their ability to complete a task successfully can affect their anxiety levels in relation to the performance of that task, and *vice versa*. Knowledge of the negative relationship between anxiety and self-efficacy can be used by teachers to help support their students, as a high level of self-efficacy may be one of the best defences against MPA.

Second, age was found to have a significant effect on MPA. The results suggest that MPA in young musicians increases with age (measured in years), and that adolescents experience significantly higher levels of MPA compared to children, confirming the findings of previous studies suggesting that age is a predictor of MPA in young musicians (Nusseck et al., 2015; Osborne et al., 2005; Patston & Osborne, 2016; Sarbescu & Dorgo, 2014). They can be explained by the stages of development postulated by Piaget (1970): as young people progress from childhood to adolescence, they develop the capacity for formal operational thought, which can lead to increased anxiety (Kenny, 2000).

No significant effect of gender was found on MPA, however, although the findings of previous studies suggest that female adolescent music students experience higher levels of MPA than males (Nusseck et al., 2015; Patston & Osborne, 2016; Thomas & Nettelback, 2014). The non-significant differences between males and females in the present study could be attributable to the relatively small sample size or the inclusion of younger children in the study sample, as gender differences comparable to those found in adolescents have not been found by other researchers (Boucher, 2008; Errico, 2012; Ryan, 2005).

Gender had no significant effect on the relationship between age, measured in years of according to age-group (children and adolescents) and MPA. Patston and Osborne (2016) also investigated the potentially moderating effect of gender on the relationship between age and MPA in adolescent musicians only and obtained similar, non-significant results. While the present study found no differences attributable to gender between the MPA experienced by children in the concrete operational phase and adolescents in the formal operational phase (Piaget, 1970), it is possible that the influence of gender could be detectable in a study of young people in a narrower age range, that is, during the transition from childhood to adolescence, at the very end of the concrete operational phase and the very beginning of the formal operational phase. Ryan (2004, 2005) investigated MPA in boys and girls aged 9-13 years, and found they experienced it differently. Future investigations of the transition from childhood to adolescence could yield more promising results.

Third, age, measured by years and by age-group, had no significant main effect on self-efficacy, a finding similar to those of Hewitt (2015) and Zelenak (2015) who investigated differences between self-efficacy in middle school and high school students. Bandura's (1977) self-efficacy theory may help explain why age-related changes in self-efficacy are not observed in young musicians. It is possible that self-efficacy beliefs are more influenced by the four sources of efficacy information put forward by Bandura than age (and gender – see below). These would therefore affect the changes in levels of self-efficacy experienced by young musicians as they move from childhood to adolescence. Since White (2010), Fisher (2014), and McPherson and McCormick (2006) found effects of age on self-efficacy in young musicians, however, further research on the topic is warranted.

Gender also had no significant main effect on self-efficacy, which is congruent with the results of several studies in the literature on self-efficacy (Clark, 2010; Randles, 2006; White, 2010). Again, these results can be explained by Bandura's (1977) theory. Another possible explanation is that other factors such as performance setting influence self-efficacy, and these might also moderate the relationship between gender and self-efficacy, as suggested by the findings of Hendricks et al. (2015). Other factors could include Bandura's four sources of efficacy information (Bugos et al., 2016; Clark et al., 2014; Hendricks et al., 2015), so future research could investigate the extent to which these sources moderate the effect of gender on self-efficacy in young musicians and thus the role of gender as a predictor of self-efficacy.

Finally, gender was not found to moderate the relationship between self-efficacy and age, measured in years, or by age-group. These results contradict those of Hewitt's (2015) study, which suggest that gender influences the different patterns of changing in self-efficacy experienced by middle and high school students as they age. However, Hewitt used measures of self-efficacy bias rather than self-efficacy so it is difficult to make a meaningful comparison between the findings of that study and those of the present study.

Limitations

The first limitation of the present study is its small sample size, given the number of factors investigated (MPA, self-efficacy, age, and gender); more respondents in the four categories (male and female children and adolescents) would have provided more statistical power and potentially significant, and therefore generalizable results. The second limitation is the sampling procedure: letters of invitation were sent to local music schools and studio piano teachers, representing only a fraction of the population of teachers of child and adolescent musicians. As always there may have been differences between those individuals who agreed and those who declined to participate. The third limitation is the way the questionnaires

were administered. Most respondents completed them at the studio where they receive music lessons. While music teachers were instructed clearly as to how the questionnaires should be administered, responses might have been more consistent if all the questionnaires had been administered by the same individual in the same place, and there would have been no possibility that respondents were influenced by the presence of their teachers while completing the questionnaires.

Future research

Further research on the relationships between MPA, self-efficacy, age and gender in young musicians should involve the participation of larger sample sizes. Investigations of the moderating effect of gender and age on the relationships between MPA and self-efficacy should focus on late childhood and early adolescence. Given the finding of a strong negative relationship between MPA and self-efficacy, researchers should evaluate the effectiveness of methods used by teachers for developing self-efficacy in young people in terms of preventing and managing MPA. For example, intervention studies reported in the literature on sport psychology (e.g. Foltz, 2014; Ste-Marie, Rymal, Vertes, & Martini, 2011) could be adapted for musicians.

CONCLUSION

The results of this study indicate that many children and teenagers experience MPA for a variety of reasons. A moderate relationship between MPA and self-efficacy was found, such that high levels of MPA are associated with low levels of self-efficacy. Age had a significant effect on MPA while gender did not. Neither age nor gender had a significant effect on self-efficacy, and gender did not moderate the relationship between age and MPA or self-efficacy. These results extend our knowledge of the relationship between MPA and self-efficacy in young musicians. They have important implications for practice, in that music educators may potentially reduce the negative effects of MPA in young musicians by helping them develop self-efficacy in pedagogical contexts.

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APPENDIX A

Music Performance Anxiety Inventory for Adolescents
MPAI-A

Please think about music in general and your major instrument and answer the questions by circling the number that describes how you feel.

		Not at all			About half the time			All of the time
1	Before I perform, I get butterflies in my stomach.	0	1	2	3	4	5	6
2	I often worry about my ability to perform.	0	1	2	3	4	5	6
3	I would rather play on my own, than in front of people.	0	1	2	3	4	5	6
4	Before I perform, I tremble or shake.	0	1	2	3	4	5	6
5	When I perform in front of an audience, I am afraid of making mistakes.	0	1	2	3	4	5	6
6	When I perform in front of an audience, my heart beats very fast.	0	1	2	3	4	5	6
7	When I perform in front of an audience, I find it hard to concentrate on my music.	0	1	2	3	4	5	6
8	If I make a mistake during performance, I usually panic.	0	1	2	3	4	5	6
9	When I perform in front of an audience I get sweaty hands.	0	1	2	3	4	5	6
10	When I finish performing, I usually feel happy with my performance.	0	1	2	3	4	5	6
11	I try to avoid playing at my own at a school concert.	0	1	2	3	4	5	6
12	Just before I perform, I feel nervous.	0	1	2	3	4	5	6
13	I worry that my parents or teacher might not like my performance.	0	1	2	3	4	5	6
14	I would rather play in a group or ensemble than on my own.	0	1	2	3	4	5	6
15	My muscles feel tense when I perform.	0	1	2	3	4	5	6

APPENDIX B

Self-Efficacy for Musical Performing - Children's Version

Now, please mark how much you agree or disagree with each of the following statements, specifically thinking about how you perform during this activity.

	Not at all sure 0%						*Completely sure 100%*
1. I am confident that I can give a successful performance.	1	2	3	4	5	6	7
2. I have set important goals for this performance, and I can make those goals happen.	1	2	3	4	5	6	7
3. I am likely to avoid difficult or challenging things in the performance.	1	2	3	4	5	6	7
4. If I think the performance worries me too much, I cannot even attempt to perform.	1	2	3	4	5	6	7
5. If something unexpected happens during the performance, I can handle it well.	1	2	3	4	5	6	7
6. I can avoid this performance if the music looks or sounds too difficult for me.	1	2	3	4	5	6	7
7. I feel sure about my playing (or singing) for this performance.	1	2	3	4	5	6	7
8. I am likely to give up easily during the performance.	1	2	3	4	5	6	7
9. I am able to deal with problems that might come up during the performance.	1	2	3	4	5	6	7