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Exploring music performance anxiety, self-efficacy, performance quality, and behavioural anxiety within a self-modelling intervention for young musicians

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ABSTRACT

The purpose of this study was to investigate the relational changes between music performance anxiety (MPA), self-efficacy, performance quality, and behavioural anxiety in five adolescent piano students over a six-week intervention. Additionally, the study explored the effects of a positive self-review self-modelling intervention on adolescent musicians. Self-report measures, performance evaluations, and behavioural anxiety ratings were used to collect data. Results indicate that the relational changes between MPA, self-efficacy, and performance quality are complex. There were no observed relationships between MPA and self-efficacy or performance, suggesting that MPA can have both debilitative and facilitate effects on these variables. Additionally, there was no relationship between MPA and behavioural anxiety, suggesting that students may appear less anxious than they feel. Finally, the results suggest that self-modelling has individual effects on musicians, meaning that self-modelling can provide teachers with a versatile strategy for reducing MPA, improving performance quality, and/or increasing performance confidence.

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Music performance anxiety; self-efficacy; music performance; self-modelling; adolescent musicians; behavioural anxiety

Public performance is often a central component of music education from an early age, and numerous studies indicate that young musicians experience music performance anxiety (MPA; Patston and Osborne 2016; Thomas and Nettelbeck 2014). While various interventions designed to reduce MPA have been tested with adult musicians (Burin and Osório 2016; Kenny and Halls 2018), fewer resources exist for younger musicians (Braden, Osborne, and Wilson 2015; Su et al. 2010). Given the negative relationship between MPA and self-efficacy documented in the music literature, (Dempsey and Comeau 2019; Hendricks, Smith, and Legutki 2015), it is possible that methods targeting self-efficacy could also reduce MPA in young musicians. This study aims to explore the extent to which self-modelling, a common athletic intervention (Rymal, Martini, and Ste-Marie 2010; Ste-Marie, Vertes, Law, and Rymal 2013), impacts MPA, self-efficacy, performance quality, and behavioural anxiety in young musicians.

Music performance anxiety

Kenny (2011) defines MPA as:

> 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

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> 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. (61)

Numerous studies confirm that adult (Casanova, Zarza, and Orejudo 2018; Kenny, Driscoll, and Ackerman 2016), adolescent (Patston and Osborne 2016; Thomas and Nettelbeck 2014) and child musicians (Boucher and Ryan 2011; Kenny and Osborne 2006) all experience MPA, which can be influenced by various internal and external factors, such as gender (Patston and Osborne 2016; Rae and McCambridge 2004), performance experience (Boucher and Ryan 2011), and post-event rumination (Nielson et al. 2018). MPA is one of the most prevalent non-physical problems among musicians and can result in unhealthy coping mechanisms such as drug and alcohol abuse (Orejudo, Zarza-Alzugaray, and Casanova 2018), the development of musculoskeletal pain or injury (Ackermann, Driscoll, and Kenny 2012), or the early termination of music education (Orejudo, Zarza-Alzugaray, and Casanova 2018). Studies examining younger musicians indicate that MPA increases with age, as both Patston and Osborne (2016) and Dempsey and Comeau (2019) found a main effect of age on self-report MPA scores in musicians aged 9–17 and 7–17 respectively. The progression of MPA from childhood to adolescence suggests a need for the development of preventative or reductive coping strategies specific to young musicians. Teaching young musicians to effectively manage MPA could potentially reduce negative health and psychological impacts in the future.

Various interventions designed to reduce MPA have been tested with musicians, including: acceptance and commitment therapy (Juncos et al. 2017), cognitive behavioural therapy (CBT: Braden, Osborne, and Wilson 2015; Osborne, Kenny, and Cooksey 2007), eye movement desensitization and reprocessing (EDMR: Brooker 2018), meditation and mindfulness (Blyskal 2018; Diaz 2018), mental skills training (Clark and Williamon 2011; Hoffman and Hanrahan 2012), relaxation training (Sweeney and Horan 1982; Sweeney-Burton 1997), researcher designed anxiety workshops (Errico 2012; Gratto 1998), and virtual reality (Bissonnette et al. 2011; Crawford 2011). With few exceptions (Crawford 2011; Sweeney-Burton 1997), results suggest that these interventions may successfully reduce MPA in adult and young musicians. These findings support Burin and Osório's (2016) systematic literature review, which found that most treatment modalities indicate tendencies towards positive MPA outcomes, warranting further research. In the review, CBT was the most commonly studied modality, and additional outcomes variables such as self-efficacy and performance quality were often tested alongside MPA. Two of the six CBT studies indicated that the intervention positively affected self-efficacy and performance quality in addition to MPA. Other studies produced similar findings, where MPA decreased following treatment while confidence or efficacy increased (Clark and Williamon 2011; Kinne 2016) or while performance quality increased (Juncos et al. 2017; Spahn, Walther, and Nusseck 2016). However, several studies observed no effect or a negative effect on performance quality following treatment, despite observing a positive MPA effect (Braden, Osborne, and Wilson 2015; Osborne, Kenny, and Cooksey 2007; Sweeney and Horan 1982). The inconsistent relational results between MPA and performance quality are not necessarily unexpected given Kenny's (2011) assertion that MPA may or may not affect performance quality.

Additionally, several studies have also investigated the effect of MPA interventions on rater-observed behavioural anxiety. Kendrick et al. (1982) evaluated behavioural anxiety using a checklist which assessed how anxious participants appeared to outside observers and found that behavioural anxiety decreased alongside self-report MPA scores following a CBT intervention. Other studies have provided similar results where both observable behavioural anxiety and self-report MPA decreased following treatment (Spahn, Walther, and Nusseck 2016; Sweeney and Horan 1982). However, Braden, Osborne, and Wilson (2015) found that despite decreasing self-report MPA, CBT did not reliably reduce observed behavioural anxiety, a finding echoed by several other intervention studies (Hoffman and Hanrahan 2012; Sweeney and Horan 1982). The conflicting results call to

question whether changes in self-perceived MPA correspond with changes in observable behavioural MPA. Overall, the promising MPA intervention results justifies further research to provide music students with additional strategies to combat MPA and investigating additional outcome variables alongside MPA will provide a more extensive understanding of the relationships between these variables.

Self-efficacy

Bandura (1982) defines self efficacy as the degree in which people believe in their ability to perform the necessary behaviours for the successful completion of a task. According to Bandura's self-efficacy theory (1977), personal expectations of efficacy are derived from four sources of information: enactive mastery experiences, vicarious experiences, verbal persuasion, and physiological/affective states. The fourth source, physiological/affective states, includes the experience of anxiety, making this source important when discussing the relationship between self-efficacy and MPA. Bandura (1977) proposed that an individual's belief in his or her ability to successfully execute a task can influence their level of anxiety in relation to that task, and vice versa. Generally, this means that people with low efficacy expectations will experience higher levels of anxiety and people with high efficacy expectations will experience lower levels of anxiety (Bandura, Reese, and Adams 1982). Bandura's (1977) proposed anxiety/self-efficacy relationship has been well-documented in music literature, where studies indicate that lower levels of self-efficacy are linked to higher MPA in adult (Orejudo et al. 2017; Robson and Kenny 2017) and younger musicians (Hendricks, Smith, and Legutki 2015; McPherson and McCormick 2006). Given these findings, it is possible that providing students with strategies to increase performance confidence may also reduce MPA.

Modelling

Bandura's (1986) social cognitive learning theory states that learning occurs through the observation of social models. Modelling is the medium through which observational learning occurs and is defined as a process where people observe and later imitate the actions of others (Williams, Davids, and Williams 1999). Modelling can affect perceived self-efficacy by acting as a source of vicarious experience. The observer's belief in their ability to perform a task can increase after watching a model successfully execute the same task, particularly if the model is similar to the observer (Bandura 1986; McCullagh and Weiss 2002). Several types of modelling exist, including self-modelling, a process where individuals observe themselves engaged in adaptive behaviours (Dowrick 1999). In addition to vicarious experience, self-modelling provides a source of mastery experience, as the observer is watching themselves perform successfully. Mastery experience is thought to be the strongest source of efficacy information (Bandura 1977; Hendricks, Smith, and Legutki 2015), so by providing mastery as well as vicarious experience, self-modelling has a strong potential to impact self-efficacy. Dowrick (1999) describes two categories of self-modelling: positive self-review and feedforward. Positive self-review videos depict current performance skills and are edited to show only adaptive behaviour. In contrast, feedforward videos use edited footage to depict an individual performing at a level not yet mastered (Dowrick 1999).

Sport literature has investigated the impact of self-modelling on a range of outcome variables, including anxiety (Law and Ste-Marie 2005; Starek and McCullagh 1999), performance outcomes (Foltz 2014; Vezzosi 2017), and self-efficacy (Clark and Ste-Marie 2007; Ste-Marie, Vertes, Rymal, and Martini 2011). Self-modelling studies testing anxiety found no significant differences following treatment (Law and Ste-Marie 2005; Vezzosi 2017), and many of these studies also found no significant changes in self-efficacy (Law and Ste-Marie 2005) or performance outcomes (Law and Ste-Marie 2005; Vezzosi 2017). In contrast, Starek and McCullagh (1999) observed increases in self-efficacy and performance scores despite finding no anxiety differences. Given that anxiety increased in several participants, it is possible that the performance results could be explained as a function of arousal instead of anxiety. Research suggests that individual have an optimal zone of pre-

performance arousal or anxiety that facilitates peak performance (Hanin 2000), meaning that performers, such as athletes and musicians, need a certain amount of arousal to maximise performance (Steptoe and Fidler 1987). While many intervention studies aim to decrease anxiety, it may be more beneficial to teach performers to distinguish between facilitative, performance-enhancing aspects and debilitative, performance-impairing aspects of arousal/anxiety (Mor et al. 1995).

Many self-modelling studies testing self-efficacy observed positive quantitative (Bradley 1993; Clark and Ste-Marie 2007) or qualitative (Foltz 2014; Ste-Marie, Rymal et al. 2011) changes in athlete self-efficacy, but other studies found no significant differences (Law and Ste-Marie 2005; Ram and McCullagh 2003; Winfrey and Weeks 1993). Similarly, several self-modelling studies observed positive performance changes following the intervention (Foltz 2014; Ste-Marie, Rymal et al. 2011) while other studies found no performance differences (Law and Ste-Marie 2005; Winfrey and Weeks 1993). Law and Ste-Marie (2005) proposed that skill level could account for the non-significant self-modelling results. Intermediate athletes could have less room for improvement on performance or psychological variables compared to beginner athletes, resulting in smaller or non-significant changes (Law and Ste-Marie 2005; Ram and McCullagh 2003; Winfrey and Weeks 1993).

Despite extensive research in sport literature, few music studies have investigated the effects of self-modelling. Moody (2014) conducted the only self-modelling study with musicians, where twelve adolescent string musicians viewed feedforward videos for one week of a two-week intervention. Moody (2014) found that self-efficacy increased only in musicians who viewed their video the second week of the intervention, but observed no other significant changes in self-efficacy, self-report MPA, or performance outcomes. Moody (2014) proposed that given the time frame of the study, a longer intervention may be required for significant MPA and performance changes to occur. The current study tests a longer, six-week intervention to further our understanding of the effects of self-modelling on MPA, self-efficacy, performance outcomes, and behavioural anxiety in young musicians. While Moody (2014) used feedforward videos, this study uses positive self-review videos, as the creation of these videos is less time-consuming, and therefore has greater potential practical application for music educators.

Purposes of the study

The purpose of this study is to investigate the relational changes between MPA, self-efficacy, performance quality, and behavioural anxiety in adolescent musicians over a six-week intervention using a multiple case study design. Additionally, the study explores the effects of a positive self-review self-modelling intervention on adolescent musicians, and will examine the following research questions:

(1) How do (a) MPA and self-efficacy, (b) MPA and performance quality, and (c) MPA and behavioural anxiety change in relation to each other over the course of a six-week self-modelling intervention?
(2) To what extent does a self-modelling intervention designed for adolescent piano students affect MPA, self-efficacy, performance quality, and behavioural anxiety?

Method

Participants

The study was approved by the Research Ethics Board of the researcher's home institution. Five adolescent piano students (3 female, 2 male) between the ages of twelve and sixteen years old participated. Originally, participants were required to be between thirteen and seventeen years old and needed to have recently completed a piano exam[1] at a grade five level or above. However, due recruitment challenges, the inclusion criteria were modified: the age limit was lowered to twelve, and

students with three performance ready pieces were included, regardless of their piano exam experience. Additionally, participants needed to have moderate to high levels of MPA, as assessed by the Music Performance Anxiety Inventory for Adolescents (MPAI-A: Osborne and Kenny 2005). Participants scoring 34 or higher, the average score for adolescent musicians (Osborne and Kenny 2005), were eligible to participate. Recruitment took place at local Royal Conservatory of Music (RCM) examination centres in person or through the local Ontario Registered Music Teacher's Association (ORTMA) group via email. Eight interested parents and students respectively completed consent and assent forms prior to participation. However, two students withdrew before starting the study, and a playing-related injury prevented a third from completing data collection. Full data sets were collected for the remaining five participants (See Table 1).

Measurements

Music performance anxiety inventory for adolescents (MPAI-A)

The MPAI-A is a self-report MPA measure (Osborne and Kenny 2005) that is validated for use with adolescents aged 12–19 (Osborne and Kenny 2005; Osborne, Kenny, and Holsomback 2005). Fifteen questions represent cognitive, somatic, and behavioural symptoms of MPA. The test uses a seven-point Likert scale, where 0 represents no perceived symptoms of anxiety and 6 represents extremely high levels of anxiety. Item 10 is reverse scored. Cronbach's alpha was .91, indicating high internal consistency and therefore strong reliability (Osborne, Kenny, and Holsomback 2005).

Self-efficacy for musical performing – children's version (SEMP)

The Self-efficacy for Musical Performing – Children's Version (SEMP: Ritchie and Williamon 2011) evaluates children's beliefs in their ability to perform music. Respondents answer nine questions while imagining themselves in a past performance situation, using a 7-point Likert scale where 1 represents 'Not sure at all' and 7 represents 'Completely sure'. Items 3, 4, 6, and 8 are reverse scored. Although the SEMP was designed for children, the wording is not overly childish and was deemed suitable for use with adolescents. Cronbach's alpha was .87, indicating internal consistency and therefore strong reliability (Ritchie and Williamon 2011).

Performance evaluations

Two Royal Conservatory of Music (RCM) piano examiners were given 45 videos organised into 15 groups. Each group contained the first, second, and third performance of each piece, organised in random order. The examiners independently scored the performances out of 100, based on the overall performance quality, a scoring system commonly used for piano exams and music festivals. The examiners were blind to condition (modelled versus unmodeled). Intraclass correlation (ICC) assessed interrater reliability at .78. Under the guidelines suggested by Koo and Li (2016), this indicates good reliability, and the two examiner scores for each performance were then averaged to produce a single evaluation score per performance.

Table 1. Demographic variables for intervention participants.

Participant	Age	Gender	Piano level	Base MPA score	Days spent in B phase	Days spent in IN phase	Days spent in RB phase	Modelled piece	Number of modelling video views
1	15	Female	6 RCM	68	14	14	17	2	9
2	12	Female	8 RCM	39	14	14	16	3	9
3	14	Male	6 RCM	44	14	14	16	2	7
4	16	Female	8 CC	67	15	13	14	2	7
5	14	Male	5 RCM	40	14	9	14	3	6

Note: RCM = Royal Conservatory of Music, CC = Conservatory of Canada, B phase = baseline phase, IN phase = intervention phase, RB phase = return to baseline phase, Modelled piece = piece receiving modelling treatment, Number of modelling video views = number of times participant watched modelling video during the IN phase (includes practice and performance).

Behavioural anxiety index (BAI)

Three independent judges received 15 groups of videos organised in the same manner as the performance evaluations. However, the original performance videos were edited into alternating 15-second observation and 10-second recording intervals. The observational intervals showed unedited performances while the recording intervals showed a black screen in order to facilitate evaluation. The judges used the Behavioural Anxiety Index (BAI: Brotons, 1994) to evaluate behavioural anxiety in participant performances. Adapted by Ryan (2000), the BAI measures 25 behavioural anxiety symptoms in five categories: feet/legs, arms/hands, body, instrument, and head/face. Each time the judges observed a symptom during an observation interval, they placed a checkmark or 'x' in the appropriate category during the following recording interval. A total BAI score for each video was calculated by adding the number of observed symptoms per observation interval, with a high BAI score indicating more behavioural anxiety and vice versa. ICC assessed interrater reliability at .75, indicating good reliability. The three judge scores were then averaged to form one BAI score per performance.

Procedure

Pre-intervention

After obtaining informed consent and assent, participants completed the MPAI-A to determine MPA eligibility. Students satisfying the inclusion criteria participated in a recording session at the researcher's home institution, with the purpose of creating a positive self-review video. Participants recorded three pieces of their own choosing and were informed that the order they recorded the pieces would be the order they performed the pieces later in the study. They were alternately assigned to receive the modelling video for piece two or three but were not aware of this assignment at the time of the recording session. Participants recorded one piece at a time and were given 30 min to record their first piece. They were instructed to play their piece as though they were giving a concert performance and could repeat this piece as many times as they wanted within 30 min. After 30 min, participants were asked to begin the next piece. However, participants could choose to move on to the next piece sooner if they were satisfied with the performances given. This procedure was repeated with the remaining two pieces. Following instruction, participants were left alone in the recording room, but were able to signal the researcher if needed. Each session lasted for a maximum of 90 min. Afterwards, participants received separate videos of each recorded performance via email and were instructed to select their favourite performance of each piece. The favourite performance of the piece assigned the modelling treatment became the positive self-review video used during the study.

Baseline (B)

Participants completed a two-week baseline (B) phase where they practiced three pieces at home as they normally would in preparation for a concert. After two weeks, they performed their pieces at the B concert before a jury of 2–3 judges at the researcher's home institution. Performances were recorded for later evaluation. Prior to the first performance, participants completed the MPAI-A and SEMP with respect to their first piece. Once completed, participants performed their first piece then returned offstage to complete a second MPAI-A and SEMP for their second piece. This procedure was repeated for all three pieces.

Intervention (IN)

The two-week intervention (IN) phase began the day after the B concert. Participants were emailed the positive self-review video and asked to watch the video 4 times per week before practicing the piece in the video (modelled piece). Otherwise, participants practiced as they normally would. After two weeks, they performed at the IN concert, which followed the same procedure as the B concert. However, participants viewed their positive self-review video once on a researcher provided

computer before completing the questionnaires for the modelled piece. After viewing the self-modelling video, participants resumed the B concert procedure.

Return to baseline (RB)

The two-week return to baseline (RB) phase began the day after the IN concert. The RB procedure was identical to the B procedure and ended with the RB concert. Participants did not view their positive self-review videos during the RB phase.

Results

All data was graphed and analyzed visually to gain an in-depth understanding of how the dependent variables (MPA, self-efficacy, performance evaluation, behavioural anxiety) changed within participant over the course of the intervention. After careful preliminary analysis, dependent variables were collapsed across piece for the first research question to allow for a clearer analysis of changes over time. Scores for the three pieces were averaged at each time point (B, IN, and RB concert) to produce one data point per concert, reducing participant data from nine data points per dependent variable to three. All original data points were included in the analysis for the second research question in order to compare changes in the modelled versus non-modelled pieces over time.

Participant one

Participant one was a 15-year-old female who performed her three pieces in an RCM exam one month prior to the beginning of the study. Participant one received a self-modelling video for her second piece (See Table 1).

MPA and self-efficacy

The relational changes between MPA and self-efficacy for participant one are unexpected (See Figure 1), as the results indicate that the participant felt slightly less anxious at each concert, but also less efficacious. This contrasts music studies which suggest that self-efficacy increases as MPA decreases (Hendricks, Smith, and Legutki 2015; Robson and Kenny 2017), a finding observed in several intervention studies (Clark and Williamon 2011; Kinne 2016). MPA may possibly act in a facilitative manner for participant one, and what she perceived as decreased MPA could actually be decreased arousal. As Steptoe and Fidler (1987) suggest that a certain amount of arousal enhances performance, participant one may have felt less able to perform well when less aroused, leading to decreased self-efficacy.

MPA and performance quality

The relational changes between MPA and performance quality for participant one (see Figure 1) support Kenny's (2011) statement that MPA may or may not affect performance quality. Various intervention studies support both the opposite directional changes from B to IN (Juncos et al. 2017; Spahn, Walther, and Nusseck 2016) and the parallel directional changes from IN to RB (Sweeney and Horan 1982; Sweeney-Burton 1997). Given the relational changes from B to IN, and the high base MPA score (see Table 1), it is likely that decreased MPA helped enhance her performance (Mor et al. 1995). While the changes from IN to RB indicate the opposite, these changes are smaller, making it more likely that MPA impairs performance for this participant.

MPA and behavioural anxiety

The relational changes between MPA and behavioural anxiety for participant one are expected (see Figure 1) and supported by findings in the literature (Kendrick et al. 1982; Spahn, Walther, and Nusseck 2016). Given that the MPAI-A includes behavioural anxiety symptoms, it is not surprising that decreased MPAI-A scores coincide with decreased BAI scores.

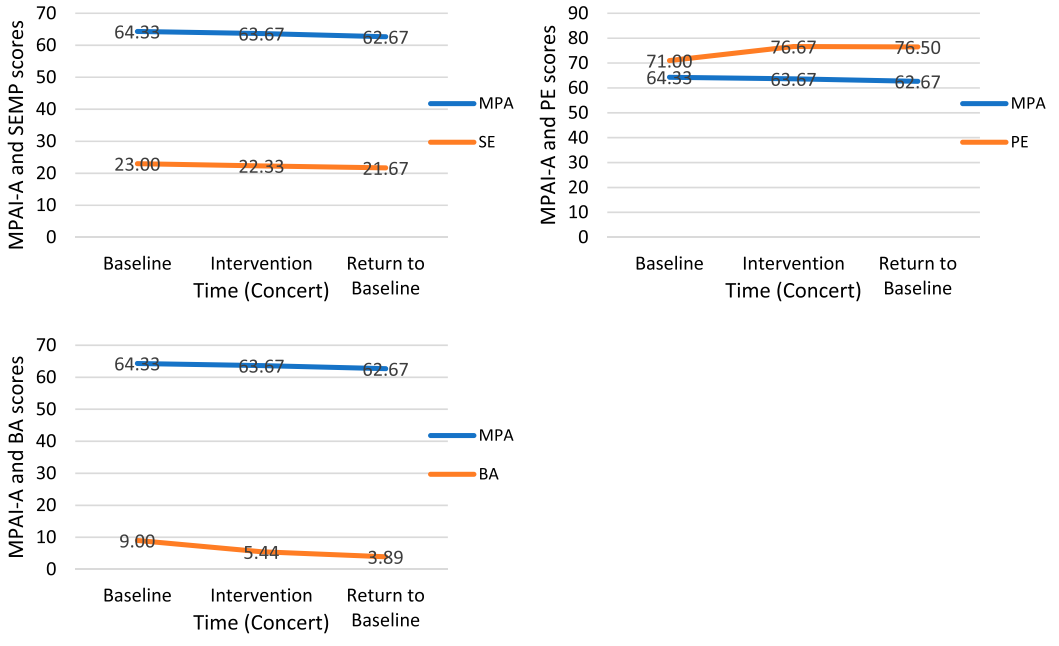

Figure 1. Changes in MPA and self-efficacy, MPA and performance quality, and MPA and behavioural anxiety over time for participant one. MPA = Music performance anxiety as measured by the MPAI-A (Osborne and Kenny 2005), SE = Self-efficacy as measured by the SEMP (Ritchie and Williamon 2011), PE = performance evaluations, BA = Behavioural anxiety as measured by the BAI (Brotons, 1994).

Self-modelling video

Results suggest that the modelling video had a slight positive effect on MPA for participant one (see Figure 2), contrasting the non-significant anxiety results from other modelling studies (Law and Ste-Marie 2005; Starek and McCullagh 1999). However, given the small MPAI-A changes, it is difficult to attribute the MPA results to the modelling video with any certainty. The remaining dependent variables suggest no effect (self-efficacy) or negative effects (performance evaluation, behavioural anxiety) from the modelling video (see Figure 2). While several studies also found non-significant self-efficacy results (Law and Ste-Marie 2005; Winfrey and Weeks 1993), the negative performance and behavioural anxiety effects are unexpected, warranting further research. Overall, the results suggest that the modelling treatment had few positive effects on participant one, but given her high base MPA, the participant may need a more extensive intervention in order to affect meaningful change on the dependent variables.

Participant two

Participant two was a 12-year-old female who performed her three pieces in an RCM exam one month prior to the beginning of the study. Participant two received a self-modelling video for her third piece (See Table 1).

MPA and self-efficacy

The relational changes between MPA and self-efficacy for participant two present conflicting results over time (see Figure 3), which may be explained by the effects of the modelling video. When there was no modelling treatment (between IN and RB), participant two felt less efficacious when feeling more anxious, a finding which reflects the MPA/self-efficacy relationship reported in various music studies (Hendricks, Smith, and Legutki 2015: Robson and Kenny 2017). However, when receiving

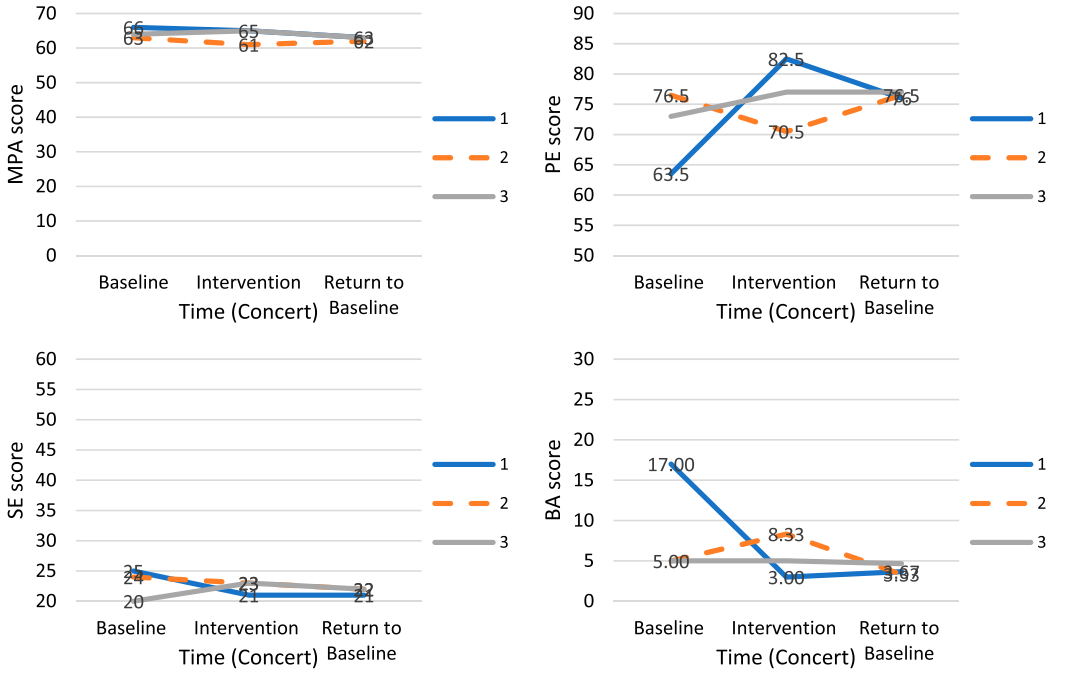

Figure 2. Comparing changes for participant one in MPA, self-efficacy, performance evaluations, and behavioural anxiety over time between modelled and unmodeled pieces. The modelled piece is indicated with a dotted line on the graph. MPA = Music performance anxiety as measured by the MPAI-A (Osborne and Kenny 2005), SE = Self-efficacy as measured by the SEMP (Ritchie and Williamon 2011), PE = performance evaluations, BA = Behavioural anxiety as measured by the BAI (Brotons, 1994). 1, 2, & 3 = Pieces 1, 2, and 3 in order of performance

the modelling treatment (between B and IN), participant two felt more efficacious despite feeling more anxious. Results suggest that the modelling video had a positive self-efficacy effect for participant two (see below), which may have influenced her relational MPA/self-efficacy changes.

MPA and performance quality

The relational changes between MPA and performance quality for participant two also support Kenny's (2011) definition (see Figure 3). While changes between B and IN indicate that increased MPA helped improve performance for the participant, these changes were small. Given the larger changes between IN and RB, where increased MPA appeared to impair performance, it is more likely that MPA has a debilitative effect for participant two.

MPA and behavioural anxiety

The relational changes between MPA and behavioural anxiety for participant two are unexpected (see Figure 3) but supported by several studies in the literature (Braden, Osborne, and Wilson 2015; Hoffman and Hanrahan 2012). The MPAI-A measures several types of anxiety symptoms, which could account for the opposite directional changes in MPAI-A and BAI scores. Given that some MPA symptoms, such as worried thoughts, are not visible to outside observers, the BAI judges may not have been able to detect the same MPA changes perceived by the participant.

Self-modelling video

Results suggest that the modelling video had a positive effect on self-efficacy for participant two, a finding supported by other modelling studies (Bradley 1993; Clark and Ste-Marie 2007). The remaining dependent variables suggest no effect (MPA, performance quality) or negative effects

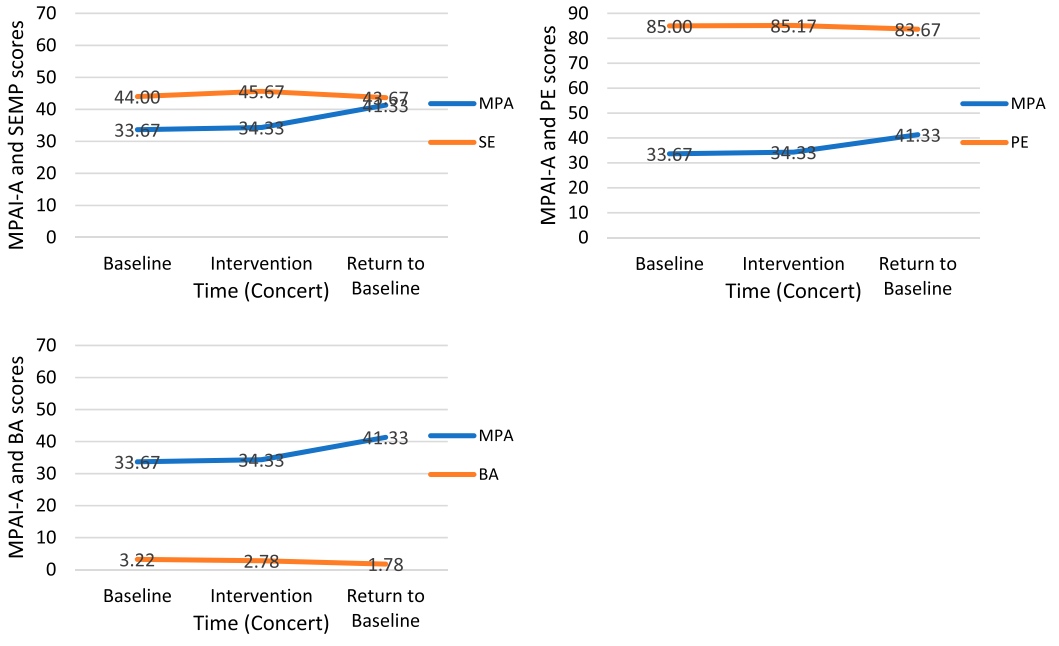

Figure 3. Changes in MPA and self-efficacy, MPA and performance quality, and MPA and behavioural anxiety over time for participant two. MPA = Music performance anxiety as measured by the MPAI-A (Osborne and Kenny 2005), SE = Self-efficacy as measured by the SEMP (Ritchie and Williamon 2011), PE = performance evaluations, BA = Behavioural anxiety as measured by the BAI (Brotons, 1994).

(behavioural anxiety) from the modelling video (see Figure 4). Apart from self-efficacy, skill level may account for the remaining dependent variable results. Law and Ste-Marie (2005) proposed that intermediate athletes may experience smaller or non-significant changes during treatment because they have less room for improvement on psychological or performance outcomes. Participant two performed at a grade eight RCM level, which is considered intermediate among musicians. Skill level combined with a low base MPA score (see Table 1) may have reduced the impact of the self-modelling video for participant two, as she may not have had much room for improvement on the dependent variables (excluding self-efficacy).

Participant three

Participant three was a 14-year-old male who had performed his three pieces in an RCM exam one month prior to the beginning of the study. Participant three received a self-modelling video for his second piece (See Table 1).

MPA and self-efficacy

The relational changes between MPA and self-efficacy for participant three are unexpected (see Figure 5), as with participant one (see above). MPA appears to act in a facilitative manner for this participant, which means the perceived MPA increase at IN could instead have been a performance-enhancing arousal increase, and vice versa at RB. With increased arousal, the participant may have felt more able to give a successful performance, and therefore more efficacious before performing.

MPA and performance quality

The relational changes between MPA and performance quality for participant three continue to support Kenny's (2011) MPA definition (see Figure 5), and potentially support Hanin's (2000)

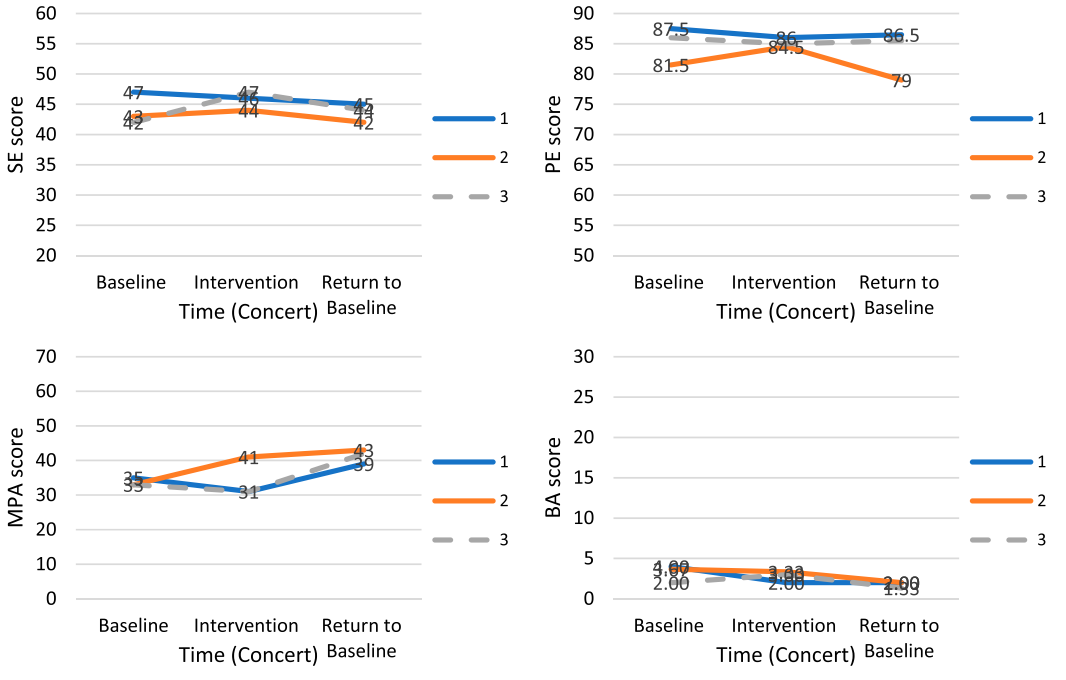

Figure 4. Comparing changes for participant two in MPA, self-efficacy, performance evaluations, and behavioural anxiety over time between modelled and unmodeled pieces. The modelled piece is indicated with a dotted line on the graph. MPA = Music performance anxiety as measured by the MPAI-A (Osborne and Kenny 2005), SE = Self-efficacy as measured by the SEMP (Ritchie and Williamon 2011), PE = performance evaluations, BA = Behavioural anxiety as measured by the BAI (Brotons, 1994). 1, 2, & 3 = Pieces 1, 2, and 3 in order of performance.

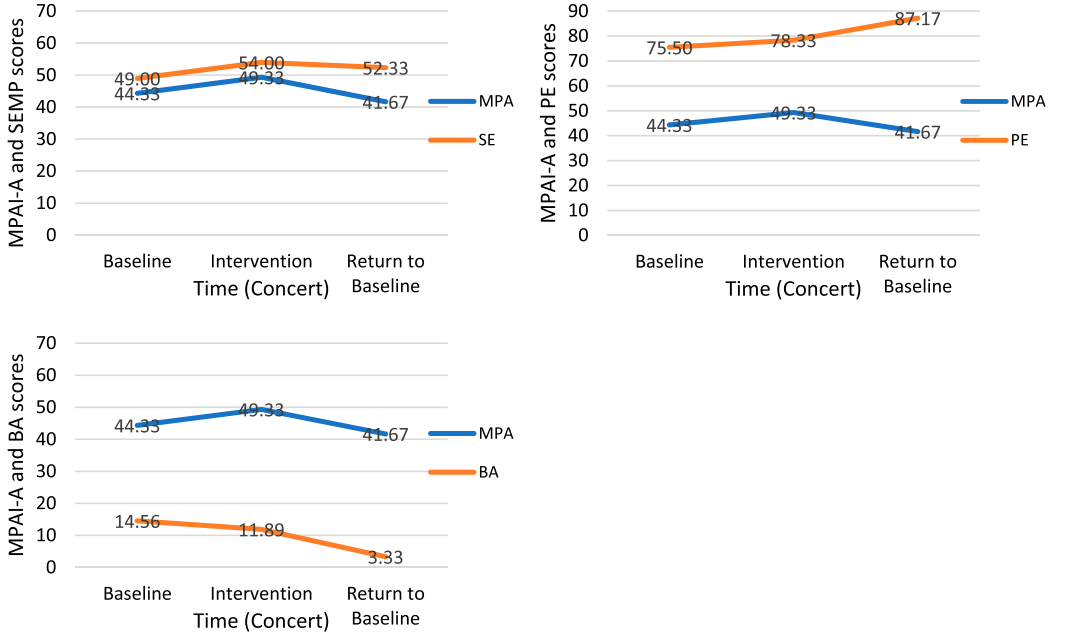

Figure 5. Changes in MPA and self-efficacy, MPA and performance quality, and MPA and behavioural anxiety over time for participant three. MPA = Music performance anxiety as measured by the MPAI-A (Osborne and Kenny 2005), SE = Self-efficacy as measured by the SEMP (Ritchie and Williamon 2011), PE = performance evaluations, BA = Behavioural anxiety as measured by the BAI (Brotons, 1994).

individual zones of optimal functioning theory. Hanin (2000) proposed that peak performance occurs within an individual, optimal zone of pre-performance anxiety, and less successful performances can occur when individuals operate outside of their optimal zone. Results for participant three indicate that decreased MPA helped enhance performance, but only to a certain extent. By continuing to decrease after IN, perhaps the participant moved outside his optimal zone at RB, meaning he no longer had enough arousal/anxiety to perform optimally.

MPA and behavioural anxiety

The relational changes between MPA and behavioural anxiety are partially expected for participant three (see Figure 5). Literature findings support both the opposite directional changes from B to IN (Braden, Osborne, and Wilson 2015; Hoffman and Hanrahan 2012), and the parallel changes from IN to RB (Kendrick et al. 1982; Spahn, Walther, and Nusseck 2016). Like participant two, participant three may have perceived changes in anxiety symptoms that were not visible to the BAI judges, which could account for the differing MPAI-A and BAI directional trajectories.

Self-modelling video

Results suggest that the modelling video had positive effects (performance quality, behavioural anxiety), negative effects (MPA), and no effect (self-efficacy) for participant three (see Figure 6). While the self-efficacy results reflect existing findings in the literature (see participant one), optimal functioning theory (Hanin 2000) may explain the remaining results. The modelling video may have helped the participant enter his optimal zone (Hanin 2000) by increasing his arousal as opposed to his anxiety (Starek and McCullagh 1999). Given that a certain level of pre-performance arousal enhances performance (Mor et al. 1995), the modelling treatment may also have had a beneficial effect on performance quality after increasing arousal.

Participant four

Participant four was a 16-year-old female who performed her three pieces at a music festival prior to the beginning of the study. Participant four received a self-modelling video for her second piece (See Table 1).

MPA and self-efficacy

The relational changes between MPA and self-efficacy for participant four present conflicting results over time (see Figure 7), as with participant two (see above). Given that self-efficacy decreases were largest when MPA also decreased, MPA may act in a facilitative manner for the participant. Like participant one (see above), participant four may have felt less able to perform well if the decreased MPA scores are an indication of decreased arousal.

MPA and performance quality

There is no clear pattern in the relational changes between MPA and performance quality for participant four (see Figure 7). This suggests that other variables, such as performance experience, may influence the relationship. Several studies have found that experience is a predictor of MPA (Biasutti and Concina 2014; Ryan and Andrews 2009), and given that she is the oldest participant, plays at an intermediate piano level, and has a high base MPA (see Table 1), participant four likely has significant experience performing while feeling anxious. In order to perform successfully, the participant may have developed strategies as a result of these experiences to prevent her MPA symptoms from impacting performance outcomes.

MPA and behavioural anxiety

The relational changes between MPA and behavioural anxiety are partially expected for participant four (see Figure 7). As with participant three (see above), the results suggest that participant four may have perceived changes in MPA symptoms not visible to the BAI judges.

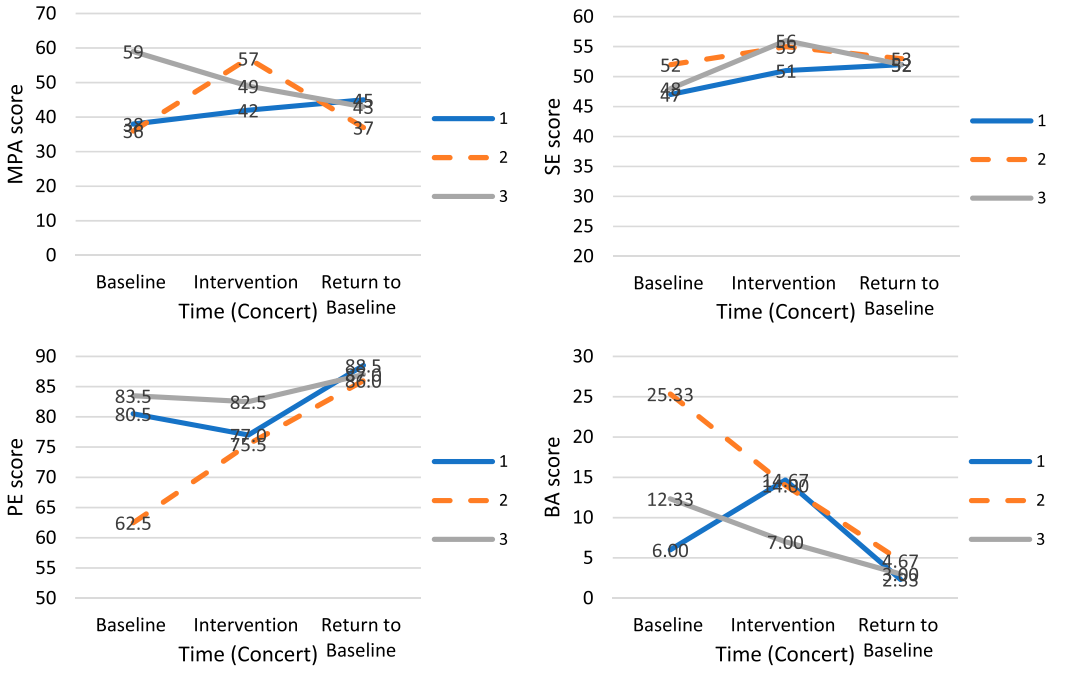

Figure 6. Comparing changes for participant three in MPA, self-efficacy, performance evaluations, and behavioural anxiety over time between modelled and unmodeled pieces. The modelled piece is indicated with a dotted line on the graph. MPA = Music performance anxiety as measured by the MPAI-A (Osborne and Kenny 2005), SE = Self-efficacy as measured by the SEMP (Ritchie and Williamon 2011), PE = performance evaluations, BA = Behavioural anxiety as measured by the BAI (Brotons, 1994). 1, 2, & 3 = Pieces 1, 2, and 3 in order of performance.

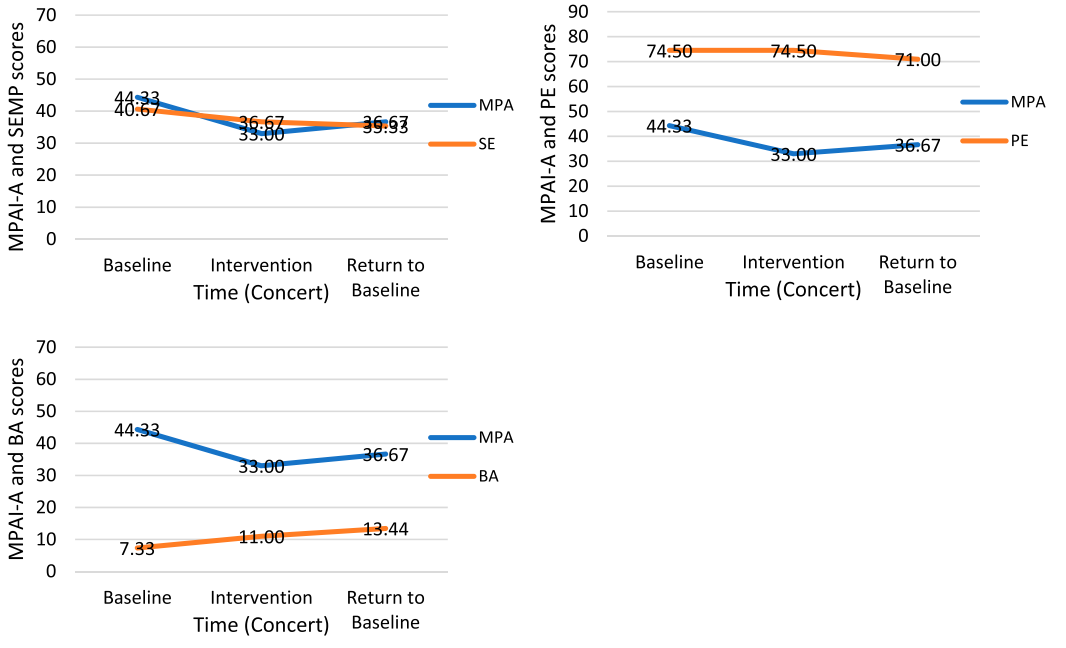

Figure 7. Changes in MPA and self-efficacy, MPA and performance quality, and MPA and behavioural anxiety over time for participant four. MPA = Music performance anxiety as measured by the MPAI-A (Osborne and Kenny 2005), SE = Self-efficacy as measured by the SEMP (Ritchie and Williamon 2011), PE = performance evaluations, BA = Behavioural anxiety as measured by the BAI (Brotons, 1994).

Self-modelling video

Results suggest that the modelling video had a positive effect on MPA for the modelled piece, as well as a positive spillover effect on the remaining, non-modelled pieces (see Figure 8). In contrast to the modelling literature (Law and Ste-Marie 2005; Starek and McCullagh 1999), the findings suggest that the self-modelling video reduced global MPA for the participant. Results indicate that the modelling video had no effect on self-efficacy, performance quality, or behavioural anxiety (see Figure 8). Participant four's skill level could account for why the modelling video did not influence the remaining dependent variables (see participant two).

Participant five

Participant five was a 14-year-old male who had three pieces memorised and performance ready at the beginning of the study. Participant five received a self-modelling video for his third piece. Due to scheduling conflicts, participant five spent less time in the IN phase compared to the other participants (See Table 1).

MPA and self-efficacy

The relational changes between MPA and self-efficacy for participant five present conflicting results over time (see Figure 9), as with participants two and four. However, his self-efficacy changes were small, making it difficult to draw conclusions about the MPA/self-efficacy relationship. Since the participant scored near the top of the SEMP, he may not have had much room to increase on the scale. With a different measure, it is possible that participant five's self-efficacy would have continued to increase as MPA decreased instead of remaining stable.

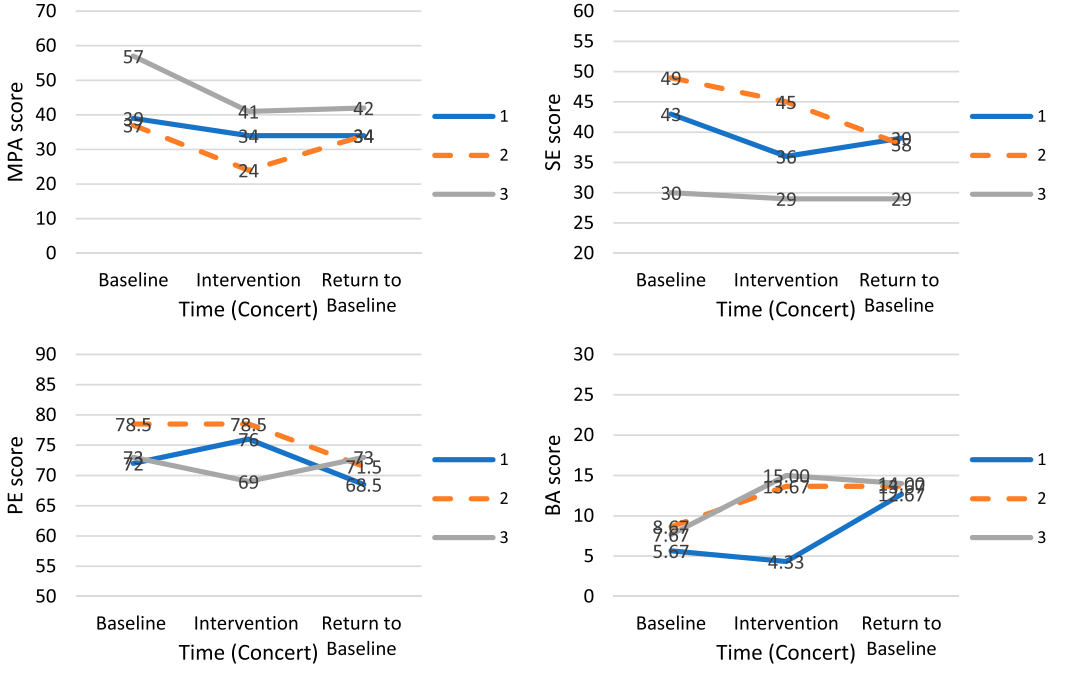

Figure 8. Comparing changes for participant four in MPA, self-efficacy, performance evaluations, and behavioural anxiety over time between modelled and unmodeled pieces. The modelled piece is indicated with a dotted line on the graph. MPA = Music performance anxiety as measured by the MPAI-A (Osborne and Kenny 2005), SE = Self-efficacy as measured by the SEMP (Ritchie and Williamon 2011), PE = performance evaluations, BA = Behavioural anxiety as measured by the BAI (Brotons, 1994). 1, 2, & 3 = Pieces 1, 2, and 3 in order of performance.

MPA and performance quality

The relational changes between MPA and performance quality for participant five also support Kenny's (2011) MPA definition (see Figure 9). However, like the SEMP scores, the changes in performance evaluations are small, making it difficult to draw conclusions. Given that the decreasing MPA scores did not appear to affect performance, participant five may have developed strategies to minimise the impact of MPA on performance (see participant four).

MPA and behavioural anxiety

The relational changes between MPA and behavioural anxiety are partially expected for participant five (see Figure 9). As with participants three and four (see above) the results suggest that participant five may have perceived changes in MPA symptoms not visible to the BAI judges. However, as with the other dependent variables, the BAI scores remained relatively stable, making it difficult to draw conclusions about the MPA/behavioural anxiety relationship.

Self-modelling video

Results suggest that the modelling video had a positive, lasting effect on MPA and self-efficacy for the modelled piece, as well as a positive, lasting spillover effect on the non-modelled pieces. The remaining results suggest a positive effect (behavioural anxiety) or negative effect (performance quality) (see Figure 10). Except for performance quality, skill level may account for the other positive results (see participants two and four). Participant five performed at a less advanced piano level compared to the other participants (see Table 1), meaning he may have had more room to demonstrate improvement following the modelling treatment.

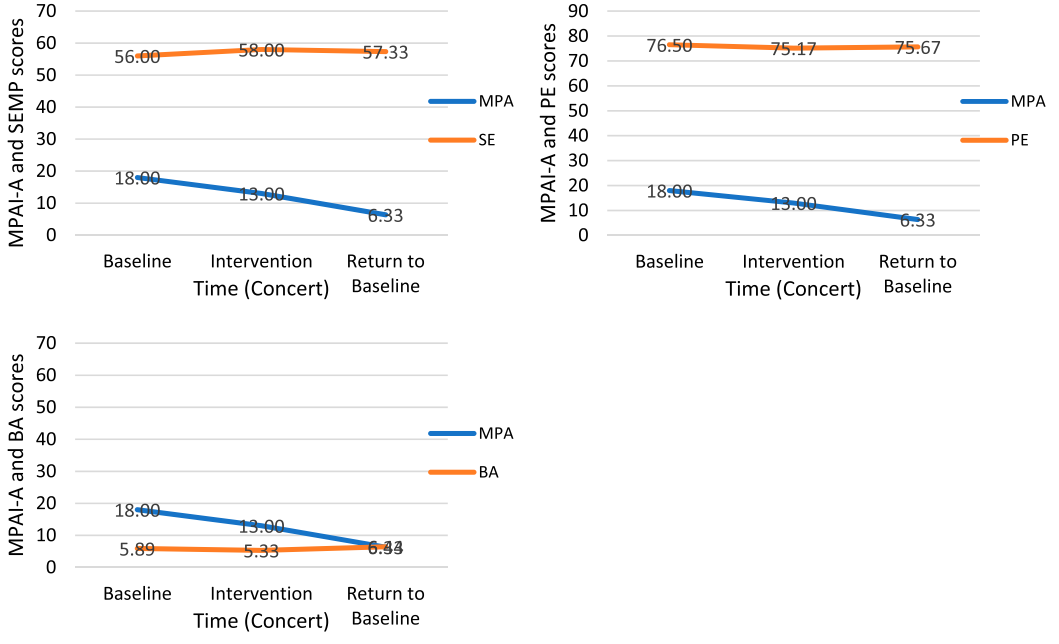

Figure 9. Changes in MPA and self-efficacy, MPA and performance quality, and MPA and behavioural anxiety over time for participant five. MPA = Music performance anxiety as measured by the MPAI-A (Osborne and Kenny 2005), SE = Self-efficacy as measured by the SEMP (Ritchie and Williamon 2011), PE = performance evaluations, BA = Behavioural anxiety as measured by the BAI (Brotons, 1994).

Discussion

The present study asked the following questions: (1) How do (a) MPA and self-efficacy, (b) MPA and performance quality, and (c) MPA and behavioural anxiety change in relation to each other over the course of a six-week self-modelling intervention? (2) To what extent does a self-modelling intervention designed for adolescent piano students affect MPA, self-efficacy, performance quality, and behavioural anxiety?

First, the relational changes between MPA and self-efficacy in the current study indicate that participants often felt less efficacious about performing when feeling less anxious, and vice versa. This pattern was demonstrated at all three concerts by two participants, and at least two concerts by the remaining participants. Hanin (2000) suggests that a certain amount of arousal or anxiety is necessary to facilitative peak performance and given that participants often felt more efficacious when MPA levels increased, our findings suggest that some participants needed a certain amount of facilitative anxiety to feel like they could perform well. The current results contrast a negative anxiety/self-efficacy relationship proposed by Bandura (1977) and found in previous studies with young musicians (Dempsey and Comeau 2019; Hendricks, Smith, and Legutki 2015). However, the former studies do not differentiate between facilitative and debilitative MPA and the negative relationship may refer to increased self-efficacy in the presence of decreased debilitative MPA. While reducing debilitative MPA can help musicians feel more efficacious, teaching students to identify and foster facilitative aspects of MPA may be just as beneficial.

Secondly, the relational changes between MPA and performance quality in the current study support Kenny's (2011) definition which states that MPA 'may or may not impair the quality of performance' (61). For all participants, increased MPA negatively impacted performance half of the time, and positively impacted performance the remaining times. A similar pattern was present

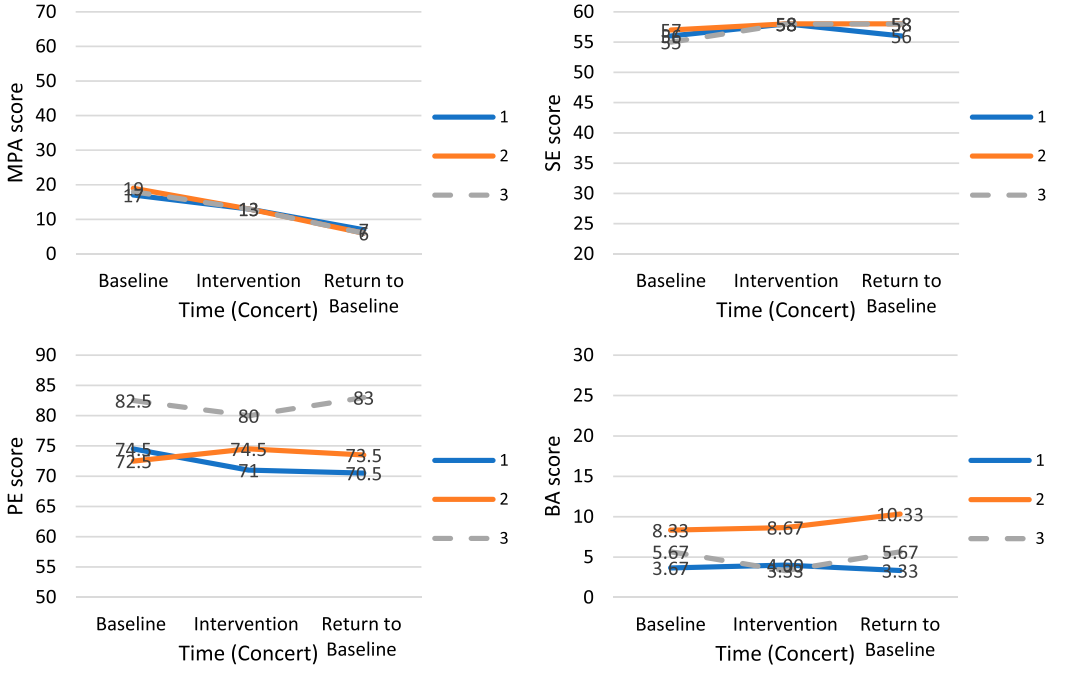

Figure 10. Comparing changes for participant four in MPA, self-efficacy, performance evaluations, and behavioural anxiety over time between modelled and unmodeled pieces. The modelled piece is indicated with a dotted line on the graph. MPA = Music performance anxiety as measured by the MPAI-A (Osborne and Kenny 2005), SE = Self-efficacy as measured by the SEMP (Ritchie and Williamon 2011), PE = performance evaluations, BA = Behavioural anxiety as measured by the BAI (Brotons, 1994). 1, 2, & 3 = Pieces 1, 2, and 3 in order of performance.

when MPA decreased, echoing the inconsistent MPA/performance findings in other studies (Juncos et al. 2017; Spahn, Walther, and Nusseck 2016). Like self-efficacy, the results suggest that differentiating between facilitative/debilitative MPA could broaden our understanding of the MPA/performance quality relationship. If a certain amount of arousal or facilitative anxiety maximises performance (Steptoe and Fidler 1987), then decreasing MPA may be beneficial (see participants one and two), but only to a certain point (see participant three). After that point, a reduction in MPA may prove counterproductive. Additionally, results from participants four and five suggest that with experience, students may be able to develop strategies that minimise the impact of MPA on performance altogether. This gives hope that further research can provide other students with similar tools to enable optimal performance, by focusing both on reducing debilitative and maximising facilitative MPA.

Thirdly, the relational changes between MPA and behavioural anxiety often provide conflicting results, reflecting the findings in the literature (Braden, Osborne, and Wilson 2015; Kendrick et al. 1982; Spahn, Walther, and Nusseck 2016). Compared to MPA, behavioural anxiety changed equally in parallel and opposite directions across participants. The self-report MPA measures in the past and present studies could account for the mixed results, as they allow participants to report on a variety of perceived changes, including some which are not visible to outside observers. Future studies could explore a more direct comparison between perceived and observed behavioural anxiety symptoms by using a self-report measure specific to behavioural anxiety. However, important teaching implications arise from the knowledge that perceived and observed MPA can differ. Teachers should be aware that observation alone may not provide an accurate MPA assessment, as some students who do not appear anxious may still suffer from undetected MPA.

Finally, the self-modelling intervention has no clear effects on MPA, self-efficacy, performance quality, or behavioural anxiety across participants. The MPA results contrast the consistent non-significant anxiety results in the literature (Starek and McCullagh 1999; Vezzosi 2017), while the self-efficacy and performance results reflect mixed significant (Foltz 2014; Ste-Marie, Rymal et al. 2011) and non-significant findings (Law and Ste-Marie 2005; Winfrey and Weeks 1993). No other modelling studies have examined behavioural anxiety to date. The results suggest that the modelling effects may be vulnerable to influence from outside variables, such as skill level and MPA severity. As mentioned above, participant five was the least advanced participant, meaning he may have had more room for improvement compared to more skilled participants (Law and Ste-Marie 2005). A lower skill level could explain why participant five demonstrated positive effects more consistently than the other participants. As well, participants five and two had the lowest base MPA scores and experienced positive self-efficacy effects, while participants with higher MPA scores experienced no self-efficacy effects. Since high MPA is linked with low self-efficacy in some studies (Orejudo et al. 2017; Robson and Kenny 2017), any possible self-efficacy effects from the modelling video may not have been enough to compensate for the negative MPA effects. Overall, the modelling video affected participants differently, suggesting that self-modelling effects on musicians may be individual. While self-modelling may provide music teachers with a versatile strategy to improve MPA, self-efficacy, and/or performance quality, teachers should be aware that the effects may vary between students.

Limitations

The first limitation of the present study is sample size. Due to a small number of participants, the results are specific to the study and not generalisable to the population. The questionnaires are a second study limitation. The participants repeatedly completed the MPAI-A and SEMP during the study, and may have experienced respondent fatigue (Porter, Whitcomb, and Weitzer 2004). Participants can become tired when completing multiple surveys, causing the quality of data to deteriorate. A final limitation is the time frame of the study. Some participants spent less time in the IN

phase due to scheduling constraints, and therefore viewed their modelling video fewer times. Standardised time frames would provide more consistent and comparable data.

Future research

Further research differentiating between facilitative and debilitative MPA could provide more insight into how MPA relates to self-efficacy and performance in young musicians. As well, research considering perceived and observed behavioural anxiety should explore a more direct comparison by using self-report measures specific to behavioural anxiety. Future modelling research could examine the extent to which MPA moderates self-efficacy effects. Finally, further research could investigate self-modelling effects on an individual basis, as trying to find a group trend among musicians may not be the best approach.

Conclusion

The results indicate that the relational changes between MPA, self-efficacy, and performance quality within young musicians are complex. There were no observed relationships between MPA and self-efficacy or performance, suggesting that MPA can have both debilitative and facilitative effects on these variables. Additionally, there was no relationship between perceived MPA and observed behavioural anxiety. This provides practical implications for music teachers, who should be aware that students who do not appear anxious could be suffering from undetected MPA. Finally, the results suggest that self-modelling effects on young musicians may be individual. Teachers should consider using self-modelling on a case to case basis to help students reduce MPA, improve performance quality, and/or feel more confident performing.

Note

1. Piano exams refer to exams conducted by the Royal Conservatory of Music (RCM) or Conservatory Canada (CC) that evaluate musical and performance proficiency

Disclosure statement

No potential conflict of interest was reported by the author(s).

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