

The Effects of Feedforward Self-modeling on Self-efficacy, Music Performance Anxiety, and
Music Performance in Anxious Adolescent Musicians

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Abstract

Music performance anxiety (MPA) is a significant concern for musicians of all ages, levels of mastery, and genders (Kenny, 2011). Whereas the anxiety-performance relationship has been well researched in athletes, similar research with musicians is sparse (Nordin-Bates, 2012). In the present research, video feed-forward self-modeling (FF-SM video) was explored as an intervention for use by musicians. FF-SM involves video-editing, typically, to depict a level of master performance higher than that yet attained by the individual. Although video FF-SM has been used successfully with athletes (Ste-Marie, Rymal, Vertes, & Martini, 2011) to increase self-efficacy and improve performance, its use has not yet been explored with musicians. In the present study, Bandura's Self-efficacy Theory (1977) was used as a framework to explore whether FF-SM videos would increase self-efficacy, lower anxiety, and improve performance in adolescent musicians who self-reported MPA. Twelve string musicians, aged 13 to 18 years, who self-reported MPA took part in a two-week intervention where in one week they practiced with the use of a FF-SM video and in the alternate week they practiced without the video. At the end of each week, participants performed the selected repertoire from their video. Video FF-SM significantly increased musicians' self-efficacy but only for those musicians who viewed the video in the second week. No changes in anxiety or performance levels were observed. Zimmerman's triadic self-regulation model is used to explain the cyclical pattern of self-efficacy benefits. It is concluded that the FF-SM video can be an effective tool to increase self-efficacy for musicians who self-report MPA, but that an enactive experience is first needed for those benefits to occur. Research extended over a longer time frame is recommended in order to examine whether influences on anxiety and performance would emerge at a later time.

Chapter 1: Literature Review

Achieving success as a musician requires an almost exclusive focus of time and intellectual and emotional energy. In many cases, musicians will have sacrificed typical experiences of childhood and adolescence in favor of talent development and career advancement (Ostwald, Baron, Byl, & Wilson, 1994). While most career decisions are typically made in late adolescence or early adulthood, musicians spend their formative years in professional training under the guidance of important teachers and significant caregivers. The average professional musician will have begun instrument lessons in early childhood. One author suggests that almost half (46%) begin before the age of seven (Nagel, 1993). A 20-year-old violinist giving a concert debut will most likely have practiced for more than 10,000 hours to perfect his/her motor skills and musical understanding (Ericsson, Krampe, & Tesch-Römer, 1993).

Musicians' lives have been described as being governed by exposure to high expectations of excellence, incessant demands for perfection, long periods of intense practice, fierce competition during formative development and high levels of anxiety (Ostwald et al., 1994). In research comparing the performance goals of athletes and musicians, musicians reported significantly higher levels of anxiety than athletes, and they perceived this anxiety as a serious performance handicap (Lacaille, Whipple, & Koestner, 2005). In the case of musicians, this anxiety is often termed music performance anxiety, and has been argued to affect both the physiological and psychological states of the performer and to impair the integrity of the performance (Kenny, 2011).

Music performance anxiety (MPA) is widespread among musicians. Research on adult professionals report that 15% - 24% of musicians experience severe and persistent anxiety (Fishbein, Middlestadt, Ottati, Straus, & Ellis, 1988; van Kemenade, van Son, & van Heesch, 1995). In the largest study of its kind, the International Conference of Symphony and Opera

Musicians' (ICSOM) survey of 2,212 musicians in 48 orchestras across the US cited severe stage fright (synonymous with MPA) in 24% of respondents (Fishbein et al., 1988), while a more recent 1994 study of 19 Canadian orchestras found that 96% of musicians reported stress related to their performance (Bartel, 1994).

Researchers and clinicians interested in the problems of performing artists have concluded that a “multidisciplinary and collaborative approach to the problems of performing artists is not only desirable but absolutely necessary” (Lederman, 1994; Ostwald et al., 1994). A review of the treatment options for music performance anxiety suggests that the best form of treatment for performance anxiety is to prevent its occurrence in the early stages of a musician's development. “Sound pedagogy, appropriate parental support and expectations, and the learning of self-management strategies early in one's musical education can help to mitigate the effects of entering a highly stressful profession” (Brugues, 2011b).

Based on the aforementioned recommendations, the research conducted as part of this thesis engaged music teachers to assist in recruiting adolescent musicians who experience music performance anxiety to explore a feed-forward self-modeling (FF-SM) intervention previously used to enhance self-efficacy in athletes (Ste-Marie, Rymal, Vertes, & Martini, 2011). Self-modeling may serve to increase a musician's self-efficacy, a situation-specific self-confidence that has been shown to be the strongest predictor of future performance (Feltz, 2008; McPherson & McCormick, 2006). With the aim of enhancing the self-efficacy beliefs of adolescent musicians, and to explore a potential early-stage self-management strategy for reducing MPA and its unwanted effects on performance, musicians watched an edited video of themselves executing successful and desirable performances, i.e., a FF-SM video (Dowrick, 1999). While video FF-SM has been used successfully with athletes (Ste-Marie et al., 2011), its use has yet to

be explored with musicians. In the following sections, MPA is defined and further justification for the use of adolescent musicians for this research is given. Current theories of anxiety are explored and a rationale for a multidimensional theory of anxiety as a framework for this research is advanced. Bandura's social-cognitive theories of self-efficacy and observational modeling are introduced, giving relevant examples from the sport and music literature, and the potential advantages of a feedforward self-modeling video intervention for adolescents with MPA are advanced.

Defining MPA

Music performance anxiety (MPA) is a multidimensional phenomenon that affects musicians of all ages, levels of mastery, and genders (Kenny, 2011). Because it overlaps physiological, cognitive, emotional, and behavioural domains, MPA has been hard to define (Brugues, 2011a). To date, MPA has not been classified within the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) of the American Psychiatric Association and, even among music researchers, there is no consensus regarding its definition (Kenny, 2011). Some of the terms that have been used to describe the phenomenon include "stage fright", "music performer's stress syndrome" (Brodsky, 1996), and "music performance anxiety" (Kenny, 2011). The confusion regarding nomenclature and the lack of a clear conceptual definition to describe the anxiety associated with performing music for an audience may account for the slow progress in successfully addressing the specific anxiety problems of musicians (Brodsky, 1996). With respect to these challenges, it is necessary to review some of the constructs identified in the literature to establish a framework for this research.

The terms "performance anxiety" and "stage fright" are often used interchangeably in the literature (Cox & Kenardy, 1993; Lehrer, 1987; Nagel, 1993; Steptoe & Fidler, 1987). There is,

however, debate about the use of the term “stage fright” because an implied focus on symptomatic anxiety in the performance context alone overlooks the fact that, for many musicians, the psychological stress of performing goes well beyond the stage, and the apprehension experienced before they perform is greater than the performance itself (Salmon, 1990). Some researchers and clinicians have described the performance symptoms experienced by musicians as a form of social phobia related to performance setting and a fear of negative evaluation (Cox & Kenardy, 1993; Kenny, 2011). Cox and Kenardy describe these symptoms within the context of social phobia as a “situational manifestation of anxiety, and its related fear of making a mistake or not being able to control one’s actions in front of other people” (p.49). Others have defined music performance anxiety symptoms in the context of career stress. Steptoe (1989) determined in his research that the domains of career stress and stage fright are not independent, and Lehrer (1990) describes the career conditions of musicians as “general stresses related to having to perform under conditions of high adrenaline flow, anxiety, fatigue, social pressure and financial insecurity” (p.48). Researchers who have attempted to codify labels have used severity as a criterion for differentiating performance anxiety symptomology (D. Clark, 1989; D. Clark & Agras, 1991; Steptoe, 1989), reflecting that musicians experience a range of symptoms from minimal to severe (Brodsky, 1996).

While there is disagreement among researchers and clinicians on how to label the performance anxiety symptoms of musicians, with few exceptions authors refer to the same symptomology (Brodsky, 1996), described by one well referenced author as “a loosely correlated constellation of physiologic, behavioral and cognitive variables” (Salmon, 1990). The primary defining characteristic of MPA is a high level of arousal, usually encountered when performance demands are high (Hildebrandt, Nubling, & Candia, 2012). Referred to as the “flight or fight

response”, arousal is a physiological state of alertness and anticipation that prepares the body for action and is characterized by elevations in heart rate, respiration rate, and perspiration. Other symptoms associated with MPA include disturbed cognitions such as worry, rumination, and self-doubt; disrupted attention in the form of memory lapses; overt behaviors including shaking, trembling, and muscle tension; and subjective feelings of discomfort (Kenny, 2011).

With the aim of defining the framework for this research that will bridge music and sports, an interdisciplinary definition of MPA by Hildebrant et al. (2012) is adopted: “Stage fright is a form of anxiety characterized by high arousal levels that are usually encountered when performance demands are high, such as during live performances in sports and music. Stage fright occurs in advance of or during a psychologically relevant event and can significantly affect any form of performance” (p.43). As sports and music are mentioned together in this definition and it refers to anxiety in advance of or during an event, it is the most relevant definition for the present research. Of note, however, is that this definition makes use of the term “stage fright”, whereas *music performance anxiety (MPA)* is deemed to be a more appropriate term for this research and will be used herein.

Justifying the use of adolescent musicians

Although there are fewer research papers focusing on children in comparison to those on adolescents and adults, an early paper reported music performance to be responsible for the highest levels of anxiety in children between the ages of 9 and 14 years old, when tested under three performance tasks: school tests, sport, and music (Simon & Marten, 1979). A more recent experiment of 173 children assessed anxiety in school-age children and found that children start to experience anxiety related to performing as early as grade 3 (Ryan, 2005). Specifically, children expressed higher state anxiety (an immediate emotional state evoked in reaction to an

external stimulus) on the day of a school concert, in contrast to a normal school day, with state anxiety being higher in children whose trait anxiety (global anxiety related to innate personality characteristics) was also high. Research also shows that adolescent musicians experience MPA at rates similar to those found in adult musicians. Shoup (1995) studied 425 high school and junior high school orchestra and band students and found that 55% reported having symptoms of performance anxiety that negatively affected their performance, while Fehm and Schmidt's (2006) study of 74 gifted adolescent musicians reported that approximately 1/3 were handicapped by their anxiety (Fehm & Schmidt, 2006).

Though the samples vary widely in research on children and adolescents, with some using gifted musicians enrolled in specialized music schools (Fehm & Schmidt, 2006; Osborne & Kenny, 2008; Ryan, 1998), and others using samples in elementary, junior or high school band and orchestra programs (Osborne & Kenny, 2005; Ryan, 2005; Shoup, 1995), the essential characteristics of MPA in younger musicians are qualitatively similar to those experienced by adults (Kenny & Osborne, 2006). Anxiety related to performance appears to follow a curvilinear trend from childhood to adolescence, with performance anxiety rarely presenting in the very young, gradually increasing throughout childhood, and peaking in adolescents between the ages 14 and 19 (Brugues, 2011a; Kenny & Osborne, 2006). This transition from carefree performing to anxious awareness may be due to a number of factors, the most evident among them an increased capacity for critical self-reflection that develops throughout childhood and adolescence (Piaget, 1970).

From the literature it is evident that adolescents are particularly vulnerable to music performance anxiety. Children may begin to experience anxiety related to performing as early as 9 years old while the levels of anxiety experienced by adolescent musicians are comparable and

may even exceed those of adults. Given these findings, an intervention that targets performance anxiety during the adolescent stage of development holds promise for addressing MPA in its early stages. In the following sections, relevant anxiety theories are discussed and a multidimensional operational theory of anxiety is advanced as a framework for this research.

An overview of anxiety theories

Anxiety theories have undergone significant conceptual and operational developments since the landmark Yerkes-Dodson inverted-U hypothesis of anxiety was introduced in 1908. This unidimensional theory of anxiety posits that there is an optimal desirable level of arousal where too little arousal results in suboptimal performance and conversely too much arousal leads to decrements in performance (Yerkes & Dodson, 1908). In this context, arousal is a mediating factor between a stimulus and a response.

The inverted-U hypothesis was the dominant conceptual framework for many decades until Spielberger (1970) developed the State Trait Anxiety Inventory (STAI). Spielberger recognized that anxiety is measurable both as a trait (individual personality characteristic) and a state (situation-specific anxiety), and as such, measures of anxiety should differentiate between the two anxiety conditions. Based on this knowledge, the first sport-specific state anxiety scale, the Competitive State Anxiety Inventory (CSAI), was introduced by Martens, Burton, Vealey, Bump, & Smith (1982). While this original version of the CSAI separates state from trait anxiety, the theoretical model for state anxiety adopted for this scale is nonetheless based on a unidimensional model (stimulus - response) of anxiety, as conceived by Yerkes-Dodson (1908).

The first challenge to a unidimensional model of anxiety emerged in the late 1980's and early 90's when anxiety was operationalized as having two contributing factors: physiological response and cognitive appraisal. Two new theories emerged concurrently as a result of this

knowledge: the catastrophe model (Fazey & Hardy, 1988) and the multidimensional theory (Martens, Burton, Vealey, Bump, & Smith, 1990). Fazey and Hardy argued in their Catastrophe model (also the Hysteresis hypothesis) that high cognitive anxiety paired with high arousal would have a catastrophic or “choking” effect on performance¹. Around the same time, Martens et al. (1990) developed a second version of the CSAI, the CSAI-2, which was based on a multidimensional theory of anxiety that differentiated Cognitive and Somatic (physiological) factors. While developing the scale, iterative factor analyses showed that Cognitive A-state consisted of two separate components (cognitive anxiety and self-confidence), factors that Martens et al. argued were at opposite ends of a cognitive evaluative continuum. However, a 2003 meta-analysis by Woodman & Hardy exploring the impact of cognitive anxiety and self-confidence on performance showed that the two constructs are orthogonal in nature and as such are relatively unrelated. As defined by Martens et al. (1990), somatic anxiety refers to the physiological autonomic response and is predicted to affect performance in a curvilinear fashion. Cognitive anxiety refers to negative expectations about success or negative self-evaluation and is predicted to have a negative linear relationship with performance. Self-confidence refers to a global perception of confidence and is predicted to have a positive linear relationship with performance. Thus, three dimensions of anxiety are represented within this multidimensional framework of anxiety.

¹ More recent research conducted under this model suggests that when cognitive anxiety is high and physiological arousal is low, anxiety has a facilitating effect on perceived performance (Edwards & Hardy, 1996).

The CSAI-2 has been one of the most commonly used scales for research in sport psychology (Cox, Martens, & Russell, 2003; Martens et al., 1990). Notwithstanding its widespread use among researchers, extensive research on the relationship between its subscales and performance has yielded equivocal results, raising concern about the psychometric properties of the CSAI-2. As mentioned previously, the multidimensional theory of anxiety (Martens et al., 1990) hypothesizes that each component of the CSAI-2 relates to performance differently: (a) cognitive anxiety shows a negative linear relationship; (b) somatic anxiety shows an inverted-U relationship; and (c) self-confidence shows a positive linear relationship. Although some results support these hypotheses (Buton, 1988; Chamberlain & Hale, 2007), many equivocal findings have also been reported (Edwards & Hardy, 1996; Gould, 1987; Hardy, 1996; Jones, Swain & Hardy, 1993; Kais & Ruadsepp, 2004, Swain & Jones, 1996). With the purpose of further exploring the relationships among cognitive anxiety, somatic anxiety and self-confidence, Craft, Magyar, Becker, & Smith (2003) conducted a meta-analysis on those studies which used the CSAI-2 with athletes (Jones, 1995; Lane, Sewell, Terry, Bartman, & Nesti, 1999; Vealey & Garner-Holman, 1988; Woodman & Hardy, 2001). Results from the meta-analysis showed a weak to non-existent relationship between the CSAI-2 subscales and performance where self-confidence only moderately predicted performance, while no support was found for a relationship between somatic anxiety and performance or cognitive anxiety and performance. Four variables were identified as factors that moderate the anxiety/performance relationship: (1) sport type (team, individual), (2) skill type (open, closed), (3) athlete level (elite, European, college athlete, college physical education student), and (4) time of CSAI-2 administration. Although the analysis was conducted within a sport context, these particular variables also map

onto musicians and thus were relevant to the population of interest in the present research, so are described in more detail below.

The moderating variable of sport type showed that the CSAI-2 was more effective at predicting sport performance for individual athletes as compared to athletes involved in team sports. With respect to skill type, the CSAI-2 showed greater predictability for open skills (environment is variable and unpredictable during action) as compared to closed skills (environment is predictable and response can be planned); however, the self-confidence subscale for athletes participating in closed-skill sports showed significant predictability. Results comparing four athlete competitive levels found the CSAI-2 was more effective at predicting the performance/anxiety relationship for higher ability athletes (gifted athletes at the high school or college level) as compared to more elite athletes (professional players or national or international level players), and for those at lower levels of competition. Finally, when examining the varied time intervals in which the CSAI-2 was administered, it was shown that time periods falling either 15 minutes or less and 31-59 minutes prior to competition were most effective for observing the anxiety/performance relationship

In relation to the population for the present research, participants consisted of high ability musicians (but not elite) individually performing a closed skill, thus mapping onto those described by Craft et al. (2003) in which the scale was most effective with athletes. As well, the CSAI-2R was administered five minutes prior to performance in the present research, thus falling in one of the acceptable time periods shown by previous research by Craft et al. (2003) to be suitable.

With the purpose of addressing some of the previously identified limitations of the CSAI-2, Cox, Martens & Russell (2003) reevaluated the scale using a calibration and validation

sample. The revised version of the CSAI-2 (the CSAI-2R) is considered to have stronger psychometric properties than its predecessor and is now recommended over the CSAI-2 for sport psychology research. Further, the CSAI-2R has been adapted for use with musicians (Yoshie et al, 2009) thus enabling a comparison of musician's anxiety with that of athletes. Additional strengths of the CSAI-2R are that it measures state anxiety and it is based on the multidimensional theory of anxiety, which assumes two independent components of anxiety (i.e somatic anxiety and cognitive anxiety). Taking the current research context into consideration and the factors noted above, the CSAI-2R should be an effective measure and thus is the selected instrument for the present research.

The interactive effects of intensity and direction of somatic anxiety, cognitive anxiety, and self-confidence on performance

Anxiety is defined as a negative emotional state associated with increases in physiological arousal that is often debilitating for performance, however, in some athletes, it can enhance performance. While early studies on the multidimensional theory of anxiety only assessed intensity symptoms (e.g. CSAI-2), Jones and Swain (1992) added direction subscales to the CSAI-2 to assess the extent to which high and low competitive athletes perceived their anxiety as facilitating or debilitating to performance. The findings of that showed no differences in cognitive and somatic anxiety between the two groups; however, the highly competitive group reported their anxiety as more facilitative and less debilitating than the low competitive group. Thus, directional perceptions of anxiety may play an important moderating role in the relationship between cognitive and somatic anxiety and performance.

Edwards and Hardy (1996) examined the intensity and direction of competitive state anxiety on the interactive influence of the three subscales of the CSAI-2 on netball players. In

that research, netballers reported that as self-confidence increased, they perceived their anxiety symptoms as being more facilitative to performance. Hardy (1990) suggests that self-confidence may provide protection against the potentially debilitating effects of anxiety. While Edwards & Hardy (1996) found no direct evidence of the facilitative influence of anxiety on performance through the direction scale, a significant interaction found between cognitive anxiety and physiological arousal suggests that cognitive anxiety may sometimes enhance and sometimes impair performance. Under high arousal, cognitive anxiety may be detrimental to performance; whereas under low arousal, increases in cognitive anxiety may have a facilitating effect. Indeed, most studies examining anxiety direction have shown that direction of an athlete's symptoms, (i.e. how they perceive their symptoms), positively predicts performance (Chamberlain & Hale, 2007; Kais & Ruadsepp, 2004; Swain and Jones, 1996). This is particularly true for elite athletes who report high levels of self-confidence and perceive their symptoms as being more facilitative than non-elite athletes (Jones, Hanton, & Swain, 1994).

Research conducted by Yoshie et al. (1990), explored the performance-anxiety relationship in pianists using the CSAI-2R, which they adapted for use with musicians. Consistent with predictions for the CSAI-2R, self-confidence intensity positively predicted global performance and cognitive anxiety intensity negatively predicted technical accuracy. Also consistent with research in athletes, cognitive anxiety direction positively predicted global performance, supporting the assumption that musicians' anxiety is similar to that of athletes.

As previously mentioned, some weaknesses have been associated with the CSAI-2. With respect to the self-confidence subscale, Craft et al. noted that the results of the meta-analyses showed only moderate support for the hypothesis that a positive linear relationship should occur between self-confidence and performance. They hypothesized that this moderate relationship

likely occurred because the self-confidence items reflected global self-confidence, rather than situation-specific self-confidence. Further, they proposed that researchers should assess performers' self-confidence in the condition specific to their performance, i.e. self-efficacy². In light of this proposal, musicians responded to a Self-appraisal scale³ administered alongside the CSAI-2R to measure self-efficacy immediately prior to performance. When responding to the CSAI-2R, musicians were asked to reflect specifically on the music performance about to occur. Given the state-specific instructions of the CSAI-2R that are analogous to the state-self-confidence instructions of the Self-appraisal scale, it is proposed that the self-confidence subscale measures obtained from the CSAI-2R in the present research are synonymous with self-efficacy beliefs as opposed to global self-confidence thus suggesting that the CSAI-2R is in fact measuring self-efficacy. To confirm that this assumption is supported, a correlation analysis of self-confidence and self-efficacy will be conducted (see Results section) In the next section, Bandura's theories of self-efficacy and social cognitive learning are discussed with respect to the feedforward self-modeling intervention conducted for this research.

Self-efficacy

The construct of self-efficacy, defined as the belief in one's own ability to complete tasks and reach goals, has played a central role in personality theory and social psychology theory since its introduction in the 1970s by Bandura. Bandura (1977) proposed the theory of self-efficacy to account for results obtained in clinical psychology for the treatment of anxiety.

According to the theory, psychological interventions, whatever their form, alter the level and

² It should be noted that the instructional set from the CSAI-2R was not modified at the time of the revisions from the original instructions of its predecessor, the CSAI-2.

³ Bandura advised using the title "Self-appraisal scale" rather than "Self-efficacy scale" to make the purpose of the scale more clear for respondents who may not understand the term "self-efficacy".

strength of self-efficacy. Bandura asserts that personal belief in one's ability to cope with anxiety-arousing events, people, or objects affects anxiety reactions and behaviours.

Expectations of personal efficacy in the face of obstacles and adverse experiences will determine if coping behaviors will be initiated, how much effort will be invested, and how long the effort will be sustained. Although individuals may display general high or low efficacious tendencies, self-efficacy can be highly specific to particular situations in which an individual is operating. For example, a person may show high self-efficacy in one domain such as math, and low self-efficacy in another, such as music performance (Bandura, 1977).

Bandura (1982) proposed that belief in one's ability to perform a specific task mediates subjective, autonomic and behavioural anxiety such that when self-efficacy beliefs are strong, anxiety is reduced. He suggests that an individual's beliefs about self-efficacy are derived from four major sources of information: 1) *mastery experience*: knowledge derived through successful coping experiences that may provide an indicator of one's capabilities; 2) *vicarious experience*: knowledge derived from someone observing the actions of another person that can alter beliefs about one's capabilities; 3) *verbal persuasion*: encouragement from trusted individuals that can modify the perception of one's capabilities; and 4) *physiological states*: perceptions of autonomic arousal that may influence interpretations about one's vulnerabilities. Of these sources, a mastery experience is considered to be the strongest source of self-efficacy because it can provide the most authentic indicator of one's own capabilities. Information derived from any one of these sources has the potential to modify behavior, but only if an individual processes the information cognitively and then acts on it reflectively (McCullagh & Weiss, 2001).

Self-efficacy theory has been used as a framework in the area of sport when designing interventions that seek to build, maintain or regain confidence in athletes (Feltz, Short, &

Sullivan, 2008). Feltz et al. suggest that athletes who image themselves successfully performing specific skills may experience increased confidence related to performing those skills, and thereby improve the performance of those skills. Self-confidence has been shown to mediate the effects of cognitive anxiety and physiological arousal on performance by increasing the probability that cognitively anxious performers can tolerate greater arousal before experiencing a decrement in performance (Edwards & Hardy, 1996) and that athletes' high levels of self-confidence facilitate coping resources (Chamberlain & Hale, 2007; Tsopani, Dallas, & Skordilis, 2011).

The reciprocal relationship that exists between anxiety and self-efficacy has been further developed to suggest that efficacy expectations directly influence the likelihood of success. One's expectation of success in a specific task or skill is considered a mediating variable between previous accomplishment and subsequent performance. According to Bandura, "mastery expectations influence performance and are, in turn, altered by the cumulative effect of one's efforts" (Bandura, 1977, p. 194). High self-efficacy expectations in athletes have been shown to be accompanied by low pre-performance anxiety, positive affect, strong goal importance, high personal goals and high trait sport confidence (Feltz & Lirgg, 2001). Since the primary goal in athletic performance, as in music performance, is to transfer skills learned in preparation to actual performance, self-efficacy strategies employed by athletes to decrease anxiety and improve performance are likely relevant to musicians.

Whereas self-efficacy theory has been well researched in the area of sport (Feltz et al., 2008), relevant studies in music are harder to find. One applicable study by McPherson and McCormick (2000) explored the contribution of motivational factors to instrumental music in a music examination. The study examined two constructs, self-efficacy and self-regulation, in 349

music students between 9 and 18 undergoing music examinations. Findings showed that self-regulation was key to improving practice and refining musical skills. Students who showed a higher level of cognitive engagement not only did more practising but were also more efficient with their learning and expressed higher overall levels of intrinsic motivation to learn their instruments. They were more likely to rehearse music in their minds as well as make critical ongoing judgements about their performance, demonstrating that musical proficiency relies not only on technical and expressive skill but also on the employment of internal motivational resources.

Of more relevance to McPherson and McCormick's research were the results associated with self-efficacy expectations and performance. The results were consistent with Bandura's self-efficacy theory and showed that student's self-efficacy perceptions immediately prior to a performance examination accounted for most of the variance in examination results. Further, self-efficacy was the best predictor of exam performance achievement (McPherson & McCormick, 2000, 2006). These findings suggest that strategies to enhance self-efficacy would be useful for musicians.

Two research papers from the 1980's examining self-efficacy and MPA are also relevant. The first, by Craske and Craig (1984), explored a multivariate "three-systems" model of anxiety and Bandura's self-efficacy theory. Craske and Craig compared "anxious musicians" with "non-anxious musicians" under two performance conditions ("with audience" and "without audience") to determine the degree of synchrony among the components of a "three-systems" (autonomic response, behavioural (i.e. performance quality), and verbal (i.e. self-report measures of anxiety, self-efficacy, etc.) theory of anxiety. The authors juxtaposed Bandura's self-efficacy theory with a "three-systems" model to test the hypothesis that the three anxiety responses are independent

and as such do not move in synchrony, as predicted by Bandura. Results from their research supported Bandura's self-efficacy theory for the "anxious" group in the "with audience" condition where significant increases in anxiety accompanied significant decreases in self-efficacy. For the "non-anxious" group, self-efficacy remained relatively stable across the two audience conditions. However, heart rate measures (autonomic anxiety) increased significantly for the non-anxious group in the "with audience condition" without corresponding decreases in reported self-efficacy (i.e. verbal) or performance quality (i.e. behavioural), thus lending support to a "three-systems" model of anxiety.

The second paper of interest involved the implementation of a cognitive behavioural intervention to alter MPA and self-efficacy beliefs in anxious musicians (Kendrick, Craig, Lawson, & Davidson, 1982). For their research, two types of therapy, "attentional training" (i.e., altering or replacing negative maladaptive thoughts with positive adaptive ones) and "behavioural rehearsal" (i.e., practice in simulated performance conditions), were compared for their effect on self-efficacy and performance anxiety. Attentional training was superior to behavioural rehearsal for enhancing personal efficacy although the real effects of the treatments were only observable at follow-up five weeks post-intervention. The authors conceded that the treatments comprised many elements, including verbal persuasion, video modeling, instruction, performance, group influence and homework assignments, making it difficult to attribute increases in self-efficacy to any individual element. While this particular experiment did not allow for conclusive results, it suggests, nonetheless, that a social-cognitive intervention for enhancing self-efficacy and reducing music-performance anxiety in musicians has promise.

The strong relationship found between highly anxious musicians, self-efficacy, and performance suggests that strategies to enhance self-efficacy may be beneficial for musicians

who encounter music performance anxiety. Given the strong links observed between self-efficacy and performance in the sport literature (Feltz et al., 2008) and its limited study in music, further research related to self-efficacy and music-performance is warranted. With the understanding that the goal of this research is to explore an intervention that will increase self-efficacy and reduce anxiety in adolescent musicians, a review of research on the use of modeling is particularly relevant.

Modeling

According to Bandura's (1989) social cognitive theory of learning, children and adolescents use social models such as parents, siblings, peers and teachers to acquire new responses. Modeling is a learning process that allows the observer to perform novel behaviours that were not previously in their repertoire (Starek & McCullagh, 1999). Bandura describes modeled learning as a multi-stage process that includes: a) *attention*: learners attend to a model with the purpose of gathering information about skill performance; b) *retention*: learners rehearse and retain cognitive representations for use when trying to reproduce the skill; and c) *motivation*: motivated learners will pay more attention to the demonstration than non-motivated learners, influencing the attention and retention stages of the process which, in turn, affect performance. Bandura hypothesized that behaviour acquisition and regulation is an integrated mechanism of cognitive processes on the one hand, and performance-based experiences on the other.

According to Bandura (1977), psychological changes that result as a consequence of performance are more powerful than cognition alone. He suggests that while cognitive processes mediate change, cognitions that are induced and altered through effective performance will exert the most powerful psychological change. Bandura applied his theory of observational learning to therapy, using modeling as an intervention for psychological disorders, particularly with phobias.

It has subsequently been used as a therapy across many domains including sports, academics and health behaviours.

Of interest to the proposed research is that model-viewer similarity has been shown to have an important influence on the effectiveness of modeling (McCullagh & Weiss, 2001). Individuals who view a model that they perceive as similar to themselves will relate more strongly to that model, increasing the attention to the modeled skill which in turn, positively affect self-efficacy and performance (Bandura, 1977, 1986). According to Bandura, the best models are those closest to the viewer in all attributes, including ability. When the model and viewer are the same person (i.e., using the self-as-a-model), one has come as close as possible to viewer similarity.

Self-modeling is an intervention procedure that uses images of oneself - usually a video recording - to initiate adaptive behaviour (Dowrick, 1999). Research has provided convincing evidence that self-modeling, conceptualized as a surrogate for enactive mastery experience, is a powerful tool for modifying behavior. Mastery experiences may indeed be the optimal model of observational learning based on a) the hierarchal sources of self-efficacy laid out in Bandura's social cognitive theory and b) supporting neurological research that shows a greater correspondence in neural activation between observation and action execution during self-viewing, first-person perspective, than when viewing another individual, third-person perspective (Holmes & Calmels, 2008; Ste-Marie, Vertes, Rymal, & Martini, 2011).

Two types of self-modeling have been classified: positive self-review and feed-forward. Positive self-review (PSR) is a two-step process where images of an individual's current efforts at a skill are captured on video and only the "best attempts at a skill so far" is presented on the video to the learner afterward, with errors and distracting footage edited out (Dowrick, 1999).

Research in the domain of sport has consistently demonstrated that self-as-model interventions may enhance both self-efficacy beliefs and performance function (Clark & Ste-Marie, 2007; Starek & McCullagh, 1999; Winfrey & Weeks, 1993).

A second form of self-modeling is feedforward self-modeling (FF-SM) which, in contrast to PSR, depicts a skill or level of mastery not yet acquired. In the feedforward self-model, the skills are within the repertoire of the individual, but they have not yet been performed in sequence or transferred to a different setting. Video editing gives the appearance of an individual performing at a level of achievement not yet attained. Dowrick (1999) suggests that feedforward self-modeling technique has four potential applications. These are: a) transferring of setting-specific behaviours to other environments, b) providing hidden supports for disorders that may be anxiety-based, c) recombining component skills and, d) transferring role play to the real world (Dowrick, 1999). Ste-Marie, Vertes et al. (2011) examined the potential benefits of video feedforward self-modeling for children learning trampoline skills with a focus on the third component of its application, skill acquisition or recombining component skills. There was a significant difference in skill acquisition between those children learning trampoline skills with the benefit of a feedforward self-modeling video and verbal instructions, and those children receiving verbal instructions alone.

Observation has not only been used in the context of learning but also as a strategy for improving competitive performance. Research by Ste-Marie, Rymal et al. (2011) used feedforward self-modeling videos with gymnasts for enhancing competitive beam performance. In their experiment, gymnasts alternated between viewing and not viewing a video during competition. Gymnasts attained higher scores when they viewed their video compared to when

they did not. Qualitative data collected alongside the experimental data showed a strong link between viewing a feedforward self-modeling video and increased self-efficacy.

While no research using feed-forward self-modeling has yet been conducted with musicians, results from Ste-Marie, Rymal et al. (2011) support a potential benefit for a feedforward self-modeling music video to increase self-efficacy, decrease music performance anxiety, and improve music performance in musicians. Moreover, further support for the use of feedforward self-modeling comes in light of Dowrick's (1999) proposal that one of the potential uses of this form of self-modeling is that it could assist with disorders that may be anxiety-based. As such, the research question was: will a feedforward self-modeling video given to adolescent musicians to view in conjunction with their personal practice, enhance self-reported expectations of self-efficacy, decrease self-reported levels of music performance anxiety and objectively improve the quality of performance?

To address this question, a feedforward self-modeling video was created for each participant. In this within-subjects design, adolescent musicians participated in both conditions of the intervention (video /no video). When participants were in the video condition, they viewed their video in conjunction with their regular daily practice routine. They recorded practice times, answered closed-ended questions on self-assessed physiological and psychological effects of the video as well as provided optional additional comments in a logbook provided. When in the no-video condition, participants completed their regular practice routine and recorded their practice times in a logbook. At the end of each practice week, participants in both conditions performed the repertoire on their self-modeling video for a proxy adjudicator and, similar to practice, the video was viewed or not viewed dependent on condition assignment.

Consistent with results from self-modeling research in athletes and Bandura's theory of self-efficacy, it was hypothesized that all participants who used a feedforward self-modeling video alongside their practice and prior to performance would show enhanced self-efficacy as measured by a Self-appraisal scale, compared to when they did not use the video. With respect to the CSAI-2R, separate predictions were made for each of the three subscales. With the view that self-modeling may be considered primarily a cognitive-behavioural intervention whose primary influence is on cognitive processes that are assumed to be independent of physiological processes, no changes were expected for somatic anxiety; however, a decrease in cognitive anxiety was hypothesized. As argued earlier, the self-confidence subscale is assumed to reflect situation-specific self-confidence, equivalent to a self-efficacy measure. In this light, it was predicted that participants using a feedforward self-modeling video would show higher self-confidence scores, indicative of increased self-efficacy, as compared to not using a video. The final prediction for this research was that the use of a feedforward self-modeling video during practice and in advance of performance would result in superior performance compared to when no video was used.

In a recent review paper on the use of observation, Ste-Marie et al. (2012) noted that most of the observation interventions used in sport research to date have been designed to improve skill performance and have not specifically examined the effects of modeling on the psychological processes of self-efficacy and anxiety. They further recommended that future research studies on modeling experiences should consider "psychological outcomes that fall within the performance function" (p. 167). Since the psychological processes of self-efficacy and anxiety are inherent to music performance, and since these processes may significantly impact performance function in musicians, an intervention to explore the impact of a feedforward self-

modeling video on self-efficacy, anxiety, and subsequent performance in musicians was well suited to address this final research gap.

In sum, while self-efficacy and consequent reductions in anxiety have been well researched in the area of sport (Feltz et al., 2008), very little research had been done in the domain of music and the present research serves to address this gap in the literature and to extend the findings from the domain of sport into that of music. Mastery experiences are considered to provide the strongest source of self-efficacy (Bandura, 1977) and it is argued that self-modeling can serve as this mastery experience to lead to increases in self-efficacy (Ste-Marie, Rymal et al., 2011).

Chapter 2: Method

Participants

Participants consisted of twelve adolescent musicians (Males = 3, Females = 9) between 13 and 18 years of age ($M = 16$, $SD = 1.6$), whose primary instrument was the violin or cello and who self-reported high levels of music performance anxiety (see Results section for confirmation of inclusion criteria). The musicians' performance levels ranged from RCM Grade 8 level to ARCT ($M = 9.8$, $SD = 1.02$), the highest achievement level of the Royal Conservatory of Music. In this 2 Order x 2 Time between-within subjects experimental design, participants were randomly assigned to view their video in either a "Video to No Video" order (Order 1), or a "No Video to Video" order (Order 2); (see Table 1, for participant information). This research received approval by the Office of Research Ethics and Integrity at the University of Ottawa (see Appendix O).

Table 1

| Participants Order 1 | Gender | Age | RCM level ^a | MPA ^b | Years on instrument | Total Minutes of Practice |
|-------------------------|--------|-------------------------------------|-------------------------------------|---------------------------------------|-------------------------------------|--|
| 1 | F | 13 | 11 (ARCT) | 49 | 8 | 1210 |
| 3 | F | 16 | 9 | 77 | 11 | 505 |
| 4 | F | 17 | 10 | 75 | 12 | 1710 |
| 8 | M | 16 | 9 | 88 | 3 | 555 |
| 10 | M | 17 | 11 (ARCT) | 48 | 10 | 1395 |
| 11 | M | 18 | 11 (ARCT) | 73 | 13 | 870 |
| | | <i>M</i> = 16.1 <i>SD</i> = 1.71 | <i>M</i> = 10.1 <i>SD</i> = 0.98 | <i>M</i> = 68.33 <i>SD</i> = 16.21 | <i>M</i> = 9.5 <i>SD</i> = 3.22 | <i>M</i> = 1040.83 <i>SD</i> = 480.46 |
| Participants Order 2 | Gender | Age | RCM level ^a | MPA ^b | Years on instrument | Total Minutes of Practice |
| 2 | F | 17 | 8 | 88 | 5.5 | 695 |
| 5 | F | 17 | 9 | 56 | 11 | 1090 |
| 6 | F | 17 | 11 (ARCT) | 56 | 13 | 1730 |
| 7 | F | 13 | 9 | 54 | 8 | 580 |
| 9 | F | 15 | 10 | 71 | 8 | 1075 |
| 12 | F | 16 | 10 | 69 | 10 | 440 |
| | | <i>M</i> = 15.8 <i>SD</i> = 1.60 | <i>M</i> = 9.5 <i>SD</i> = 1.04 | <i>M</i> = 65.6 <i>SD</i> = 13.12 | <i>M</i> = 9.25 <i>SD</i> = 2.64 | <i>M</i> = 935 <i>SD</i> = 429.01 |

^a Royal Conservatory of Music

^b Trait anxiety as Measured by the Music Performance Anxiety Inventory - Adolescents (Osborne & Kenny 2005)

Materials

A selection of materials was used for this two-week intervention. When in a video week, participants practiced for 6 days with the use of a Feedforward self-modeling video and on day 7, gave a performance of the repertoire from the video; in a no video week, participants followed the same protocol, without the use of the a Feedforward self-modeling video. Video recording and editing materials were used pre-intervention to create the feedforward self-modeling videos. Several psychometric scales, described in more detail below, were used pre-intervention and during the intervention to measure trait and state anxiety, and self-efficacy (See Appendices). Video recording materials were also used during the intervention to capture two live performances that took place at the end of both weeks of practice.

Pre-intervention.

Primary video footage was captured on a Sony PMW-200 camera placed in front of the performer. High quality audio was recorded via XLR input into the PMW-200 camera. Three additional cameras, a Canon XF100, a Sony HFS10, and a Canon S100 were used to complement the main camera shot with a tight side shot, a tight low-angle shot and a high wide shot respectively. The video footage was then copied on to a 3.33 GHz Mac Pro hard drive and imported into Avid Media Composer (Version 7). The four camera shots were synchronized in Avid Media and the secondary audio from the three supplementary cameras was erased. An unedited version of each participant's footage with time code was then used to select usable footage, and any mistakes, bad notes or false starts along with any other distractions to the performance were edited out to produce a single, uninterrupted performance that was a representation of the best footage from the recording session. Feedforward self-modeling videos

were uploaded on to Hightail, a professional video file-sharing website and each participant's own video was accessible for download.

The Music Performance Anxiety Inventory for Musicians for Adolescents (MPAI-A; Osborne & Kenny, 2005) was used pre-intervention to assess participants' individual levels of trait anxiety relating to music performance. The MPAI-A is the first standardized assessment tool for music performance anxiety developed specifically for adolescent musicians. It has been validated for both construct validity and external validity (Osborne & Kenny, 2005; Osborne, Kenny, & Holsomback, 2005). The MPAI-A is an 18-item scale divided into three subscales: somatic and cognitive anxiety, performance evaluation, and performance context. The first, "somatic and cognitive anxiety", pertains to both the physical manifestations of MPA (e.g., "When I perform in front of an audience, my heart beats very fast"), as well as psychological elements that may disrupt a performance (e.g., "I often worry about my ability to perform"). The second, "performance evaluation", pertains to evaluations that both the performer and the audience may make of a performance and the consequences of those evaluations (e.g., "I worry that my parents or teacher might not like my performance"). The third, "performance context", describes the preference performers have for either solo or group contexts and the nature of the audience (e.g., "I would rather play on my own than in front of other people"). Responses for the MPAI-A are scored on a Likert-type scale from (0) *not at all* to (6) *all of the time*. Responses for the 18 items were summed to produce a score out of 90. Cronbach's alpha for the MPAI-A, used to measure of the internal consistency of the scale for these participants, was $\alpha = 0.895$.

Intervention.

Logbooks were used during the intervention phase to record practice duration (minutes of practice) and to instruct participants on a prescribed practice order (i.e., warm-up, technical

studies, repertoire from video, additional repertoire etc.). Space for additional comments was also provided. In the Video condition, the logbooks included instructions on when and how to view the video (i.e., Do your regular warm-up; View your video twice) and presented three close-ended questions relating to the use of the video tapping into motivation, anxiety, and self-confidence (i.e., “How confident do you feel about your upcoming performance after watching your video?”)⁴.

The Revised Competitive State Anxiety Inventory-2R (CSAI-2; Yoshie et al., 2009) was used to assess participants’ state anxiety prior to two live performances. The CSAI-2R is a validated 17-item self-report anxiety assessment tool that includes separate report measures for somatic anxiety, cognitive anxiety, and self-confidence. Example items for the three scales include, “I am concerned about performing poorly” for cognitive anxiety, “I feel jittery” for somatic anxiety, and for self-confidence, “I’m confident about performing well”. This scale was chosen over other existing scales for MPA (i.e., MPAQ, K-MPAI) for three main reasons: (1) it captures the multidimensional components of anxiety by separating the constructs of cognitive anxiety, somatic anxiety, and self-confidence; (2) it measures state anxiety as opposed to trait anxiety; and (3) it is a scale that is applicable to not only athletes, but also musicians. This questionnaire that is typically used to measure competitive state anxiety in athletes, was modified by Yoshie et al. (2009), for use with musicians and will be the version used here. Specifically, items 2, 5, and 7 were modified to better reflect music performance situations. For example, the term “losing” was replaced with the term “failing” for Item 5 (i.e., “I am concerned about

⁴ In hindsight, the logbooks should have included questions relating to motivation, anxiety, and self-confidence for both Video and No Video conditions. As this was not done, there will be no further reporting on the data from the close-ended questions obtained from the logbooks. See the Results section for a report on “minutes of practice”).

failing”). Responses from the CSAI-2R are reported on a Likert-type scale ranging in one-unit intervals from 1 (*not at all*) to 4 (*very much so*). Scores range from 10 to 40 for each of the subscales (i.e., somatic, cognitive, and self-confidence). Responses were summed, divided by the number of items for that subscale, and multiplied by ten. For all three subscales, a higher score indicated a higher response level for that particular subscale (i.e., a score of 40 for self-confidence indicated a high measure of self-confidence). Cronbach’s alphas in the present research were .552 for somatic, .747 for cognitive and .865 for self-confidence for the first performance and .706 for somatic, .814 for cognitive, and .895 for self-confidence for the second performance indicating a moderate to high degree of internal consistency for the CSAI-2R scale with these participants.

The Self-appraisal scale was developed by the researcher for the purpose of this experiment to assess self-efficacy expectations. Results from a meta-analysis of self-efficacy interventions in sport shows that self-efficacy questions must relate very specifically to the particular task that is being measured (Moritz, Feltz, Fahrback, & Mack, 2000). For this reason, the Self-appraisal scale asked the musicians to reflect on the selected repertoire from their video and to indicate their immediate feelings of confidence to perform that repertoire, with their anxiety under control, under increasingly difficult task conditions. Eight questions were developed to reflect increasingly difficult task conditions for the performer (e.g., “How confident are you to perform your piece alone in a practice room with your anxiety under control?” or “How confident are you to perform your piece in recital for an audience with your anxiety under control?”). This scale was constructed based on Bandura’s (2006) guidelines for constructing self-efficacy scales. Additionally, this scale borrowed from previous scales used to evaluate self-efficacy in musicians, and in particular those developed by Craske & Craig (1984). Specifically,

the wording in their instructions "...how confident are you that you could [now] perform the following tasks with your anxiety under control" were used in the instructions of this scale. In the scale developed for the present research, the words, "Thinking about the piece you are about to perform..." were added to beginning of the self-efficacy question, to ensure that the participants were reflecting on personal self-efficacy expectations specific to the performance situation at hand and not general self-efficacy related to the tasks. Responses for the Self-appraisal scale were assessed on 100-point scale, ranging in 10-unit intervals from 0 (*cannot do*); through 50 (*moderately certain can do*); to 100 (*highly certain can do*). Self-efficacy scores were obtained by calculating the mean for the eight items from the scale and then dividing by ten. Cronbach's alpha in the present research was 0.818 for the first performance and 0.908 for the second performance indicating a high degree of internal consistency for the scale with this sample.

To assess performance, video footage from two live performances was captured on a Canon VIXIA HF S10 high definition camcorder, mounted on a tripod and placed on an angle, out of direct view of the performer. High quality audio was recorded via Sony ECM -909 stereo microphone input directly into the VIXIA HF S10 camera. Backup footage and audio were captured on a Panasonic Lumix DMC-ZS7 12.1 MP Digital Camera with 12 X Optical Zoom mounted on a tripod and placed orthogonally to the first camera. The resulting video footage was transferred from 16 GB SanDisk SD cards removed from the cameras and copied on to a 2.26 GHz MacBook Pro hard drive for post-intervention evaluation.

The Music Performance Anxiety Strategies Survey (MPASS) was developed by the researcher for the purpose of the present research to gain an understanding of pre-existing strategies used by participants to self-manage their performance anxiety. The MPASS is a list of

11 strategies selected by the researcher and based on many years' teaching experience as being commonly used by young musicians to calm their nerves before a performance. Three of the items were chosen specifically because they represent strategies related to the feedforward self-modeling video. They are positive self-talk (i.e., "I engage in positive self-talk"), mental imagery (i.e., "I imagine myself performing the music"), and mental rehearsal ("I rehearse the music in my mind"). These items were embedded within the list of strategies to see if participants would alter their strategies throughout the course of the intervention as a result using the video. Participants were asked to give a "yes" or "no" response for each item. Additional space was provided for comments.

Post- intervention.

In the post-intervention phase, video footage for the 12 participants from the two performances (24 video captures in total) was transferred from the 2.26 GHz MacBook Pro hard drive and copied on two DVDs to accommodate all 24 video captures. The DVDs were then sent for external evaluation by two string instrument adjudicators from the Royal Conservatory of Music (RCM). Both adjudicators signed a Confidentiality Agreement prior to adjudications. The adjudicators were provided with a score sheet based on a holistic marking system out of 100, to reflect overall performance quality as opposed to a segmented mark based on subcategories of assessment. The rationale for using this particular marking scheme was to preserve the highest level of ecological validity by minimizing intervention in the evaluation process (Thompson & Williamon, 2003).

Procedures

Pre-intervention.

In the recruitment phase, music teachers were approached by the Principal Researcher to discuss the research project with their students and to assist the researcher in identifying students who would likely self-report MPA, and who then expressed an interest in participating in the research. Music teachers informed the parents of interested students who would likely meet the inclusion criteria, and following contact with the researcher, an Information Letter and Consent Form was distributed via email. Parents signed the consent form and video release form and participants gave their assent immediately prior to the first data collection session.

In the pre-intervention stage, participants were asked to select a movement of unaccompanied Bach for their instrument in collaboration with their private teacher.⁵ When the selected repertoire had been learned with the help of their teacher, participants met individually with the researcher, a professional violinist and violist with extensive knowledge of the cello, for approximately 45 minutes to gather footage for the feedforward self-modeling videos. Immediately prior to the recording session, the MPASS was administered to participants in order to gather pre-intervention strategies for managing music performance anxiety. The MPAI-A was also administered at this time in order to obtain trait anxiety measurements to validate the inclusion criteria of the person self-reporting music performance anxiety. This measure was used as a covariate in the final analysis. Finally, the appropriate Video/No Video condition logbooks were distributed to all participants.

⁵ Unaccompanied Bach was chosen as the ideal repertoire for matching participants and instruments because solo Bach is both idiosyncratic and idiomatic and as such, is well suited to cross-validation.

To gather footage for the feedforward self-modeling videos, participants were asked to perform the selected piece of music in its entirety without stops in order to create a single, uninterrupted performance as a baseline for the editing process. The researcher then worked with the participant to improve intonation, technical security, rhythmic accuracy, tone, phrasing, expressivity, deportment and visually relaxed movements. Sections needing work in the aforementioned areas were rehearsed and recorded again. The resulting video footage from the recording session was then edited using video editing software to remove errors and the aggregate footage was assembled to create a personal feedforward modeling video (i.e., a video portraying a mastery level of performance not yet attained by that individual).

Intervention.

In the intervention phase, participants took part in a two-week experiment where in one week they practiced with the use of their feedforward self-modeling video and in the alternate week they practiced without the video. All participants responded to the Self-appraisal scale and the CSAI-2R five minutes in advance of each performance.

In the video condition, on the evening that preceded the six days of practice, the feedforward self-modeling videos were made accessible for the participants to download onto a personal viewing device (computer, iPod, etc). They were then asked to view their video each day for six consecutive days. Participants were instructed to complete their regular warm-up and then viewed their video twice in a row. Immediately following this viewing, they were instructed to practice the repertoire from their video. On days two, four, and six, participants also answered in their logbook, three close-ended questions pertaining to the video. At the end of the week, on day seven, participants gave a performance of the selected repertoire from their video. Immediately prior to this performance, participants viewed their feedforward self-modeling

videos twice on a MacBook Pro laptop computer provided by the researcher. After viewing the video, and before performing, they completed Self-appraisal scale and the adapted CSAI-2R. Participants then performed the repertoire from their video for a proxy adjudicator. Proxy adjudicators were present at the performances to create realistic performance conditions that would be expected to cause anxiety for the participants. The scoring of the proxy adjudicators was not used for the analyses, but rather, the performances on this day were video recorded for future evaluation by professional RCM adjudicators. Immediately following both performances, all participants completed the MPASS. Participants in the No Video condition were instructed to follow the same protocol as in the Video condition with the exception that no feedforward self-modeling video was viewed during the six days of practice or in advance of performance on the seventh day.

Post- intervention.

Post-intervention, all of the Video and No Video performances were forwarded to two RCM adjudicators for evaluation. The videos of the two performances for the 12 participants (24 videos in total) were transferred from the researcher's MacBook Pro computer hard drive. All of the video performances were then transferred on to two separate DVDs, with the first DVD holding both performances for participants numbers one through six, and the other holding both performances for participants numbers seven through twelve. The performance order for the two adjudicators was flipped so that Adjudicator One viewed the videos in performance order 1-2 and Adjudicator Two viewed the videos in performance order 2-1. Each adjudicator was blind to the other's condition. To prevent perceptual fluency, no participant's performances were viewed back to back (Jacoby & Dallas, 1981). The examiners were asked to view each performance video once only, without pauses, and to take a 24-36 hour break between the two DVDs.

Chapter 3: Results

All data from pre-intervention and intervention questionnaires were entered into SPSS Statistics Version 21 for analyses.

Preliminary analysis

To confirm that the test sample used in this research was comprised of participants with higher than average trait anxiety related to music performance, a t-test for independent samples was conducted using the MPAI-A scores from the validation sample used to develop the original MPAI-A by Osborne & Kenny (2005). The descriptive data for this comparison are presented in Table 2. This analysis showed that the musicians in this sample experienced significantly higher anxiety than is typical of adolescent musicians, $t(308) = 4.24, p < .0001$.

To support the argument that the self-confidence subscale, administered with the same state-specific instructions as the Self-appraisal scale, provided information similar to self-efficacy, a Pearson's product-moment correlation coefficient was performed to test the strength of the relationship between Self-efficacy and the Self-confidence subscale of the CSAI-2R for both the performance time measurements (i.e., performance in Week 1 and Week 2). This analysis shows the measures as being significantly correlated (see Table 3).

Table 2

A Comparison of MPAI-A Data: Experimental Sample Compared to a Validation Sample

| The effects of feedforward self-modeling on self-efficacy, music performance anxiety and music performance in adolescent musicians | | Development and validation of a music performance anxiety inventory for gifted adolescent musicians (Osborne & Kenny, 2004) | |
|--|--------|---|-------|
| <i>N</i> | 12 | <i>N</i> | 298 |
| Mean | 67 * | Mean | 42.92 |
| <i>SD</i> | 14.135 | <i>SD</i> | 19.44 |
| Age | 12-18 | Age | 14-19 |

* $p < .0001$, two-tailed.

Table 3*Correlation and Means for Self-efficacy and Self-confidence*

| Time | Pearson's correlation | Self confidence | | Self-efficacy | |
|---------------|-----------------------|-----------------|------|---------------|------|
| | r | M | SD | M | SD |
| Performance 1 | .683 * | 20.75 | 6.16 | 67.07 | 13.6 |
| Performance 2 | .683 * | 23.33 | 7.2 | 71.489 | 16.1 |

Note. SE = Self-efficacy, SC = Self-confidence

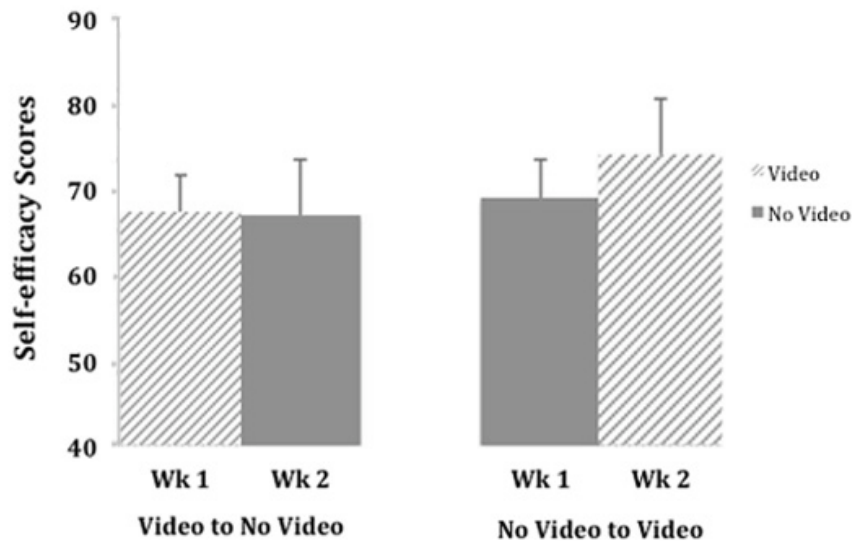
* $p < .05$, two-tailed.

Self appraisal scale results

The self-efficacy scores from the Self-appraisal scale were subjected to a 2 Order (Video to No Video, No Video to Video) x 2 Time (Week 1, Week 2) ANOVA with repeated measures for Time, performed to test the effect of a feedforward self-modeling video on the construct of self-efficacy. As shown in Figure 1, the self-efficacy scores of participants who used a feedforward self-modeling video in Week 1 of the experiment did not differ from their scores in Week 2 (no video). By contrast, participants who used a feedforward self-modeling video in Week 2 displayed higher self-efficacy scores in comparison to Week 1, when the video was not provided. While these differences approached significance, $F(1,10) = 3.419$, $p = .094$, they did not meet the $p < .05$ criterion for statistical significance.

Figure 1

Self-efficacy scores across Order and Time



Note. Self-efficacy scores range from zero to 100.

CSAI-2R results

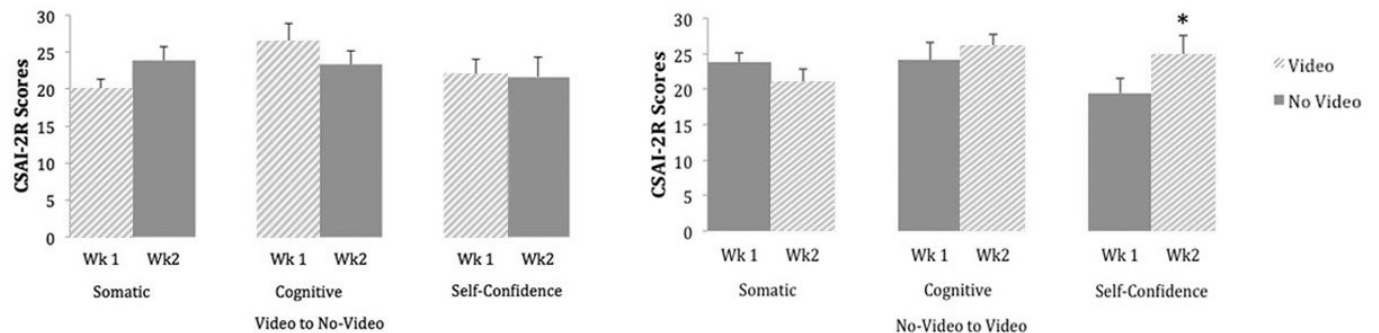
A 2 Order (Video to No Video, No Video to Video) x 2 Time (Week 1, Week 2) x 3 Subscales (Somatic, Cognitive, and Self-Confidence) mixed measures ANCOVA with repeated measures for Time and Subscale was used to examine the effect of the intervention of a feedforward self-modeling video (independent variable) on music performance anxiety as measured by the subscales of the CSAI-2R (dependent variables). Participants' trait anxiety scores from the pre-intervention administration of the MPAI-A were used as covariates in this analysis. Preliminary checks were conducted to ensure that there was no violation of the

assumptions of normality, linearity, homogeneity of variance, homogeneity of regression slopes, or reliable measurement of the covariate.

No main effects or two-way interactions were observed; however, the analysis showed a significant three-way interaction, $F(2,18) = 4.434, p = .027$ (see Table 2, for CSAI-2R scores). *Post hoc* analysis was performed using Tukey's HSD test to determine where significant differences occurred. Results from the *post hoc* analysis revealed that the only differences found were with the self-confidence subscale, wherein the video condition was better than the no-video condition, but only if the video was used in the second week after a week of practice and a performance of the same repertoire from the video.

Figure 2

Subscales of the CSAI-2R across Order and Time



Performance results

A Pearson's product-moment correlation coefficient performed to test the inter-rater reliability of the two RCM adjudicators who had scored the performances showed a high degree of agreement $r(10) = .725, p = .01$ between the raters for this research, which met acceptable levels of reliability (Multon, 2010).

A 2 Order (Video to No Video, No Video to Video) x 2 Time (Week 1, Week 2) ANOVA was performed to test the effect of feedforward self-modeling on Performance. Participants' trait anxiety scores from the pre-intervention administration of the MPAI-A were used as covariates in this analysis. Preliminary checks were conducted to ensure that there was no violation of the assumptions of normality, linearity, homogeneity of variance, homogeneity of regression slopes, or reliable measurement of the covariate.

Results from the ANOVA showed only a significant main effect for time, $F(1,9) = 7.562, p < .022$. The mean Performance scores in Week 1 were lower than mean Performance scores in Week 2 (see Table 4, for performance scores).

Table 4

Comparison of Adjusted Means and Standard Error for Performance Scores

| | <i>N</i> | Time 1 | | Time 2 | |
|---------|----------|--------|-----------|--------|-----------|
| | | Mean | <i>SE</i> | Mean | <i>SE</i> |
| Order 1 | 6 | 82.316 | 1.146 | 85.992 | 1.052 |
| Order 2 | 6 | 81.934 | 1.146 | 84.758 | 1.052 |

Note. Order 1 = Video/No Video, Order 2 = No Video/Video

MPASS results

Three questions tapping into cognitive processes were identified from the list of eleven strategies from the MPASS describing strategies that musicians might be expected to use to manage their anxiety in a performance situation (see Appendix N). The questions 1) I engage in positive self-talk, 2) I imagine myself playing the music, and 3) I rehearse the music in my mind were chosen because they can be considered as cognitive strategies that relate specifically to the feedforward self-modeling video intervention. A Fisher's exact test was performed for each dependent variable (self-talk, imaging and rehearsing) to determine if there were significant differences in the use of these strategies as a result of using a self-modeling video from baseline compared to the video condition. The differences between baseline and video conditions were significant for Positive Self-talk, $c^2(1, N = 24) = 4.196, p = .049$, Imaging, $c^2(1, N = 24) = 6.750, p = .014$ and Rehearsing, $c^2(1, N = 24) = 4.800, p = .047$ (See Table 5).

Table 5

A Comparison Cognitive Strategies: Baseline and Video Conditions

| | I engage in positive self-talk | | I imagine myself playing my music | | I rehearse the music in my mind | |
|----------|--------------------------------|----------|-----------------------------------|----------|---------------------------------|----------|
| | <i>N</i> | <i>n</i> | <i>n</i> | <i>n</i> | <i>n</i> | <i>n</i> |
| Baseline | 12 | 4 | 5 | 5 | 8 | 8 |
| Video | 12 | 9* | 10* | 10* | 12* | 12* |

* $p < .05$, one-tailed.

Logbook results

To test the assumption that there were no differences minutes of practice between Orders 1 and 2, a t-test for independent samples was conducted on the combined minutes of practice for Weeks 1 and Week 2, for Order 1 and Order 2. The descriptive data for these comparisons are presented in Table 6. This analysis showed that there were no significant differences in the amount of practice completed by musicians in Order 1 compared to those in Order 2, $t(10) = 0.3857, p = .708$. Given the non-significant result, no further analyses were conducted on these data.

Table 6

A Comparison of Minutes of Practice: Order 1 and Order 2

| | <i>N</i> | Mean | <i>SD</i> |
|---------|----------|---------|-----------|
| Order 1 | 6 | 1040.83 | 480.54 |
| Order 2 | 6 | 935.00 | 469.96 |

Note. Order 1 = Video/No Video, Order 2 = No Video/Video
 $p = 0.707$, two-tailed.

Chapter 4: Discussion

Research in the area of sport has shown that the use of feedforward self-modeling by athletes has resulted in increased self-efficacy expectations and improved performance (Ste-Marie, Rymal et al., 2011; Starek & McCullagh, 2003). In the present study, a feedforward self-modeling video was given to adolescent musicians to use during one week of practice and in advance of a performance, to examine whether it would serve to (1) enhance self-efficacy expectations, (2) reduce anxiety related to music performance, and (3) enhance the music performance. Each of these areas of exploration is addressed next.

Self-efficacy

In their meta-analysis of the CSAI-2, Craft et al. (2012) suggested that the likely reason that the CSAI-2 showed only a moderate relationship between self-confidence and performance was because the self-confidence items reflected global self-confidence, rather than situation specific self-confidence. They proposed that further research should assess performers' self-confidence in the condition specific to their performance. Their recommendation was adopted in the present research by including a Self-appraisal scale and by explicitly stating alongside the instructions for the CSAI-2R that the musician should complete the scale in reference to their upcoming performance. Thus, the suggestion made here is that the results from the self-confidence subscale of the CSAI-2R provide information about the musicians' self-efficacy. The strong relationship obtained between the appraisal scale and the self-confidence subscale provides support for the proposition that both measures are assumed to be tapping into the same construct. Given this result, the combined results from the self-efficacy measure and the self-confidence subscale are used here to speak to the findings related to changes in musicians' self-efficacy beliefs.

The underlying logic of a feedforward self-modeling video is that it is expected to act like a mastery experience. Mastery experience is considered to be the most influential source of self-efficacy because it provides authentic evidence to the observer (e.g., athlete, musician) whether they have the resources and necessary skills to succeed (Bandura, 1977). In the case of the present research, it was expected that providing musicians with a video of themselves performing successfully would act as a mastery experience, thus making them feel more confident about succeeding in their upcoming performance, as mediated by a reduction in anxiety. These heightened feelings of self-efficacy could then translate into better performance. Thus, the first stage of the analysis was to determine if there were greater levels of self-efficacy under conditions in which a video was viewed prior to performance as compared to when it was not viewed.

Based on the self-efficacy appraisal measure, changes to self-efficacy only occurred when participants first had a week to practice and to perform without a feedforward self-modeling video. Correspondingly, the significant three-way interaction obtained with the CSAI-2R showed the same results; the video was only effective at increasing self-efficacy when participants used the video in week two, after a full week of practicing the repertoire without the video. Given that the sample used in the present research mapped closely to those factors of the self-confidence subscale noted by Craft et al. (2003) to be effective, it is assumed these results are reliable. The main question then becomes why the video was only effective in changing self-efficacy in the second week. One possible interpretation relies on Zimmerman's model of self-regulation (2000).

In Zimmerman's (2000) model of self-regulation, he explains how humans use self-evaluated feedback from previous performance to affect learning and future performance. Self-

regulation has been used as a framework in feedforward self-modeling research with athletes as an explanatory mechanism for its potential benefits (Rymal et al, 2010; Clark & Ste-Marie, 2007; Ste-Marie, Rymal et al., 2011). Bandura's self-efficacy theory, which is central to the present research, is found within the forethought phase of Zimmerman's self-regulation model, and is consequently an appropriate framework to use to explain the benefits in self-efficacy.

Zimmerman's (2000) self-regulation model incorporates a triadic feedback loop beginning with a forethought phase, moving through to a performance phase and finishing with a self-reflection phase, wherein the process starts over again. The forethought phase is comprised of thoughts and processes that occur in advance of a performance and includes task strategies and motivational influences, such as self-efficacy beliefs. This phase is followed by a performance phase where strategies, such as attention focusing and affect control are integrated during the actual performance of the task to influence its performance outcomes. The final phase of the triad is a self-reflection phase that occurs following performance. In this final phase, comparisons are made between the performance that just took place and various potential comparators, including mastery expectations or previous performance. Self-judgments of self-satisfaction are also made during this phase, which in turn, influence future performance and those activities that occur during the forethought phase.

Working within Zimmerman's (2000) model, it is proposed that at least one triadic cycle of the musicians' performance of the repertoire may be a necessary precursor that enables the musician to first gain an enactive experience of the event, such as performing the music repertoire in the presence of an adjudicator. Thus, the group who had the video during the first week could not benefit from the video because they had not had their own enactive experience of the performance. For those who did not have a video during the first week's performance, they

were better able to integrate the feedforward video into the forethought phase that occurred during the second week's performance because it followed a prior enactive experience. In this situation, the feedforward self-modeling video could now serve as tool to enhance self-efficacy beliefs. Interestingly, Rymal, Martini, & Ste-Marie (2010) used an experimental design wherein gymnasts were first able to have experiences of performing their competitive routines without the video prior to its integration into their pre-competition preparation, thus providing support for the proposition advanced. Further, Bandura (1977) also proposes the notion that an individual's self-efficacy builds across a number of episodes, thus supporting the interpretation that prior enactive experiences may be required to generate benefits from a feedforward self-modeling video.

Although not a focus of the research, an interesting component emerged from the Music Performance Anxiety Strategies Survey with respect to the possible contributing role of self-talk in relation to observed changes in self-efficacy. As highlighted earlier, according to Bandura's (1977) theory of self-efficacy there are four sources of self-efficacy: mastery experience, vicarious experience, verbal persuasion and physiological states. Hardy (2005) proposed that self-talk could be one source of verbal persuasion and may be a useful complementary strategy to enhance self-efficacy. Thus, one might predict that the more positive the self-talk, the greater the impact on self-efficacy. An increase in the self-reported use of positive self-talk by participants when they viewed the video (compared to baseline) suggests that viewing the video (mastery experience) may have encouraged the use of positive self-talk (verbal persuasion) that further contributed to the enhanced self-efficacy.

Cognitive and Somatic anxiety

To date, feedforward self-modeling has primarily been used for skill acquisition and to improve performance (Ste-Marie, Law, Rymal, Hall, & McCullagh, 2012), and little is known about its effect on anxiety. According to Bandura (1977), self-efficacy is a mediator of the anxiety-performance relationship. As such, when self-efficacy is increased, a corresponding reduction in anxiety is expected, which in turn is expected to improve performance. The present research confirmed that using a feedforward self-modeling video leads to increases in self-efficacy in adolescent musicians, so the question then turns to whether there were corresponding measurable reductions in anxiety.

With respect to cognitive anxiety, it was predicted that a feedforward self-modeling video would reduce adolescent musicians' cognitive anxiety to perform. However, there were no significant differences in cognitive anxiety when participants used a video compared to when they did not. That self-efficacy increased without corresponding changes in cognitive anxiety scores suggests that the time period required for cognitive changes to take place may be longer than the one-week period in which participants used the video. Indeed, in their research with musicians, Kendrick et al. (1982) reported that cognitive changes from cognitive-behavioral therapy that targeted music performance anxiety were only observed at follow-up, five weeks after the treatment had ended. Thus, immediate changes in cognitive anxiety may not surface in the time frame used within this intervention.

Based on prior knowledge of the frequently reported low reliability of the somatic anxiety measurements of the CSAI-2 (Craft et al., 2003), no initial predictions were made for somatic anxiety. Not surprisingly, the results for somatic anxiety showed no significant differences when participants used a feedforward self-modeling video compared to when they

did not. Of the three subscales, somatic anxiety results for this research showed the most variability among participants, suggesting that this particular self-report measure may not be directly related to physiological anxiety. In reference to the CSAI-2 scale and somatic anxiety, Woodman & Hardy (2003) stated that, “although somatic anxiety is a useful indirect measure of the physiological indices of anxiety, it is of limited theoretical value in explaining the relationship between physiological arousal and performance” (p.444). Given the weak relationship between somatic anxiety and performance and the equivocal reliability of the somatic scale of the CSAI-2, the somatic anxiety results are deemed to be of limited consequence for this research.

The relationship between self-efficacy and performance

In their meta-analysis on self-efficacy and sport performance, Moritz et al. (2000) showed that there is clear evidence for a significant relationship between self-efficacy and performance. The final goal of the present research was to determine whether feedforward self-modeling would enhance music performance. Performance results, however, were not superior under conditions in which the video was used, even for those musicians who used the video in the second week. Some researchers have reported significant associations between using a self-modeling video and improved performance (Bradley, 1993; Starek & McCullagh, 1999; Ste-Marie, Rymal et al., 2011) whereas others have failed to find such results (Winfrey & Weeks, 1993, Ram & McCullagh, 2003). Research where significant findings were reported used longer time frames for the intervention; for example in the case of Ste-Marie, Rymal et al. (2011) research took place over the course of an entire competitive season as compared to research by Ram & McCullagh (2003) that took place over a period of twelve days. The implication for the present research is that the seven-day time period may not have been sufficient to effect changes

in performance. Another possible explanation for the absence of performance differences is that the global measure of performance used in the present research may not have been sufficiently sensitive to detect performance changes. It may be that an evaluation of performance targeting specific elements of a performance, such as note accuracy or other behavioural indices of music performance would have been more effective (Kendrick et al., 1982). This hypothesis should be tested in future research.

While there was no main effect for a feedforward self-modeling video, performance scores did improve for all participants across time. Referring back to Zimmerman (2000), performance involves self-regulation of multiple processes including attention focusing, affect control, and task strategy that take place during performance. The fact that performance improved irrespective of whether or not participants used a video supports the idea that participants benefited from repeated practice of the performance task, allowing them to adjust their strategies to improve their performance. In returning to Zimmerman's (2000) model, such improvements with practice suggest that the musicians were likely engaging in self-regulatory cyclical processes throughout the intervention.

Strengths, limitations, & future directions

A notable strength of the present research was its interdisciplinary nature that drew from the domains of sport, music, and psychology. This integration afforded unique insight into music performance anxiety and self-efficacy that would not have been possible in a non-interdisciplinary setting. Another distinct strength was that the author, a professional musician with well-established ties in the music community, was able to approach music teachers to assist in recruiting high-level adolescent musicians for this research. Further, the author's expertise in string instrument performance was also an asset in the video editing process to facilitate the

assembly of professional quality self-modeling videos. Consequently, it was possible to successfully conduct the feedforward self-modeling intervention in an applied setting with the population of interest.

A limitation of the present research was the small sample size used. A power analysis run prior to recruitment determined an optimum sample size of 24. However, because of tight sampling criteria and other practical reasons, only twelve musicians were recruited. With only twelve participants, it is possible that some real effects of the video were missed as evidenced by the near significance of self-efficacy. Given analogous results for self-confidence that were obtained under the same directives as self-efficacy, a larger sample (and greater statistical power) could have yielded a significant result for self-efficacy. Further, with a bigger sample, potential mediating effects of the video on the self-efficacy-performance relationship may have been detected. In future, research operating over a less restrictive time frame should use a larger group of musicians so that the relationships among self-efficacy, anxiety, and performance can be better examined.

The two-week duration of the study was another limiting factor in this research. It was suggested earlier that the results did not show significant differences in anxiety and performance because a longer time interval may be needed for self-efficacy to have an impact on anxiety and, subsequently, performance. Previous research with self-modeling that has shown changes in performance, for example, were of a longer duration (Ste-Marie, Rymal et al., 2011). In this regard, a longitudinal study that extends beyond the time frame used here should be used in the future to examine self-modeling performance benefits for musicians.

Another limitation of this research was a lack of qualitative data collection. Follow-up interviews or post-intervention questionnaires would have added valuable support to claims

being made with respect to the psychological impact of a feedforward self-modeling video on self-efficacy. Also related to data collection, the Self-appraisal scale used in the present research was developed specifically for this study, and therefore was not a validated questionnaire. However, self-efficacy scales must always be tailored to the specific task to the task being measured (Bandura, 2006) and as such, are all subject to the same validation concerns. One last measurement limitation concerns the reliability of somatic anxiety scale of the CSAI-2R that was identified earlier on in the research. To address this potential weakness, a better measurement (e.g., heart rate monitoring) might be used to measure somatic anxiety. Nonetheless, to avoid obstructing the natural movements of the performers, a decision was made not to use an external wearable device.

Promising results from the Music Performance Anxiety Strategies Survey (MPASS) showed that musicians were beginning to adopt cognitive strategies related to the use of the video that were not in their repertoire prior to the intervention. In the case of participants who used a feedforward self-modeling video in the first week, not only were they adopting mental imagery strategies, but these strategies appeared to be carried over into the second week when they no longer had the video. The suggestion here is that video modeling may be an effective tool for introducing varied strategies such as mental practice for musicians and that self-regulatory processes may play a role in maintaining and reinforcing those strategies. While mental preparation has long been a central strategy in sports performance, in general, musicians have had limited exposure to mental preparation techniques, notwithstanding the potential benefits to performance that have been well documented in the realm of sport. Consequently, future research should explore how video modeling could be used to introduce and integrate varied mental practice technique into musicians' performance preparation.

Conclusion

The primary purpose of the present research was to determine whether using a feedforward self-modeling video could serve as a psychological tool to increase self-efficacy in adolescent musicians, thereby reducing music performance anxiety and its unwanted effects on performance. A secondary interest was an introductory exploration into the effects of FF-SM video on the use of cognitive strategies such as positive self-talk and mental imagery in musicians.

The main finding of the present research was that feedforward self-modeling had a positive impact on a musician's self-efficacy as hypothesized, but only when it was introduced following a week of practice and a performance without a video. By implication, prior experience in the performance setting is useful in order for musicians to gain experience, and once a reference has been established the video can be used as a tool to enhance self-efficacy beliefs.

Although reductions in somatic and cognitive anxiety were not observed in the present research, future longitudinal research could clarify whether feedforward self-modeling can be useful in lowering cognitive anxiety and improving performance in musicians who experience music performance anxiety.

A final finding from this research was the strong correlation between self-efficacy appraisal and the self-confidence scale of the CSAI-2R. It has been suggested that state self-confidence and self-efficacy are likely synonymous constructs within this scale, and the clear correlation found between self-efficacy and self-confidence in the present research further supports this argument.

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Appendix A

Recruitment Letter: For Teachers

Dear Colleague,

My name is Lisa Moody and I am a professional violist and violinist as well as a music teacher (SAA, ORMTA). I am currently working on a master's thesis in Interdisciplinary Health Sciences at the University of Ottawa. As part of my research, I am currently recruiting participants for a study on music performance anxiety. I am collaborating Prof. Diane Ste-Marie in the department of Human Kinetics at the University of Ottawa to explore a technique used in athletes to reduce anxiety and improve performance, and transfer it to musicians. I am therefore asking if you have any students whom you think experience music performance anxiety that negatively affects their performance, and who you think might be interested in participating in my study.

I am recruiting string students of violin, viola, cello, and harp between ages 12 and 18 who are at an RCM level of Grade 8 and above, and who experience performance anxiety.

I will be conducting this research starting in September 2013. If your student chooses to participate, he/she will be asked to prepare a movement of solo Bach (3 minutes or less) with your help. Once the music is at an advanced stage of learning and memorized, I will meet with your student to create their self-modeling video, a video that has been edited to depict the “best possible performance” of the selected repertoire, for that individual. The purpose of the video is to increase self-confidence and lower performance anxiety with the anticipated outcome of improved performance.

To do this, students will be videotaped at the University of Ottawa on one of the following three dates of their choice (Sunday October 20, Sunday October 27 or Saturday November 2, 2013) playing their prepared repertoire. Footage gathered during the video recording session will be professionally edited and the best parts will be spliced together to create the self-modeling video for the participant. One week following their video recording session, your student will begin a two-week intervention where in one week, they practice at home **with** their self-modeling video and in the other week, they practice at home **without** their self-modeling video. At the end of each of these weeks, they will give a performance of the selected repertoire on their video, at the University of Ottawa, for an adjudicator who will evaluate their performance. These evaluations are for research purposes only and will only be available to the researchers. At the end of the study, your student will get to keep their self-modeling video.

Participation in this research will involve a certain time commitment and some possible disruption to the home schedule of your student's family for the two-week intervention period,

including travel time to the University of Ottawa. The potential benefits to your students are that they may acquire new strategies for addressing performance anxiety, which may have career-lasting effects. Participation in this study is entirely voluntary and your student may withdraw from the study at any point without consequence. If you have any students whom you think might benefit from this study and are interested in participating, or would like further information on the study, please have them contact me by Friday, September 20, 2013 using the contact information below. I will be accepting students on a first come, first serve basis.

Interested parents will be sent a “Letter of Consent for Parents” which must be signed and returned to me by September 29, 2013. An information meeting for all participants and their parents will be held on Sunday, September 29, 2013 at the University of Ottawa to go over the procedures for the intervention and to provide a forum to ask questions. At this time, students intending to participate will be requested to sign a “Letter of Assent for Children” and then to complete two questionnaires.

Thank you in advance for your interest and I look forward to hearing from you,

Lisa D. Moody, MMus, B Mus, MSc (c)
Interdisciplinary School of Health Science
University of Ottawa
125 University Private, Ottawa, K1N 6N5

Appendix B

uOttawa

“The Effects of Feedforward Self-modeling on Self-efficacy, Music Performance Anxiety and Music Performance in Anxious Adolescent Musicians”

Information Letter and Consent Form: For Parents

The following people are conducting research on the project regarding the effects of feedforward self-modeling on self-efficacy, music performance anxiety and music performance in anxious adolescent musicians. If for any reason you would like to contact us, the following information should provide you with the means to do so:

Dr. Diane Ste-Marie, Full Professor, Faculty of Health Sciences, School of Human Kinetics.

Lisa Moody, Principal Researcher, Faculty of Health Science, Interdisciplinary School of Health Sciences.

If you or your child have concerns regarding the ethical issues involved, please contact the Protocol Officer for Ethics in Research at the University of Ottawa, Tabaret Hall, 550 Cumberland Street, room 159, Ottawa, ON K1N 6N5, tel.: (613) 562-5841, email: ethics@uottawa.ca

.....
 This letter is used to inform you of the activities involved in this research as well as to seek your consent for your child’s participation. You are being provided this letter because your child was identified as possibly having difficulties with music performance anxiety. As part of the requirements for this study, your child will be required to complete four questionnaires, two of which have been validated for research purposes in English only. Given these tasks, your child must be able to read and understand the English language. Listed below is more information relating to this study. After having read this information, please indicate if you are willing to allow your child to participate.

We recognize that some of the terms used in the title of the research may be unfamiliar to you, so will begin by defining some of these. Feedforward self-modeling is an observational learning medium that involves constructing a video that shows an individual performing better than he/she can perform at that particular time. To create the video, the best sections from repeated performances of a selected piece of music are edited together using video software, to create the “best possible performance” for that individual. Self-efficacy is a term used in psychology and is most easily equated with self-confidence. Music performance anxiety is a complex and difficult term to define but it contains both physical and psychological elements and it may significantly impact the quality of a music performance.

Purpose of the study: The purpose of this research is to examine whether a self-modeling video given to adolescent musicians to use in conjunction with their regular practice and prior to a performance will enhance self-confidence and decrease music performance anxiety that may impair a music performance, thereby improving the quality of performance. We are also interested in learning whether adolescent musicians, as a result of using the video, would change existing strategies and/or adopt new strategies for coping with music performance anxiety.

Description of participation requirements: Your child's participation in this study will require that he/she select and prepare a movement of unaccompanied Bach, no longer than three minutes in duration, for his/her instrument with his/her private teacher. When the selected repertoire is learned and memorized, your child will meet with Lisa Moody, the primary researcher, at Freiman Hall in the Perez building at the University of Ottawa for 45 minutes, on your choice of one of the following three dates: Sunday October 20, Sunday October 27, or Saturday November 2, 2013. The researcher will confirm your child's assent prior to the start of the video recording session and your child will be asked to complete a music performance anxiety questionnaire and a music performance anxiety strategies survey. The researcher will then gather video footage for your child's self-modeling video. On the first Sunday following your child's self-modeling video session, he/she will begin a two-week practice period. In one week, your child will practice with his/her video and in the alternate week he/she will not use the video during practice. Random selection will determine whether your child receives his/her video during the first or second week of the intervention.

At the beginning of a "video" week, your child will receive his/her video to view alongside his/her regular practice at home. Your child will determine the length of his/her own practice, but he/she will be asked to follow a specific practice order in a logbook provided. The logbook includes instructions on when and how to view the self-modeling video as well as three questions relating to the perceived physical and psychological effects of the video. Following six days of practice, your child will return to Freiman Hall at the University of Ottawa to give a performance of the selected repertoire for an adjudicator. Before this performance, your child will view his/her self-modeling video on a laptop provided, and answer two questionnaires: the first will ask your child to reflect on current levels of self-confidence to perform the repertoire on his/her video; the second will ask your child to reflect on his/her current level of music performance anxiety. The performance will be video recorded for further evaluation by two professional examiners. Immediately following this performance, your child will be asked to reflect on anxiety coping strategies used for that performance. This "performance day" video session for the "video" week will take 15-20 minutes to complete.

The same protocol will be completed in the "no video" week, with the exception that the logbook will not contain questions about the video, and no video will be provided to be used during practice or on performance day. The "performance day" video session for the "no video" week will take 15-20 minutes to complete.

An optional debriefing session will be held at the University of Ottawa on December 3, 2013 from 7:00-8:00 pm. This is an opportunity for your child to learn more about music performance anxiety.

Potential risks or discomforts: This research is not anticipated to cause distress beyond that of a typical music performance situation that your child has already experienced. However, given that your child is participating in the study because he/she experiences anxiety related to performing, the process of creating the self-modeling video and/or the two performances might understandably cause some discomfort to your child. In anticipation of this, every effort will be made to ensure that any discomfort or distress is minimized and that your child feels comfortable. Participants are able to withdraw at any time. If your child feels uncomfortable in the situation he/she may take a break, stop, or leave the situation completely without consequence or reprisal.

Potential benefits: As a participant of the experiment, your child will receive his/her own self-modeling video to keep. Studying self-modeling is important because it has the potential to help young musicians enhance self-confidence and may lead to the acquisition of strategies for self-managing performance anxiety that may help mitigate the effects of anxiety later in their careers. Few researchers have examined the effects of self-modeling on anxiety. Further, self-modeling has never been examined with musicians. Therefore, this study will contribute to our understanding of the effects of self-modeling on self-confidence, performance anxiety and music performance.

Anonymity and confidentiality: Due to the nature of the research consisting of video recordings of your child performing on his/her instrument, there are limitations to anonymity. Please note, however, that the video recordings will only be accessible to the research team and two independent evaluators. Therefore, you need to be aware that maintaining full anonymity in this process will be difficult. However, your child's name will not be used in the videos, and only the two evaluators, who will have signed a confidentiality pledge, will view the videos. As well, your child's name will not be used on any documentation. Instead, participant numbers will be used. All questionnaires, forms, videos and data will be kept in a locked filing cabinet in Montpetit 403 at the University of Ottawa. This location is only accessible to the principal investigator, the supervising professor and her graduate students. Post-publication of this study, all of the video recordings and written information will be destroyed.

Voluntary Participation: Your child's participation in the study is strictly voluntary and he/she will be able to withdraw at any time. If your child chooses to withdraw in the middle of the study, all of their data that has been previously collected will be destroyed immediately.

If you have any questions with respect to the study, you can contact the principal researcher or assistant researcher using the information listed on the first page.

Acceptance: I, _____, give consent for my child to participate in the above research study conducted by Dr. Diane Ste-Marie of the Human Kinetics, Health Sciences Faculty.

If I have any questions about the study, I may contact the researcher or her research assistant.

There are two copies of the consent form, one of which is mine to keep.

Parent's signature: _____ Date: _____.

Researcher's signature: _____ Date: _____.

Appendix C

“The effects of self-modeling on self-efficacy, music performance anxiety and music performance in adolescent musicians”

Child Assent Form: for children

We are asking you to take part in a research project that will help us know more about how young string players manage their nervousness before and during a music performance and to help them to learn new strategies for coping with music performance anxiety.

If you agree to take part in this study, you will be asked to select, prepare, and memorize a movement of unaccompanied Bach for your instrument with the help of your private teacher. You will then meet with the main researcher, Lisa Moody, who is a professional string player and a music teacher, to create a video. To do this, you will play your piece multiple times and video editing software will be used to combine the best sections to create a video showing the best performance that you have the potential to do. This will be called your self-modeling video. You will practice one week with the use of your video and one week without the use of your video. At the end of each of these weeks, you will give a performance of the music from your video for a professional Royal Conservatory of Music adjudicator who will listen to your performances and evaluate them. You should know that your performances will also be video taped so that two other adjudicators, who don't live in Ottawa, can also evaluate them. The scores from the adjudicators for these performances will be kept private. Only myself, my supervisor and her graduate students will be aloud to see them.

Before each performance, we will ask you to fill out three short questionnaires. Two of these questionnaires will ask you about your level of nervousness, and one will ask you about your confidence to perform the music from your video. After each performance, we will ask you about strategies that you used to cope with your nerves for that specific performance.

Please talk about this with your parents before you decide. We have also talked to your parents about allowing you to take part in this project. Even though your parents agreed for you to participate, it is up to you if you want to participate. You can still say no, even if your parents said yes. If you decide to participate and then you want to stop, or withdraw, you can do so for any reason, at any time, without any consequences. Feel free to ask any questions at any time.

Student Assent:

The study has been explained to me. I had a chance to ask questions about the study and I understood the answers. I am signing my name to say yes, I want to be in the study.

Name of Child: _____ Date of birth: _____

Signature of Child: _____ Date: _____

Signature of Researcher: _____ Date: _____

Appendix D**Université d'Ottawa · University of Ottawa**Faculté des sciences de la santé
École des sciences de l'activité physiqueFaculty of Health Sciences
School of Human Kinetics**Video Release Form**

Title of Study: The effects of feedforward self-modeling on self-efficacy, music performance anxiety, and music performance in anxious adolescent musicians.

The following people are conducting this research. If for any reason you would like to contact us, the following information should provide you with the means to do so:

Dr. Diane Ste-Marie, Professor, School of Human Kinetics, University of Ottawa.

Lisa Moody, Master's student in the Interdisciplinary Health Sciences, Interdisciplinary School of Health Sciences, University of Ottawa.

Name of Participant: _____

I hereby give my permission to Dr. Ste-Marie and Lisa Moody to use any videotape material taken of my child during my participation in the study "The effects of feedforward self-modeling on self-efficacy, music performance anxiety, and music performance in anxious adolescent musicians". I understand that the videotape material will only be used for research purposes; specifically, data analysis and only the identified researchers will have access to the videotapes and no names will appear on the videotapes.

As with all research consent, I may at any time withdraw permission for video footage of my child to be used in this research study. There are two copies of the video release form, one copy for you and one for the researchers.

Signature of parent or legal guardian:

Appendix E

Date: _____

MPAI-A: What I think about music and performing.

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

| | Not At All | | Half Of The Time | | | All The Time | |
|---|------------|---|------------------|---|---|--------------|---|
| 1. Before I perform, I have 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 a 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 on 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 F

The Revised CSAI-2 / 533

Appendix*Revised Competitive State Anxiety-2 (CSAI-2R)*

Directions: A number of statements that athletes have used to describe their feelings before competition are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel right now – at this moment. There are no right or wrong answers. Do not spend too much time on any one statement, but choose the answer which describes your feelings right now.

1. I feel jittery (somatic anxiety, 5).
2. I am concerned that I may not do as well in this competition as I could (cognitive anxiety, 7).
3. I feel self-confident (self-confidence, 9).
4. My body feels tense (somatic anxiety, 8).
5. I am concerned about losing (cognitive anxiety, 10).
6. I feel tense in my stomach (somatic anxiety, 11).
7. I'm confident I can meet the challenge (self-confidence, 15).
8. I am concerned about choking under pressure (cognitive anxiety, 13).
9. My heart is racing (somatic anxiety, 17).
10. I'm confident about performing well (self-confidence, 18).
11. I'm concerned about performing poorly (cognitive anxiety, 16).
12. I feel my stomach sinking (somatic anxiety, 20).
13. I'm confident because I mentally picture myself reaching my goal (self-confidence, 24).
14. I'm concerned that others will be disappointed with my performance (cognitive anxiety, 22).
15. My hands are clammy (somatic anxiety, 23).
16. I'm confident of coming through under pressure (self-confidence, 27).
17. My body feels tight (somatic anxiety, 26)

Note: Original CSAI-2 item number is in parentheses along with factor classification. Each item is set to a 4-point Likert scale as in the original CSAI-2.

Scoring key:

Somatic anxiety: 1, 4, 6, 9, 12, 15, 17

Cognitive anxiety: 2, 5, 8, 11, 14

Self-confidence: 3, 7, 10, 13, 16

Subscale score is obtained by summing, dividing by number of items, and multiplying by 10. Score range is 10 to 40 for each subscale. If an athlete fails to respond to an item, merely sum and divide by items answered.

Manuscript submitted: December 11, 2001; *Revision accepted:* March 24, 2003

Appendix G**Revised Competitive State Anxiety-2 (CSAI-2R)- Adapted for Musicians**

Directions: A number of statements that musicians have used to describe their feelings before performing are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel RIGHT NOW – at this moment . There are no right or wrong answers. Do not spend too much time on any one statement but choose the answer which describes your feelings RIGHT NOW.

1. I feel jittery (somatic anxiety)
2. I am concerned that I may not play as well in this performance as I could (cognitive anxiety)
3. I feel self-confident (self-confidence)
4. My body feels tense (somatic anxiety)
5. I am concerned about failing (cognitive anxiety)
6. I feel tense in my stomach (somatic anxiety)
7. I am confident that I can meet the audience's expectations (self-confidence)
8. I am concerned about choking under pressure (cognitive anxiety)
9. My heart is racing (somatic anxiety)
10. I'm confident about performing well (self-confidence)
11. I'm concerned about performing poorly (cognitive anxiety)
12. I feel my stomach sinking (somatic anxiety)
13. I'm confident because I mentally picture myself reaching my goal (self-confidence)
14. I'm concerned that others will be disappointed with my performance (cognitive anxiety)
15. My hands are clammy (somatic anxiety)
16. I'm confident of coming through under pressure (self-confidence)
17. My body feels tight (somatic anxiety)

Scoring Key:

Somatic Anxiety: 1,4,6,9,12,15,17

Cognitive Anxiety: 2,5,8,11,14

Self-confidence: 3,7,10,13,16

Subscale score is obtained by summing, dividing by number of items, and multiplying by 10. Score range is 10 to 40 for each subscale. If a musician fails to respond to an item, merely sum and divide by items answered.

Appendix H

Appraisal Scale

Thinking about the piece that you are about to perform, how confident are you that you can complete the following tasks with your ANXIETY UNDER CONTROL?

Rate your degree of confidence by recording a number from 0 to 100 using the scale below:

| | | | | | | | | | | |
|---------------------|----|----|----|----|----------------------|----|----|----|----|--------------------------|
| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| Cannot do at all | | | | | Moderately can do | | | | | Highly certain can do |

| | Confidence (0 -100) |
|--|------------------------|
| Perform your piece alone in a practice room? | _____ |
| Perform your piece for your teacher? | _____ |
| Perform your piece for family members? | _____ |
| Perform your piece for a small group of friends? | _____ |
| Perform your piece with an examiner present? | _____ |
| Perform your piece in recital for an audience? | _____ |
| Perform your piece for an audition? | _____ |
| Perform your piece in a music competition? | _____ |

Appendix I

Université d'Ottawa · University of Ottawa

Faculté des sciences de la santé Faculty of Health Sciences
 École des sciences de l'activité physique School of Human Kinetics

Confidentiality Agreement

I, _____, agree that I will keep confidential
 (name printed)

any personal information about the participants that comes to me as a result of carrying out my responsibilities with respect to research at the University of Ottawa, titled “The effects of feedforward self-modeling on self-efficacy, music performance anxiety and music performance in adolescent musicians”. I will not discuss with anyone, with the exception of the Principal Researcher and her supervisor, any personal information relating to the participants or their performances.

 Name (printed)

 Signature

 Witness name (printed)

 Signature

Date: _____

Appendix J

Adjudicator # _____

Name: _____

Date: _____

| Participants | Disk 1 | Score out of 100 | Participants | Disk 2 | Score out of 100 |
|--------------|---------------|------------------|--------------|---------------|------------------|
| #1 | Performance 1 | | #7 | Performance 1 | |
| #2 | Performance 1 | | #8 | Performance 1 | |
| #3 | Performance 1 | | #9 | Performance 1 | |
| #4 | Performance 1 | | #10 | Performance 1 | |
| #5 | Performance 1 | | #11 | Performance 1 | |
| #6 | Performance 1 | | #12 | Performance 2 | |
| #1 | Performance 2 | | #7 | Performance 2 | |
| #2 | Performance 2 | | #8 | Performance 2 | |
| #3 | Performance 2 | | #9 | Performance 2 | |
| #4 | Performance 2 | | #10 | Performance 2 | |
| #5 | Performance 2 | | #11 | Performance 2 | |
| #6 | Performance 2 | | #12 | Performance 2 | |

Appendix K



Université d'Ottawa · University of Ottawa

Faculté des sciences de la santé
École des sciences de l'activité physique

Faculty of Health Sciences
School of Human Kinetics

Thank you for your help with this research project. Please follow the instructions for adjudicating the performances as described below. Please do not hesitate to call me if you have any questions.

1. Please sign the “Confidentiality Agreement” before you begin.
2. Set aside two time periods of approximately one hour each, spaced 24 hours apart to view the two disks separately.
3. Listen to each participant’s performance one time through only, in the viewing order listed on the disk and as listed on the form labeled “Viewing Order and Score”. You will notice that each of the two disks contains both the **Video Week** and **No Video Week** performances for 6 participants, with a total of 12 participants. The order for these performances has been intermixed so that you are blind to the performance condition.
4. Provide a score for each participant on the rating forms included and then enter the mark on the “Viewing Order and Score” form. Even though I have provided guidelines for what to observe and comment on, the score should be a holistic one, out of 100, and reflect the overall quality of the performance. In other words, it should be more like a music festival score (like Kiwanis), than an RCM mark. The comments may be in point form and brief.
5. When you are finished, please scan and email the “Viewing Order and Score” form.
6. Return the disks and Rating Forms in the mail in the return envelope provided, at your earliest convenience.

Thank you and good luck!

Lisa

Appendix L

Daily Practice Log - (FF-SM video) - Days 1, 3, 4 and 6

Identification: _____

Date: _____

| | |
|----------------------------------|--|
| 1. Record start time | |
| 2. Do your regular warm-up | |
| 3. View your video twice | |
| 4. Practice the piece from video | |
| 5. Practice your other material | |
| 6. Record your end time | |
| 7. Comments | |

| | |
|--|--|
| | |
| 5. Comments | |
| 6. Practice the selected piece from your video | |
| 7. Practice your other material | |
| 8. Record your end time | |

Appendix N**MPASS: Music Performance Anxiety Strategies Survey**

What strategies do you typically use to help control your anxiety before performing?
 Answer “yes” or “no” to the following questions by putting a checkmark in the appropriate column.

| To calm my nerves before a performance ... | Yes | No |
|--|-----|----|
| I engage in positive self-talk | | |
| I do a warm-up routine on my instrument | | |
| I do breathing exercises | | |
| I do stretching exercises | | |
| I imagine myself playing my music | | |
| I rehearse the music in my mind | | |
| I look at my music score | | |
| I do relaxation exercises | | |
| I run my hands under warm water | | |
| I eat a particular food (eg: bananas, chocolate) | | |
| I find a distraction (ipod, electronic game, book, etc.) | | |
| Others? Comments? | | |

Appendix O

File Number: H08-13-09



Date (mm/dd/yyyy): 09/25/2013

Université d'Ottawa **University of Ottawa**
 Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

Ethics Approval Notice Health Sciences and Science REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

| <u>First Name</u> | <u>Last Name</u> | <u>Affiliation</u> | <u>Role</u> |
|-------------------|------------------|----------------------------------|--------------------|
| Diane | Ste-Marie | Health Sciences / Human Kinetics | Supervisor |
| Lisa | Moody | Health Sciences / Others | Student Researcher |

File Number: H08-13-09

Type of Project: Master's Thesis

Title: The effects of feedforward self-modeling on self-efficacy, music performance anxiety and music performance in anxious adolescent musicians

| Approval Date (mm/dd/yyyy) | Expiry Date (mm/dd/yyyy) | Approval Type |
|-----------------------------------|---------------------------------|----------------------|
| 09/25/2013 | 09/24/2014 | Ia |

(Ia: Approval, Ib: Approval for initial stage only)

Special Conditions / Comments:

N/A