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Safety in numbers: the prevalence and nature of music performance anxiety in non-music major undergraduates in ensemble rehearsals and concerts

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SAFETY IN NUMBERS:

THE PREVALENCE AND NATURE OF MUSIC PERFORMANCE ANXIETY IN NON-MUSIC MAJOR UNDERGRADUATES IN ENSEMBLE REHEARSALS AND CONCERTS

by

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DEDICATION

I am grateful to all who supported this project, especially my own students who helped pilot the study, all of the study participants, the directors who graciously allowed me into their rehearsals, and the faculty of Boston University. I owe deep appreciation to the advisor of this study, Professor Dianna T. Kenny, who generously gifted me with her time, patience, and enormous expertise.

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ABSTRACT

The troubling negative effects of music performance anxiety (MPA) have remained less investigated under ensemble settings and with undergraduate non-music majors than under solo settings with music majors and professional musicians. This study examined the experience and prevalence of music performance anxiety in ensemble rehearsal and concert settings in 166 undergraduate non-music majors, 108 undergraduate music majors, 4 undeclared undergraduates, 9 graduate non-music majors, and 14 graduate music majors. The participants (instrumentalists and vocalists) were drawn from 10 Mid-Atlantic colleges and universities.

The Kenny Music Performance Anxiety Inventory Revised (K-MPAI-R; Kenny, 2009) was administered within the last six weeks of the semester. Students reported the full range of cognitive, somatic, affective, and behavioral symptoms of MPA, with cognitive symptoms most frequently reported.

The factor structure of the K-MPAI-R was found to be stable with those factor structures previously established by Kenny using elite professional musicians and

tertiary-level music students. The results of a standard multiple regression conducted to identify unique predictors of MPA indicated that although depression, being an instrumentalist, being female, and having had a music performance breakdown, all made significant contributions to K-MPAI-R scores, and depression made the strongest unique contribution (beta = .42, $p < 0.001$).

Greater self-efficacy (as indicated by higher scores on confidence statements in the K-MPAI-R) was correlated with lower MPA under both concert ($r = .49, p < 0.0005$) and rehearsal settings ($r = .52, p < 0.0005$). Students with higher depression indicator scores exhibited higher MPA than students with lower depression indicator scores (WT = 31.40, $p < 0.001$). Music performance breakdowns occurred more often during solos than ensemble performances and memory lapse (16.3% of all students) was cited as the leading cause of music performance breakdowns.

Overall, MPA and depression indicator scores for the sample were high compared with other groups that had been previously evaluated with the K-MPAI-R and the same depression screen. Instructors should therefore be sensitive to the possibility that ensemble musicians may experience significant negative effects of MPA during both concerts and rehearsals, and apprise themselves of evidence-based treatment options and coping strategies available for MPA.

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> "For my third judged performance, I got so nervous I threw up two times before the performance. I skipped the whole middle section because I couldn't remember."
>
> *-Female, 22 year old, non-music major undergraduate*

Literature Review, Aims, and Background of the Study

Sweaty palms, trembling, racing heart, difficulty concentrating… the symptoms of music performance anxiety are familiar to many musicians and can cause mild concern or debilitating, potentially career-ending consequences. Kirchner (2003) highlighted the range of symptoms experienced by six college or university piano faculty members whose encounters with music performance anxiety were characterized by difficulties in thinking (related to the music, to non-music distractions, and to self-doubts of performance ability), worries about others' expectations, apprehension, low self-esteem, and despondency; and by physiological symptoms, including sweating, shaking, difficulty breathing, rapid heart rate, gastrointestinal discomfort, butterflies, and feelings of being hot or cold. The severity of physiological symptoms intensified these musicians' experience of negative thoughts and feelings and increased overall anxiety (Kirchner, 2003).

Within the current version of the DSM-5 Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-V; American Psychiatric Association, 2013),

performance anxiety is described as a specific type of social anxiety disorder or social phobia; it makes no distinction between areas of performance, such as acting, music performance, dancing, or sports. According to the DSM-5, the diagnostic criteria for performance anxiety include a) a significant fear of or anxiety in situations where the individual will perform in front of someone else (some sort of audience), b) a fear that the performance and any display of anxiety (such as trembling) will be negatively evaluated, c) a persistent (lasting at least six months) and consistent pattern of anxiety about or fear of performing, d) an avoidance of performing or persisting in performing accompanied by anxiety or fear, e) an anxiety over or fear of performing consequences that is out of proportion to what the clinician judges to be reasonable, f) the anxiety impairs the functioning of the performer, and g) the anxiety or fear is not better attributed to some other source such as drugs or another medical or psychological condition. The authors of the DSM-5 stated that the anxiety disorders are characterized by both fear, " . . . the emotional response to real or perceived imminent threat . . ." and anxiety, " . . . anticipation of future threat . . ." (p.189) and that social anxiety disorders may develop slowly over time or may be recognized following a stressful or humiliating experience.

As with the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision (DSM-IV-TR; American Psychiatric Association, 2000), writers of the DSM-V advised that these diagnostic criteria are meant to be guidelines used by the clinician who must also weigh all the factors involved. Other factors include the social and cultural contexts of the individual. Furthermore, some individuals may have anxiety that is significant but not so severe that it warrants a clinical diagnosis (4th ed., text rev.;

DSM-IV-TR; American Psychiatric Association, 2000).

Researchers of music performance anxiety (MPA) have formulated other understandings of MPA that encompass non-clinical conditions. An oft-cited description of MPA comes from Salmon (1990), who distilled the findings of a review of music performance anxiety to four general observations: a) "MPA comprises a loosely correlated constellation of physiological, behavioral, and cognitive variables" (p. 3), b) "the physiological component of MPA reflects arousal associated with the autonomic nervous system (ANS) which, largely through conditioning, has become excessively associated with fear" (p. 4), c) "the anticipation of stressful events, musical or otherwise, can evoke as much (if not more) anxiety than the event itself" (p. 6), and d) "psychotherapeutic interventions for MPA appear to be successful to the degree that they address specific components (cognitive, physiological, behavioral) or the overall profile of anxiety" (p. 8). Fehm and Schmidt (2006) adopted Salmon's (1990) definition of music performance anxiety, further explaining it as a persistent and distressful apprehension about public performing that may or may not result in actual impairment. Fehm and Schmidt added that this apprehension is out of proportion to the individual's degree of training and preparation. Lee (2002) also referred to Salmon's (1990) review and stated that the anticipation of performance creates a vulnerable state in the musician.

There are other descriptions of MPA that are not so directly derived from Salmon's (1990) representation. McGinnis and Milling (2005) brought out the importance of the anticipation of a negative evaluation in precipitating MPA. Powell (2004) defined music performance anxiety to be the same as debilitating performance

anxiety: “strong but delimited fears that severely compromise an individual’s capacity to execute a task at a level that could be reasonably expected, which is crucial to that person’s normal adjustment” (p. 804). Kokotsaki and Davidson (2003) and Langendörfer, Hodapp, Kreutz, and Bongard (2006) relied on Wilson (1997) to derive their understanding of music performance anxiety as an exaggerated and potentially devastating fear of performing in public. Additionally, some researchers have based their understanding of music performance anxiety on the DSM-IV (American Psychiatric Association, 1994) (Kenny, Davis, & Oates, 2004), and other researchers do not overtly state their operating definition of music performance anxiety at all. It appears that a synthesis of the working definitions found in past research should take into account persistent apprehension or marked fear about performing and evaluation, and impairment of performance based on what is reasonable for the experience and skill of the musician.

Kenny (2011) emphasized the need for a standard definition of MPA so that the field of research can continue to develop and the severity of symptoms and the incidence of MPA can be more accurately evaluated. To that end, Kenny supplied a complete definition that I shall use for this study:

> Music performance anxiety is the experience of marked and persistent anxious apprehension related to musical performance that has arisen through underlying biological and/or psychological vulnerabilities and/or specific anxiety-conditioning experiences. It is manifested through combinations of affective, cognitive, somatic, and behavioral symptoms. It may occur in a range of performance settings, but is usually more severe in settings involving high ego

> investment, evaluative threat (audience), and fear of failure. It may be focal (i.e. focused only on music performance), or occur comorbidly with other anxiety disorders, in particular social phobia. It affects musicians across the lifespan and is at least partially independent of years of training, practice, and level of musical accomplishment. It may or may not impair the quality of the musical performance (Kenny, 2011, p. 61).

The advantages of Kenny's definition are that it acknowledges the work of past researchers and it expresses the symptoms of, the effects of setting on, and a succinct etiology for MPA.

Kenny (2011) also noted the need for a standardized terminology to describe the experience of anxiety during music performance. Previously, performance anxiety in musicians has been described as *performance anxiety* (Cox & Kenardy, 1993; Langendörfer et al., 2006), *music performance anxiety* (Brugués, 2011a, 2011b; Chang, Midlarsky, & Lin, 2003; Hoffman & Hanrahan, 2012) and *stage fright* (Steptoe & Fidler, 1987). Still other scholars have used the terms performance anxiety and music performance anxiety interchangeably (Craske & Craig, 1984). Kenny (2011) explained that the deeper problem is the conflation of performance anxiety with other anxiety disorders:

> The lack of a clear definition of music performance anxiety and the failure to make explicit the criteria that distinguish music performance anxiety from other anxiety disorders, including its close relatives, specific phobia and social phobia, if such distinctions exist, are a theoretical impediment to the field that

> compromise identification of those who need treatment and hinder the development of appropriate treatments (p. 50).

The present study will follow the convention of using the term music performance anxiety (MPA) to refer to the anxiety associated with music performance and that may or may not be present at a clinically diagnosable level.

Effects of MPA on Performance

Detrimental effects of MPA, including negative career impact, have been discussed by Fehm and Schmidt (2006); McGinnis and Milling (2005); van Kemenade, van Son, and van Heesch (1995); and Wesner, Noyes, and Davis (1990). Sixteen and a half percent of the respondents in Wesner, Noyes, and Davis' (1990) study (who included music school students and faculty) believed that MPA markedly impaired their performance, 29.6% reported moderate performance impairment due to MPA, and 16.1% felt that "performance anxiety had adversely affected their careers" (p. 177). Negative career influences due to performance anxiety were reported by 9.5% of the music students in a study by Fehm and Schmidt (2006) and 33.8% felt at least moderate distress or impairment related to performance anxiety. An even higher percentage of students believed performance anxiety had lessened their performing ability (65%) in Kokotsaki and Davidson's (2003) study of musical performance anxiety in college age vocal students, while all 32 students in Cox and Kenardy's (1993) study claimed to experience performance anxiety and 84% of the students felt it was detrimental to their performances. Van Kemenade et al. (1995) studied the responses of 155 members of the main trade union for orchestral musicians and discovered that about 60% of the

musicians experienced performance anxiety and 55% of these musicians felt performance anxiety had been considerably detrimental to their careers. In a review of psychological treatments for MPA, McGinnis and Milling (2005) were struck by the great percentage of musicians who not only have felt performance anxiety, but who reported that it damaged their careers. Van Kemenade et al.'s (1995) study and the research of others highlight the negative effects of MPA on musicians' beliefs about their performances, their careers, and for some, consequent quality of life.

Who Is Affected by Music Performance Anxiety?

Music performance anxiety (MPA) affects musicians in all musical endeavors. This includes piano teachers, like those in Kirchner's (2003) study, professional orchestra musicians (Langendörfer et al., 2006; Steptoe & Fidler, 1987; and van Kemenade et al., 1995), professional operatic chorus artists (Kenny et al., 2004), and semi-professional choristers in which 57% of the singers experienced moderate levels of MPA at 50% or more of their concerts (Ryan & Andrews, 2009). Kenny et al. (2004) examined state and trait anxiety in 32 opera chorus artists from Opera Australia and determined that this sample did indeed have higher trait anxiety than a normative sample, interpreted by Kenny et al. as related to more intense experiences of MPA.

MPA appears to affect both singers and instrumentalists of almost all ages, and is present in children as young as 3 to 7 years old (Boucher & Ryan, 2011; and Brugués, 2011a). In Boucher and Ryan's (2011) study, some of the three and four year-old participants exhibited anticipatory pre-performance stress and demonstrated elevated cortisol levels and anxious behaviors while performing. When considering the origin of

MPA, Boucher and Ryan hypothesized that for some children, MPA is innate and for other children it is developed through experience. (Boucher and Ryan's use of the word *innate* to describe MPA suggests that some individuals are born with MPA. A more precise description would be that such individuals may have predisposing psychological vulnerabilities for the later development of performance anxiety, such as behavioral inhibition and high trait anxiety). Brugués (2011a) confirmed the presence of MPA in young musicians aged 3-19 years old, and concluded that within this age group MPA may be most intense in adolescents aged 14-19 years.

Music performance anxiety is highly prevalent in college-age vocal and instrumental musicians. Steptoe and Fidler (1987) remarked that more student orchestral musicians reported music performance anxiety (50.3%) than professional (42.4%) and amateur musicians (46.4%). Further corroboration of the existence of music performance anxiety in college-age musicians is provided by the results of Kokotsaki and Davidson's (2003) study, in which 65% of the student musician participants reported that anxiety had impaired their performances. A study of instrumental and vocal undergraduate and graduate students by Hamann (1982) also revealed the existence and effects of music performance anxiety in this population.

MPA in non-music majors.

The non-music majors who have been included in studies of music performance anxiety are students who, although not majoring in music, have enough proficiency at playing or singing that they are capable of performing music in public. Alderman, Baker, Bohnenblust, Hunget, and Villines (1989) measured state and trait anxiety of 91 non-

music majors from the spring 1988 quarter at the University of Northern Colorado. They used the state anxiety subscale of the Spielberger State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970) as an assessment of MPA. It was administered immediately before a graded performance of soprano recorder music performed both for a tape recording and in front of the instructor. Students filled out the trait anxiety portion of the STAI in the class period that followed the performance. Judges who were professional performers and instructors evaluated the performances. The students also completed a survey after the performance that ascertained students' participation in all kinds of ensembles, amount of solo experience, private instruction, age, college year, and immediate family's musical background.

The results demonstrated that students with higher trait anxiety also exhibited higher state anxiety immediately before the performance. In addition, students with higher state anxiety performed more poorly than students with lower state anxiety. Student age, class year, and years of informal study had no significant effect on performance quality (Alderman et al., 1989).

Alderman et al. (1989) did not provide interjudge reliability, and it is not clear whether students played for different instructors during the performance (students had been drawn from four different sections of a large class). Further, there was no indication of how students were selected, or whether all performed solo on soprano recorders; this may not reflect student experiences on their own instruments, much less their experience of playing in ensembles. Nevertheless, the results of this study do suggest that non-music majors can suffer the same effects of high MPA compared with other groups such as

music majors and professional musicians.

It is possible that non-music majors may experience higher degrees of performance anxiety than music majors who have received more training. Taborsky (2007) highlighted, in general, older musicians and those with professional or extensive performing experience tend to have less performance anxiety than younger musicians and those with less training. Further support for this idea was provided by a study conducted by Papageorgi et al. (2010). The non-conservatory, university students in this study were engaged in a music program at the University of York, but their program had a more academic and less performance orientation than the programs of students attending conservatories. Papageorgi et al. confirmed that the non-conservatory students possessed less confidence and more anxiety than students in conservatory programs.

In a related finding, Hamann (1982) found that students with more years of formal training received higher ratings by judges than students with fewer years of experience, and suggested that anxiety may improve performance in more experienced players and diminish performance quality in less experienced players. More experienced students might also be expected to be more proficient, with greater proficiency lending itself to enhanced task mastery and reduced risk of performance breakdowns – a factor connected to developing more severe MPA (Osborne & Kenny, 2008). It may follow then that students who are not music majors, who tend to be less experienced and proficient than music majors, can be affected more detrimentally by anxiety. It is also possible that the particular judges in Hamann's study were responding to higher levels of ability in the more experienced players, or that the more experienced players had developed better

anxiety coping skills than the less experienced players.

Conversely, Osborne, Kenny, and Holsomback (2005) found that less advanced students reported lower levels of MPA than more highly trained musicians. In the case of Osborne et al.'s study, however, perhaps less advanced students exhibited lower levels of MPA than their music major counterparts because the consequences of negative evaluation was reduced for non-music majors, and/or those students with a tendency for high levels of MPA had already shied away from music activities in general.

Based on findings in the study by Kokotsaki and Davidson (2003) that only 7% of the undergraduate singers believed MPA had improved their performance, and 65% who thought MPA had lessened performing capacity in situations of evaluative threat, and also on studies by Cox and Kenardy (1993; all students reported MPA with 84% perceiving its performance effects as detrimental), and Steptoe and Fidler (1987; 50.3% of orchestral music students reported having MPA), the present study will test the hypothesis that the majority of undergraduate non-music majors will report negative symptoms of MPA. Additionally, due to research that has linked negative performing experiences to MPA (Osborne & Kenny, 2008), another hypothesis is that students who report having had a music performance breakdown will have higher levels of MPA than students who deny having had a music performance breakdown.

MPA in females versus MPA in males.

Both males and females are affected by MPA, with females tending to report more MPA than males. The professional orchestral musicians most prone to MPA (based on assessment using the Kenny Music Performance Anxiety Inventory – revised; Kenny,

2009) in Kenny, Driscoll, and Ackermann's (2012) study were those who were younger and female. Iusca and Dafinoiu (2012) studied the influence of gender on MPA and the relationship of different symptoms of MPA with performance quality in 130 Romanian undergraduate music students and found that female students had higher levels of MPA overall and also demonstrated a strong and negative relationship between levels of MPA and performance quality. Rae and McCambridge (2004) discovered similar results in their study of the relationship of MPA to gender in 120 Irish school children (average age 16 years), noting that females reported higher MPA than males. Numerous other studies, including Osborne and Kenny (2008), Osborne, Kenny, and Holsomback (2005), and Wesner et al. (1990) support the higher susceptibility of females to negative symptoms of MPA. It is expected that the present study will confirm that females tend to exhibit more MPA than males (Biasutti & Concina, 2014; Iusca & Dafinoia, 2012; Kenny et al., 2012; Osborne & Kenny, 2008; and Rae & McCambridge, 2004), leading to the hypothesis: female undergraduate non-music majors in the present study will have higher levels of MPA than their male peers.

Self-efficacy and MPA

Earlier research associating lower self-efficacy with higher levels of performance anxiety was supported by Papageorgi et al. (2010) in a study of undergraduate musicians that examined among other variables, the connections between self-reported musical efficacy and performing confidence, performance anxiety, and academic setting. Papageorgi et al. commented that this "is consistent with Bandura's self-efficacy theory (Bandura, 1982) that argues that reduced confidence in one's abilities to perform causes

self-defeating thoughts and distress, diminished behavioural mastery and heightened physiological arousal" (p. 441). Papageorgi et al. speculated that students at the university were not as performance-oriented as the conservatory students and thus may not have developed the same levels of confidence as students whose main focus was performing. Other possibilities are a) that the non-conservatory students' potentially lower proficiency made them more prone to performance errors and subsequent reduced self-confidence and b) students with lower MPA had selected performance-focused programs instead of academically focused programs.

Liston, Frost, and Mohr (2003) found a similar association between self-efficacy and MPA in a study of music students. After conducting a standard multiple regression, catastrophizing and personal efficacy emerged as the sole significant predictors of MPA ($t = 7.16, p < 0.001$; and $t = -2.11, p < 0.05$, respectively). The researchers also examined the singular, predictive capabilities of lowered self-esteem, high trait anxiety, and perfectionism on MPA. Results demonstrated positive correlations between MPA and catastrophizing ($r = 0.72, p \leq 0.001$), trait anxiety ($r = 0.48, p \leq 0.001$), concern over mistakes ($r = 0.40, p \leq 0.001$), parental expectations ($r = 0.24, p < 0.05$), parental criticism ($r = 0.30, p < 0.05$), and doubts about actions ($r = 0.40, p \leq 0.001$). Negative correlations were reported for self-esteem ($r = -0.41, p \leq 0.001$) and personal efficacy ($r = -0.21, p < 0.05$). Liston et al. explained that, "The finding suggests that relationships with musical performance anxiety previously reported for characteristics such as perfectionism, gender, and trait anxiety are substantially explicable in terms of catastrophizing cognitions and low perceived control over events in one's life" (p. 123).

In as much as MPA appears to be affected by past performing experience, with negative performing experiences being linked to higher MPA (Osborne & Kenny, 2008), it is relevant that self-efficacy has been found to be a predictor for music performance quality. McPherson and McCormick (2006) studied self-efficacy as a predictor of music performance quality in 446 Australian music students, aged 9-19 years. In their structured equation model, formal practice (a warmup routine and practicing technical exercises, sightreading, and examination pieces) was one of the main factors that had a direct positive effect on performance quality, but self-efficacy was found to be the strongest predictor of performance results (path coefficient = .31, $p < 0.01$) (McPherson & McCormick, 2006). Thus, strong self-efficacy may have a protective nature that mitigates the severity and impacts of MPA.

Contrary to the idea that low self-efficacy may be a factor in the development of MPA, Craske and Craig (1984) made a case that the three-systems model - a model composed of behavioral, physiological, and verbal systems that interact with each other - was a better fit for describing MPA than Bandura's theory of self-efficacy. Bandura's theory of self-efficacy was understood by Craske and Craig as, "a parsimonious interpretation of fear enhancement and fear reduction, regardless of specific treatment strategies" (p. 268). It was concluded from the data analyses that the predictions based on the three-systems model were generally accurate, but the prediction that self-efficacy would correspond with autonomic and behavioral responses was not accurate. Self-efficacy ratings were only correlated to self-report measures. It should be noted, however, that heart rate may be high with some individuals who interpret this kind of arousal as

appropriate for performing, and not the result of anxiety, fear, or apprehension; therefore, a performer may feel high self-efficacy, accordingly low music performance anxiety, and yet still have an elevated heart rate. A hypothesis of the present study, built on the research that suggests a moderating effect of self-efficacy on MPA (Liston et al., 2003; and Papageorgi et al., 2010), is that there will be a negative relationship between self-efficacy and MPA in both ensemble concert and ensemble rehearsal conditions.

Depression and MPA

Kenny (2011) highlighted the importance of considering depression when examining MPA because depression is frequently comorbid with anxiety disorders in clinical populations. A study based on the assessment of 377 Australian professional orchestral musicians (Kenny et al., 2012) using the *Kenny Music Performance Anxiety Inventory* – revised (K-MPAI-R; Kenny, 2009), the trait questionnaire of the *State-Trait Anxiety Inventory* (STAI-T; Spielberger, 1983), and the two-item *Primary Care Evaluation of Mental Disorders Patient Health Questionnaire* (PRIME-MD PHQ; Kroenke, Spitzer, & Williams, 2003) showed a positive association between trait anxiety and depression scores and also between MPA and depression scores. Thirty-two percent (32%) of the musicians returned a positive depression screen, and musicians who answered affirmatively to both questions on the PRIME-MD had significantly higher scores on the STAI-T, SPIN, and K-MPAI-R compared with those who answered affirmatively to only one or neither question. Musicians who denied any depression (25%) reported the highest playing-related musculoskeletal disorder (PRMD) severity levels, but generally, PRMDs and trigger point discomfort levels were strongly associated

with increasing severity of psychological issues, such as depression and MPA (Kenny & Ackermann, 2013). Kenny and Ackermann supplied a definition of trigger points from Lavelle, Lavell, and Smith (2007): "A myofascial trigger point is a hyper-irritable spot, usually within a taut band of skeletal muscle, which is painful on compression and can give rise to characteristic referred pain, motor dysfunction, and autonomic phenomena" (p. 841).

Kenny and Ackermann (2013) investigated connections between performance-related musculoskeletal pain, depression, MPA, social phobia, and trait anxiety in this same population of professional orchestral musicians. Of these musicians, only 26.7% reported never having experienced performance-related musculoskeletal pain. A significant relationship between pain severity and depression was found ($F = 3.90$, $p = 0.021$), and similar but nonsignificant relationships were detected between social phobia and pain frequency and severity. Results also indicated that the musicians who were most depressed and had the greatest MPA also had higher trigger point scores than the musicians who reported lower depression and MPA (trigger points were used because of their sensitivity to psychological, as well as physiological, stressors).

Continuing the study of this sample of 377 musicians, Ackermann, Kenny, O'Brien, and Driscoll (2014) considered the participants' PRMDs, psychological aspects, and hearing. Ackermann et al. observed that 78% of the musicians connected an earlier bad performance experience, often cited as occurring during adolescence, to their ongoing MPA. Also, although the highest PRMD severity levels were reported by musicians who denied any depression (25%), all other musicians demonstrated a trend of

increasing PRMD severity with increasing depression. Ackermann et al.'s examination of the participants' hearing revealed that 43% of the musicians reported hearing loss, and even though measured sound levels in orchestral rehearsals, concerts, and during personal practice often exceeded recommended safe limits, only 64% of the musicians regularly wore personal hearing protection.

Another link between MPA and depression was established by Barber, Crippa, and Osório (2013) with a sample of 230 Brazilian amateur and professional musicians. Participants were administered the 26-item Kenny Music Performance Anxiety Inventory (K-MPAI; Kenny et al., 2004) translated by Osório et al. (2012), the Social Phobia Inventory (SPIN; Connor et al., 2000) translated by Osório, Crippa, and Loureiro (2008, 2010), the Beck Anxiety Inventory (BAI; Beck & Steer, 1993), translated by Cunha (2001), Self-Statements During Public Performance (SSPS-D; adapted from the Self-Statements During Public Speaking Scale; Hoffman & DiBartolo, 2000) translated by Osório et al. (2012), and the Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001) translated by Osório, Mendes, Crippa, and Loureiro (2009). Based on a discriminant validity study performed by Barber, Crippa and Osório (2014) that developed a cutoff point for sensitivity and specificity, 56 musicians (24%) had MPA indicators. These musicians scored higher than the others for general anxiety, social anxiety, depression and negative cognitions. Fully 48% of the 56 musicians identified with MPA also had PHQ-9 scores indicating the presence of depression. Arising from these studies that have established a link between depression and MPA in other populations of musicians, a hypothesis was developed that there would be a positive

relationship between depression indicators and MPA in this sample of undergraduate musicians.

Performance Setting and MPA

Performance setting, such as rehearsal versus concert or ensemble versus solo, has been demonstrated to make a difference in the presence and severity of MPA. Miller and Chesky (2004) studied varied performance settings, including lessons, and MPA in a sample of 71 college performance and nonperformance majors who were taking studio lessons. Students were assessed at baseline before lessons began for the semester, and were assessed before and after lessons, and at pre-jury and jury performances. Assessment tools included a modified Competitive Trait Anxiety Inventory-2 (CTAI-2), a modified Competitive State Anxiety Inventory-2 (CSAI-2), a performance self-assessment, and a demographics questionnaire. Students also gauged the amount of anxiety they associated with different performing conditions.

Students rated large ensemble performing least anxiety provoking (M = 1.86 out of 10) and solo juries most anxiety provoking (M = 5.48) (Miller & Chesky, 2004). Lessons received a rating of 2.52; small ensemble performing a rating of 2.6, and studio class performance received a rating of 4.88. Participants rated the negative impact of their MPA on performing with a mean of 4.89, but this rating was not tied to any specific performance setting. Both teachers and students additionally rated performance quality, level of anxiety, and the negative impact of anxiety after each lesson and performance. Students displayed more cognitive intensity than somatic intensity under all conditions. Intensity levels for both were highest at baseline, dropped over the course of the three

lessons that were assessed, and then rose again for the pre-jury and jury, with low self-confidence significantly correlated to high cognitive intensity ($r = -0.454$, $p < 0.001$; two-tailed). Teachers consistently rated performance quality significantly higher than students did under all performance conditions but perceptions of anxiety differed. Teacher and student perceptions of anxiety and its impact were similar for lessons, but students reported higher levels of anxiety and its impact on jury and pre-jury performances than what teachers perceived (Miller & Chesky, 2004).

The results of Miller and Chesky's (2004) study suggest that teachers may not necessarily be able to detect by observation alone the MPA that is felt by students. A consideration with Miller and Chesky's study is the extensive assessment over multiple lessons and performing events, which may have resulted in test-taking fatigue. Furthermore, if students were not allowed ample time to record their assessments, especially the assessments that occurred before and after lessons, haste may have led to inaccurate self-reporting.

Papageorgi et al. (2010) examined many variables in music students' learning experiences. There was a focus, however, on the connections between self-reported musical efficacy and performing confidence, performance anxiety, and academic setting in 170 tertiary music students. The academic settings were classical and traditional music conservatory (16% of sample), jazz and popular music conservatory (54% of sample), and university (30% of sample). The average age of the undergraduate, music major participants was 21.5 years, and they were divided among singers, woodwind, brass, keyboard, guitar, string, and percussion, among others. Participants completed a web-

based questionnaire at the beginning and end of a 12-month period. Papageorgi et al. also carried out semi-structured interviews that formed the basis for 13 case studies, and six videoed focus groups. The survey contained questions related to personal characteristics or traits, musical skills and practice approaches, musical activities, and attitudes toward performance, including performance anxiety. The interview questions dealt with issues also contained in the survey items. NVivo was used to thematically analyze the case study interviews and focus group data.

The students reported more anxiety (mean score 12 out of 21) when performing as a soloist than when performing in groups (8.61 out of 21) (Papageorgi et al., 2010). Ensemble rehearsals were not reported on and there was no differentiation between negative and positive symptoms of MPA. The students in the non-conservatory, university program indicated possessing less confidence and more anxiety than students in the conservatory programs. Remarks made in interviews denoted that anxiety was linked to type of audience and assessment for some, and that anxiety was seen as having both a negative and positive effect on the quality of the performance, depending on the respondent. The results also seem to support earlier research that associates lower self-efficacy to higher levels of performance anxiety (Papageorgi et al., 2010).

In a questionnaire-based study at the University of Iowa School of Music of 302 music performance and education majors and faculty by Wesner at al. (1990), 16.5% of respondents believed MPA markedly impaired their performance and 16.1% felt MPA had had a deleterious effect on their careers. The female respondents of this study appeared to be more affected by MPA, reporting more avoidance of performances than

men and more problems during performances. Self-reported symptoms of MPA included sweating, rapid heart rate, trembling, dry mouth, and poor concentration. Participants with MPA claimed to turn to psychological approaches for help far more than to drugs and alcohol use. Wesner et al. pointed out that the respondents' rates of nervousness, general anxiety, and phobias did not significantly differ from general population rates. There were also no significant differences found in perceptions of MPA between different age groups and levels of experience. Participants additionally responded to questions that measured anxiety under different performance situations, including solo, small and large ensemble performances; private lessons; and auditions. Separate questions included, "How much is your performance actually impaired by anxiety and/or its physical effects?" and "How often do you feel that anxiety interferes with your performance?" These latter questions were not tied to the performance situations, however, so it is not possible to tell if the 16.5% of the participants who felt MPA had markedly impaired performance and the 29.6% who felt MPA had moderately impaired performance experienced that impairment under all performing situations or just one or several.

MPA prevalence was examined in group-rehearsal and concert settings in Cox and Kenardy's (1993) study of 32 students, aged 18-40 years from the University of Newcastle Faculty and Conservatorium of Music. Various interactions between setting (solo performance, group performance, practice), experience, trait anxiety, social phobia, and MPA were examined in the study, and students completed a Personal Details Form, which collected demographic and performance background data, the Trait Scale from the

State-Trait Anxiety Inventory, the Performance Anxiety Questionnaire, and the Social Phobia and Anxiety Inventory. All 32 students claimed to experience MPA while performing and 84% of the students felt MPA was detrimental to their performances.

Results also showed that solo performances were the most anxiety inducing, followed by group performance and group rehearsal, with no significant differences related to the students' levels of experience (Cox & Kenardy, 1993). The amount of trait anxiety students had appeared to have no significant interaction with performance setting and students with more trait anxiety tended to be more anxious across all settings than students with low trait anxiety. There was, however, a significant interaction between social phobia and setting. Of methodological concern in this study, however, were the small sample size and the substantial number of tests that were administered.

Cox and Kenardy's (1993) results also possess an aspect of ambiguity. The Performance Anxiety Questionnaire, one of the measures used to assess anxiety, includes the question, "Do you feel that anxiety has a detrimental effect on your performance?" and leaves room for an explanation. Of the 32 participants, 84% reported that anxiety was detrimental to performance. The questionnaire does not connect the query about detrimental effect to performance setting, though, and thus it is impossible to divine if detrimental effects were felt in all performance settings or possibly in just one or two.

Music performance anxiety during group rehearsal was also evident in a study by Langendörfer et al. (2006) that investigated interrelationships between different aspects of performance anxiety (e.g., worry and lack of confidence), personality traits (e.g., extraversion and perfectionism), coping styles, type of motivation, self-efficacy, self-

esteem, self-confidence, neuroticism, and the difficulty of the music among 122 German orchestra musicians. The participants were given state, trait, and demographic questionnaires made up of 13 scales taken from different sources.

Pearson correlations were calculated and some of the results were a) socially prescribed perfectionism was positively correlated with worry ($r = .30, p < .05$) and lack of confidence ($r = .26, p < .05$) in rehearsal situations, but not in performances; b) self-efficacy was negatively correlated with lack of confidence in both rehearsals ($r = -.64, p < .01$) and performances ($r = -.51, p < .01$); and c) while lack of confidence was not affected by performer age and experience, other aspects of performance anxiety such as worry, emotionality, and physiological symptoms were experienced less with greater age and experience (Langendörfer et al., 2006). A weakness of the study was its 40% response rate. The low response rate could indicate that a certain segment of the population that might have answered the questionnaire very differently was less inclined to respond.

Brotons (1994) investigated how open or double blind performing conditions affected students' MPA and how MPA affected performance quality under each of these conditions. The open performing condition was described as when a student performs for a jury, audition, or exam and the judge(s) can see the student. The double blind condition is when the musician performs behind a screen so that neither she nor the judge(s) can see each other. The sample consisted of 64 graduate and undergraduate (instrumental and vocal) music program students, evenly divided between males and females. The mean age of the students was 24.02 years. Heart rate was measured; and perceived anxiety

(using questions drawn from the STAI, Form Y-1; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1980), performance quality, and behavior were assessed. The research design entailed a pretest, which was assessed pre-jury in a practice studio, and a posttest, which was the jury performance. There was a control group, and one experimental group underwent open performing conditions and the other, double blind conditions.

Results showed that the students' heart rates and STAI levels were significantly higher during jury performances than in the practice room (Brotons, 1994). A MANOVA was performed to assess the difference in students' responses to the two jury-performing conditions. Reported STAI levels were higher for students playing under double blind conditions, but there were no significant differences between heart rate, STAI, behavior, and performance quality between the different playing condition groups. Performance quality was not evaluated in the practice room, so it was not possible to assess any change pre and posttest. Brotons learned that many students were made nervous by the knowledge that judges and peers would be in the room, underlining the impact that evaluators in the audience can have on MPA.

Although solo performance has been cited as the greatest setting-related trigger for MPA in musicians (Kenny et al., 2012), MPA has also been reported during lessons and ensemble performances (Chesky, Kondraske, Henoch, Hipple & Rubin, 2002). After administration of a scale comparable to the Performance Anxiety Inventory of Nagel, Himle, and Papsdorf (1989), Papageorgi et al. (2010) confirmed that students reported a higher degree of MPA (as rated by a mean score of 12 out of 21) when performing as a soloist, but still felt anxiety when performing in groups (as rated by a mean score of 8.61

out of 21). Respondents in a study of MPA by Wesner et al. (1990) judged solo performances and auditions to be most stressful, followed by small ensemble performances, private lessons, and large ensemble performances. Miller and Chesky (2004) found similar results with their study of 71 college music performance and nonperformance majors. Students rated large ensemble performing least anxiety provoking (M = 1.86 out of 10), and solo juries most anxiety provoking (M = 5.48). Lessons received a rating of M = 2.52, small ensemble performing received a rating of M = 2.6, and studio class performance received a rating of M = 4.88. Interestingly, over the course of the semester during which MPA data were gathered, students reported the highest intensity at the beginning of the semester and then again before the pre-jury and jury assessments (Miller & Chesky, 2004).

Musicians also experience MPA in group-rehearsal settings. Cox and Kenardy (1993) studied 32 performance and non-performance music majors, aged 18-40 years, from the University of Newcastle's Faculty and Conservatorium of Music and results showed that although solo performances were the most anxiety inducing, group performance and practice also provoked negative symptoms of MPA, with no significant differences related to the student's level of experience. Langendörfer et al. (2006) found similar results in their study of adult orchestral musicians. These musicians experienced symptoms of MPA under both rehearsal and performance settings, but coping styles and levels of symptoms varied between the two settings. Consequently, based on the evidence that other types of musicians experience MPA in group-rehearsal settings, there is reason to believe that non-music majors may also experience negative feelings of MPA in group

rehearsals.

With the potential of MPA to harm performance quality and the performer's enjoyment of music making in all performance settings, it is not surprising that music students have expressed a desire to address MPA in their courses of study. Fehm and Schmidt (2006) reported that students suggested that more frequent chances to perform, openly talking about performance anxiety, and more support and encouragement during lessons might help in coping with performance anxiety. Some students in Fehm and Schmidt's study also mentioned a desire for courses in relaxation techniques and performance training. Moreover, following an exploration of the cognitive processes involved during music performance anxiety, Picard (1999) recommended that teachers discuss MPA with their students well in advance of student performances.

Because previous research has shown MPA is influenced by performance settings, with anxiety tending to be greater under concert performance settings than non-concert settings (Chesky et al., 2002; Cox & Kenardy, 1993; Langendörfer et al., 2006; Miller & Chesky, 2004; Papageorgi et al., 2010; and Wesner et al., 1990), and because it is not clear from existing literature whether non-music majors in particular experience MPA in ensemble rehearsals and/or concert settings, a hypothesis for the present study was formed: undergraduate non-music majors will experience greater levels of MPA during ensemble concert conditions than during ensemble rehearsal conditions. Another hypothesis, springing from research that indicates musicians tend to have more MPA when playing solo than when playing in a group (Cox & Kenardy, 1993; and Wesner et

al., 1990) is that music performance breakdowns occur more often during solo playing conditions than during ensemble playing conditions

Impact of Audience and Evaluation on MPA

The working definition of MPA for the present study specifies that MPA is usually more severe in settings where there is some evaluative threat (this could be the presence of an audience, teacher, judge, etc.), and fear of failure. The presence of evaluators in a solo performance setting was demonstrated to be a factor in the effect of anxiety on performance of 85 undergraduate and 5 graduate music students investigated by Hamann (1982). The students performed the same piece under two conditions within a five-day period. One condition was recorded in front of the students' colleagues/peers and instructor. The other condition was in a room alone with recording equipment. Students were administered the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970) and the State-Trait Personality Inventory (STPI; Spielberger, Barker, Knight, Marks, Russell, Silva De Crane, & Westberry, 1979) after each performance. Independent judges evaluated the recordings and the Pearson product-moment correlation coefficient for interjudge reliability was $r = .70$. The students with more years of formal training received higher ratings by the judges than students with fewer years of experience, and students indicated they had higher levels of anxiety when performing in front of their peers and instructor.

The effect of audience on MPA has been the focus of, or a research consideration in, other studies. Nideffer and Hessler (1978) revealed that the most important factors in predicting the presence and degree of anxiety were a) who is in the audience, b) how

important this performance is to the future career of the musician, and c) how important the music is to the music maker, that is, the relevance and value it has in his/her life. They also observed that some performers are almost reassured by pre-performance nerves or are able to deal well with them and perform successfully. Other musicians may be so debilitated by anxiety that performance is gravely affected and they may change careers altogether. In another study that included audience as a factor in MPA, LeBlanc, Jin, Obert, and Siivola (1997) discovered that the majority of students in the study (63%) found playing for the researchers and a group of peers to be more stressful than playing alone (7%) or playing in front of one researcher (30%). Additionally, Zakaria, Musib, and Shariff (2013) found that 88% of 55 final semester undergraduate music students perceived that anxiety affected their playing abilities, especially if they were being evaluated.

The conductor can be thought of as a highly critical and important audience member to the performer and indeed, the conductor has been found to be a contributing factor to performance anxiety in choral singers in a study by Ryan and Andrews (2009). Ryan and Andrews (2009) reported that, "It appears that most choral singers attribute at least some of their performance anxiety to characteristics and/or behaviors of the conductor with whom they are working" (p. 119). The presence of certain conductors and colleagues also affected the performance anxiety of orchestra musicians studied by van Kemenade et al. (1995) and Kenny (2011). In Kenny's (2011) study of a group of 20 orchestral musicians who were interviewed about performance anxiety, nearly all of them had a story about a bad conductor or conducting and the effect it had on them. Troubling

conductor behaviors included such things as inconsistent tempi, unplayable tempi, and unkind or demeaning comments to the musicians. In fact, conductors were cited most frequently of all situational stressors in the study.

Fehm and Schmidt (2006) found a similar anxiety reaction to audience with students' indication that their teachers' presence at a performance was the most anxiety provoking of all types of audience members. The type of the audience member influenced the level of anxiety experienced by 58.1% of the students, with teachers' and professors' attendance leading to the highest degrees of anxiety. Fehm and Schmidt explained that this was because teachers and professors have more professional knowledge and may be in positions to evaluate the performance. Furthermore, fear of some kind of evaluation accounted for 60% of the negative cognitions reported by the students in a study by Osborne and Kenny (2008). As research has suggested that anxiety increases with higher stakes and evaluative components (Brotons, 1994; Fehm & Schmidt, 2006; Hamann, 1982; Kenny, 2011; Nideffer & Hessler, 1978; Osborne & Kenny, 2008; van Kemenade et al., 1995), a hypothesis is that students who are graded for their ensemble participation will experience more MPA than students who are not graded.

Need for the Study

The focus of the present study is MPA experienced by non-music major undergraduates in ensemble rehearsal and concert settings. Notwithstanding the student recommendations from Fehm and Schmidt's (2006) study, Picard's (1999) advisement, and the success claims of Nideffer and Hessler (1978), Zander, Voltmer, and Spahn (2010), and Gratto (1998), it seems likely that some students, particularly non-music

majors, are not receiving acknowledgement, support, and guidance from their teachers when dealing with MPA. Although some schools may address performance anxiety in formal classes, other schools do not offer formal classes that include discussions of music performance anxiety and health. Investigations from this study on the symptoms of MPA, circumstances, and prevalence of MPA in undergraduate non-music majors may offer justification for the inclusion in the curricula. At the very least, teachers of these students may develop an awareness of the existence of MPA in this population, and understand the need for MPA to be generally addressed and also considered in ensemble rehearsals and concerts.

There are programs that may help music majors learn how to deal with MPA at some music schools and conservatories, but fewer exist to benefit non-music majors. Evidence of music programs that do offer course instruction about musician health issues was provided by Manchester (2007a, 2007b, 2007c). Ohio University School of Music offered an elective performance preparation class that had received positive comments from students, including an expressed desire that the class be offered as frequently as possible and that it was good to be able to discuss music performance anxiety from different perspectives (Manchester, 2007a). Other schools in Manchester's survey that document the availability of musician health-related courses include the University of Indianapolis, the University of North Texas, Northwestern University, the Eastman School of Music, Shepherd University, University of Southern Maine, Michigan State University, George Mason University, the Royal College of Music, and the Hannover University of Music and Drama (Manchester, 2007a, 2007b, 2007c). Not all of these

schools' courses are required of music students; furthermore, many are intended for music majors, not for non-majors (Manchester, 2007a, 2007b, 2007c).

A brief investigation of schools that do not currently list classes containing a component that addresses music performance anxiety in the Philadelphia, PA area yielded the following: University of Pennsylvania, University of the Sciences, Villanova University, Swarthmore College, Bryn Mawr College, and Haverford College. Drexel University does not list a course in performer health or MPA, offering instead an all campus mindfulness/meditation group for students who feel generally anxious or depressed. Temple University has a one-credit class on MPA, but it is only open to students currently enrolled in a degree program through the Boyer College of Music and Dance. All of these Philadelphia area schools have active performing groups and opportunities for non-music major students to participate. Yet, there are no clear indications that non-music majors receive attention regarding how to cope with MPA.

Although these schools do not constitute a representative sample of all of the schools in the United States that provide performing opportunities to non-music majors, this accounting shows that certainly not all such schools formally address performing anxiety in their student musicians. It seems plausible that, especially in the applied teaching studio, some talk about performance anxiety might occur, particularly before an important performance. Non-majors, on the other hand, may not have a private teacher and may be participating in courses that involve music performance at an evaluated but purely elective level; therefore, non-majors may not receive the same kind of information about and attention to MPA from their teachers that music majors might potentially

receive.

Because there are strategies that teachers can employ to help reduce MPA in their students (Gratto, 1998; Lehrer, 1987; Nideffer & Hessler, 1978; and Zander et al., 2010), and because students have requested that teachers address their needs in this regard (Fehm & Schmidt, 2006), it would be useful for teachers to know if MPA is a problem in this particular population. Having a clearer understanding of the prevalence and nature of negative symptoms of MPA among non-music majors in ensemble rehearsals and performances would be useful for teachers as they determine appropriate teaching and rehearsal strategies.

Consequently, the purpose of the study was to determine what percentage of undergraduate non-music major ensemble participants experience music performance anxiety (e.g., concerns of diminished performance quality, negative perceptions of their performance abilities, and/or reduced enjoyment of music making) in ensemble rehearsal and/or concert settings. Also under investigation are the relationships between age, grading, self-efficacy, and depression and MPA; the impact of performance setting, performing with majors, and sex on MPA; differences in MPA between music majors and non-music majors; and the nature of the negative symptoms of music performance anxiety these students experience. In light of factor analyses previously performed on the *Kenny Music Performance Anxiety Inventory – Revised* (K-MPAI-R: Kenny, 2009), which was selected to measure MPA for the present study, a hypothesis is that the factor structure of the K-MPAI-R will be stable with those established by Kenny (2011) with professional orchestral musicians and with tertiary-level music students. Additionally to

be examined are the variables predicting MPA, and the conditions under which music performance breakdowns occur.

Conceptual Framework of MPA

Many models have been put forward to explain the mechanism behind MPA. Researchers have looked to psychological, biochemical/physiological, cognitive, and social origins, and various combinations of these. Theories and models include the high-risk model of threat perception (Zinn, McCain, & Zinn, 2000), multidimensional anxiety theory (Miller & Chesky, 2004), the biopsychosocial model (Manchester, 2011), the psychological behaviorism model (Hopko, McNeil, Zvolensky, & Eifert, 2001), Bandura's theory of self-efficacy (Bandura, 1986), psychodynamic theory (Nagel, 1990), the four-systems model (Langendörfer et al., 2006) and Kenny's emotion-based model (Kenny, 2011). Some current models, including the one used for this study, allow for many factors that contribute to or affect MPA. The conceptual framework for the present study assimilates an understanding of the causes of MPA and explains why non-music major undergraduates may experience negative feelings of MPA in ensemble rehearsals and/or concerts. To this end, the conceptual framework is primarily based on a combination of elements from Kenny's (2011) emotion-based model, and incorporates biological, environmental, and emotional, and cognitive sources that can contribute to MPA.

Emotion-based model of MPA (Kenny, 2011).

Kenny's emotion-based model of music performance anxiety (2011) is a descendant of Barlow's (2000) triple vulnerability model of anxiety, and encompasses all

of the previously discussed factors that affect MPA. Factors with biological origins include anxiety sensitivity and trait anxiety. Factors with environmental origins can be manifested as conditioned responses that cause anxious apprehension and state anxiety. Similar to the triple vulnerability model, in Kenny's emotion-based model high trait anxiety and early experiences leading to general psychological vulnerability are followed by intensely critical evaluative performances that result in classical or operant conditioning of the individual. Anxiety, self-evaluation, catastrophizing, hopelessness, depression, feelings of loss of control, and false alarms (which may be panic attacks), all may result.

The idea of false alarms comes from Barlow, who contrasted these to true alarms (Kenny, 2011). Kenny described a true alarm as the physiological response that comes from a real threat to life or wellbeing. A false alarm is a panic attack that comes from something that is not a real and immediate danger. With MPA, however,

> true alarms and false alarms may become mutually recursive, such that successive performance impairments or successive exposure to genuinely threatening performance experiences increase subsequent true alarms, which in turn, increase the probability of subsequent performance impairments because of the interference effects that alarms exert on performance (Kenny, 2011, p. 164).

Kenny also qualified that even successful performances can trigger an alarm reaction. In sum, MPA will result if the individual is psychologically vulnerable, classical and/or operant conditioning produces learned alarms, and performance outcomes and/or intervention do not extinguish or reduce MPA (Kenny, 2011).

According to the present study's model, debilitating responses (such as muscle tension, nausea, and negative cognitions), actual poor performance or imagined poor performance, dissatisfaction, and the desire to avoid performing are potential outcomes of MPA. Actual avoidance is generally low in musicians—an important feature that distinguishes MPA from social anxiety and social anxiety disorders in which avoidance is a major coping strategy (Kenny, 2011). Also MPA does not necessarily result in (discernible) performance quality decrement, even though the performer can believe the performance quality is poor and have consequent negative self-thoughts while performing.

Non-music major undergraduates may experience MPA in ensemble rehearsals and performances because of biological, environmental, and/or emotional and cognitive origins. Specifically, this population, just as music major undergraduates, will have been at risk for having developed psychological vulnerabilities from early childhood, reduced self-efficacy, and for having had negative performing experiences in the past that may have triggered MPA. In spite of playing in a group that has been demonstrated to be less anxiety provoking than solo settings, critical evaluations remain a factor for these students, especially if their teacher-conductor grades the students' participation in the ensemble. Some students similar to those in the studies of LeBlanc et al. (1997) and Hamann (1982) may even be made anxious by the observation, albeit peripheral, of their peers.

Summary of Hypotheses and Research Questions

This model of MPA served to guide the methodology of the present study and to ground the hypotheses and research questions. The hypotheses, based on preexisting research that suggests relationships and conditions that may hold true for students in the present study, are:

1. The majority of undergraduate non-music majors will report negative symptoms of MPA.
2. Undergraduate non-music majors will experience greater levels of MPA during ensemble concert conditions than during ensemble rehearsal conditions.
3. Students who are graded for their ensemble participation will experience more MPA than students who are not graded.
4. Female students will have higher levels of MPA than male students.
5. There will be a negative relationship between self-efficacy and MPA in both ensemble concert and ensemble rehearsal conditions for non-music major undergraduates.
6. There will be a positive relationship between indicators of depression and MPA in undergraduate musicians.
7. The factor structure for the instrument used to measure student MPA in this study (the *Kenny Music Performance Anxiety Inventory – Revised*; Kenny, 2009) will be stable with those established previously by Kenny (2011) with professional orchestral musicians and with tertiary-level music students.

8. Music performance breakdowns among undergraduate musicians occur more often during solo playing conditions than during ensemble playing conditions.
9. Students who report having had a music performance breakdown will have higher levels of MPA than students who deny having had a music performance breakdown.

Research questions were developed in order to fulfill the purpose of the study and thoroughly describe the nature of MPA symptoms experienced by these students. These questions, dealing with areas that have not been investigated within the body of literature, include:

1. What kinds of negative symptoms of music performance anxiety, if any, do these students experience?
2. Is there a difference in the degree of MPA experienced by music majors and non-music majors?
3. Does performing with majors impact the MPA of non-music majors?
4. What variables predict MPA for undergraduates in this sample?
5. What are the most common reasons students cite for music performance breakdowns?

Method

The purpose of the study was to investigate MPA in a less-studied population—non-music major undergraduates—with the goal of making descriptive statements and comparisons to other, related, populations. The research design, therefore, is descriptive and quantitative, based on data derived from an administration of a well-established self-report instrument. Ensemble directors were selected in a random process and data were collected from participating student musicians during the second half of the 2014 semester. According to the conceptual framework, evaluation tends toward increased MPA. Because concerts, which represent a chief evaluation opportunity for teachers and audiences, tend to be scheduled toward the end of a semester, students might feel more pressure to have mastered the music as the semester progresses. It was expected that increased pressure to sufficiently master the repertoire and the potential for higher expectations in evaluation would make the last part of the semester the time more likely for students to experience MPA.

Participants

The target population consisted of non-music major undergraduates participating in a music performance ensemble. Additionally, in order to comprehend levels of MPA in the target population more thoroughly, music majors were also recruited. Because the effect size between setting scores was predicted to be moderate, with students feeling somewhat more MPA in concert settings than during rehearsals, sample size of at least 100 respondents was required (Olejnik, 1984) in Gall, Gall, and Borg, 2007).

Sampling.

Directors of choirs and instrumental groups in the participating music schools were selected by a random process and recruited via email. The random process for selecting directors was as follows:

1. Two large state universities and four colleges from each state in the mid-Atlantic region of the United States (New York, New Jersey, Pennsylvania, Delaware, Maryland, West Virginia, and Virginia) that have non-music major and music major participation in performing ensembles were identified by researching online resources. Examples include the website hosted by the State Council of Higher Education for Virginia, and the individual schools' websites. In order to begin the random selection process, these schools were arbitrarily required to have names that start with the same initial letter as the state, or, if that did not yield results, names that start with letters immediately following the initial letter as the state in order of the alphabet.
2. The universities and colleges from this initial selection were alphabetized and assigned numbers. One of the large universities and two of the colleges from each state were selected by rolling dice. Immediately after receiving approval from the Boston University Institutional Research Board, directors from the schools whose numbers matched the roll of the die were sent emails requesting if I could come on campus to invite their students to participate in the study.
3. After receiving an affirmative reply from the director, a future rehearsal was identified for a campus visit and an email was immediately sent to the IRB of the

school of the director, requesting permission to invite the students to participate. Additional IRB requirements made by the schools were met as well.

The sampling techniques resulted in the participation of musicians from 10 colleges and universities. These schools comprise the following: a small, private university with a professional focus (33 participants); a small, private liberal arts college (49 participants); a small Jesuit university (5); a small, private university (10); two state universities (that are also historically black universities) (67); a medium-sized state-assisted university (50); a large public university (34); and two Ivy League universities (53).

Procedure

Data were collected during rehearsals, and at varying times before scheduled concerts. I traveled to each school and, after a short introduction, distributed the questionnaires, pencils, and consent forms/information cover sheets at the beginning, middle, or end of the rehearsal. Student participants responded to the questionnaire in the rehearsal room of the respective ensemble. Copies of the study's conceptual framework of music performance anxiety were provided for students to read if they preferred not to complete the questionnaire. In addition, copies were made available to the students who chose to participate. Students were encouraged to ask questions if clarification of any part of the questionnaire was needed, and were assured again that their participation was entirely voluntary.

The aim of the collection process was to attend a rehearsal held during the final three to four weeks of the semester, but the logistics of scheduling ten schools resulted in data collection occurring within a window of up to 6 weeks before the end of the schools'

spring semester. Also, it was speculated that MPA would be most clearly realized immediately before rehearsing, and thus directors were requested to allow students to fill out the surveys before rehearsals began.

Previous research prompted methodological decisions to administer the questionnaire before a rehearsal began and in reasonably close proximity to a concert. Miller and Chesky (2004), observed a trend toward increasing levels of MPA prior to pre-jury and jury performances in a study of 71 performance and non-performance college students. Salmon (1990) stated, "the anticipation of stressful events, musical or otherwise, can evoke as much (if not more) anxiety than the event itself" (p. 6). Additionally, Kemeny (2003) determined that cortisol levels peak 20 to 40 minutes before a stressful event and drop to baseline 40 to 60 minutes after the event. Some directors who had agreed to participate in the study declined to allow the survey to take place at the beginning of their rehearsals. Furthermore, the late arrivals of students at some rehearsals prompted a decision to administer the survey after a warm-up period in order to capture as many responses as possible. Thus, rather than all participants receiving the survey at the beginning of the rehearsal, 134 musicians responded at the beginning of their rehearsal period, 63 responded in the middle, and 123 responded at the end.

Measures

Kenny Music Performance Anxiety Inventory – revised.

K-MPAI-R (40-items).

The *Kenny Music Performance Anxiety Inventory* – revised (K-MPAI-R; Kenny, 2009), a 40-item self-report instrument, was used to assess music performance anxiety in the sample. The questionnaire uses a 7-point Likert scale (0 = *strongly disagree* to 6 = *strongly agree*), with higher scores indicative of greater anxiety and emotional distress. This questionnaire is aligned with the Kenny (2011) definition of MPA that is fundamental to this study and with the present study's conceptual framework. Each item on the K-MPAI-R was scored on a Likert scale ranging from 0 = strongly disagree to 6 = strongly agree. Several items (K-1, 2, 9, 17, 23, 33, 35, and 37) were worded positively and reverse scored to avoid response-set. The positively worded items were found in both the pre-disposer section and in the symptom-focused, rehearsal and concert performance-setting section of the questionnaire.

The Kenny (2009) K-MPAI is one of the few MPA-measuring instruments with well-established validity and reliability. It was formulated to be consistent with Barlow's (2000) emotion-based theory of anxiety, and consequently, Kenny's (2011) emotion-based theory of MPA, which also forms part of the present study's conceptual model. The K-MPAI was determined to hold excellent internal reliability with a Cronbach's alpha of 0.94 (Kenny, 2009). Factor analysis of the results of a population study of elite Australian orchestral musicians "revealed six robust factors (Cronbach's alpha): proximal somatic anxiety and worry about performance (.91); worry/dread (negative

cognitions/ruminations) focused on self/other scrutiny (.86); depression/hopelessness (psychological vulnerability: .85); parental empathy (.75); an additional weaker factor – anxious apprehension (.59); and one item for biological vulnerability" (Kenny et al., 2012, p. 3). A similar factor structure was reported for a study of 159 tertiary level music students (Kenny et al., 2012). A Spanish language version of the 26-item K-MPAI (Kenny, 2004) administered to 490 Spanish music conservatory students was determined to have a Cronbach's alpha of .866 (Alzugaray, Hernández, López, & Gil, 2015). Confirmatory factor analysis performed by Alzugaray et al. also identified the same factors for the Spanish-speaking musicians as for English-speaking musicians, demonstrating its cross-cultural stability.

K-MPAI_Modified (62-items).

The K-MPAI was slightly modified to allow students to respond to symptom-focused statements according to both rehearsal and concert settings. Statements reflect affective (K-10 and 28), cognitive (K-11, 14, 18, 21, 25, 26, 32, and 39), somatic (K-12, 16, 22, 30, and 36), and behavioral (K-7, 15, 24, 34, and 40) symptoms. These statements were slightly reworded to pertain to either rehearsal or to concert settings, and the scales for agreement were presented in separate columns, with one column for rehearsal-settings and an adjacent column for concert settings. Students were thus able to indicate agreement with each symptom statement under rehearsal settings and under concert settings. The K-MPAI_Rehearsal score is the sum of the pre-disposer statements and the rehearsal-setting symptom statements.

Like previous applications of the K-MPAI, reliability of the scale with its

modifications for setting was excellent in this study. Assessing reliability for the concert setting alone (K-MPAI) resulted in a Cronbach's alpha of .918. The reliability for the rehearsal setting (K-MPAI_Rehearsal) was found to be .910, and Cronbach's alpha for the scale including both performance and rehearsal setting statements (K-MPAI_Modified) was .943.

Two-question PRIME-MD.

Recent research has suggested there may be a link between depression and MPA (Kenny & Ackermann, 2013). The interpretation of the results of the present study was expected to be enhanced by knowledge of the extent and prevalence of depression in this population. The questions related to depression are drawn from the PRIME-MD Patient Health Questionnaire (PRIME-MD PHQ; Kenny & Ackermann, 2013), which is a two-item questionnaire intended to screen for depression. The PRIME-MD PHQ comes originally from the *Primary Care Evaluation of Mental Disorders Patient Health Questionnaire* (Kroenke, Spitzer, & Williams, 2003). A sensitivity of 96% and a specificity of 57% for these two questions were determined by Whooley, Avins, Miranda, and Browner (1997).

Additional items.

Data collected included the date of questionnaire administration and date of the next important/graded concert with the ensemble (to gauge the time from administration to concert), gender, age, whether the participant played an instrument or sang in the ensemble, primary and (possibly) secondary instrument played in the ensemble, length of time spent playing the instrument(s) or singing, if music was the student's declared major

area of study, if the student performed with music majors in the ensemble, and if participation was graded.

To better understand the circumstances under which students have their most stressful performances, respondents were asked if they had ever experienced a music performance breakdown in which there was a memory lapse, a loss of technique, or anxiety so severe the performance could not begin or could not continue. Respondents were asked to identify whether this was a solo or ensemble performance, how many times performance breakdowns may have happened in the preceding 12 months, and to rank the issues that were relevant to the breakdown(s). Issues included "memory lapse that stopped your playing," "loss of technique or control that stopped your playing," "pre-performance anxiety so severe that you could not continue a performance," "pre-performance anxiety so severe that you could not continue a performance," "pre-performance anxiety so severe that you had to cancel a performance in advance." The most serious issue was to be ranked "1," the second most serious issue was to be ranked "2," and so forth. Respondents were also given space to describe other issues that were not already provided. The part of the questionnaire devoted to music performance breakdowns concluded with an open-ended question that asked respondents to "describe your worst performance experience in as much detail as you can remember (type of event, size and type of audience, solo or ensemble performance, preparation for performance, what happened just before and during the performance, what happened afterward, etc.)."

Data Analysis

Data were analyzed using SPSS 22.0. Means, medians, and standard deviations were calculated to describe the sample. Total scale scores were computed for comparisons between groups. These included the total for statements linked to pre-disposers and concert-setting anxiety symptoms (K-MPAI), the total for statements linked to pre-disposers and rehearsal-setting anxiety symptoms (K-MPAI_Rehearsal), and the total for statements linked to pre-disposers, concert-setting anxiety symptoms, and rehearsal-setting anxiety symptoms (K-MPAI_Modified).

A one-way between-groups analyses of variance was performed to investigate whether timing of the administration of the survey (before, midway, or after the rehearsal) impacted survey results. The impact of depression on MPA was evaluated by a Welch test of equality of means. Undergraduate non-music majors' levels of MPA during ensemble concert conditions and ensemble rehearsal conditions were compared via paired-samples t-test. Independent-samples t-tests were conducted to determine if grading impacted MPA scores, if students who reported having had a music performance breakdown had higher levels of MPA than students who denied having had a music performance breakdown, the impact of choice of major on MPA, the impact performing with majors had on the MPA of non-majors, and the impact of sex (gender) on MPA. Pearson product-moment correlations described relationships between proximity to the concert and MPA, self-efficacy and MPA, and between the three modes of scoring the questionnaire (scores for K-MPAI, K-MPAI_Rehearsal, and K-MPAI_Modified). Principal components analysis with Varimax rotation was used as the factor analysis

technique to investigate the factor structure of the K-MPAI-R and multiple regression was conducted to identify predictors of MPA.

There was no systematic qualitative analysis of the answers to the open-ended question that asked respondents to describe their worst performing experiences. Quotes from the responses served as illustrations of themes identified through other analyses. They also added much warmth and humanity to the project.

Most participants answered most of the questions. If an answer was missing to a question that was part of a total score, the total score was not calculated for that participant and therefore was not included in any comparisons. The question that was skipped the most was "Age" (282 out of 320 answered). Also, K-MPAI_Modified scores, which involved summing the greatest number of items, could only be calculated for 288 out of 320 respondents. Only one question seemed to be misunderstood with any frequency. This was the question that asked respondents to rank the issues that resulted in a performance breakdown that they may have had. Respondents were requested to place a "1" in the box next to the most serious issue, a "2" in the box next to the second most serious issue, and so on. Some students placed an "x" in the boxes without ranking the issues by number. This happened with 17 of the 126 respondents who admitted to a performance breakdown. These 17 respondents' answers were not included in analyses dealing with this question.

Preliminary Results

Possible confounding factors that occurred during data collection were assessed prior to hypothesis testing. These included the possible effect the timing of the

administration of the questionnaire had on respondents' answers and the potential impact proximity to the respondents' next concert had on their answers. The impact of age on MPA and the correlation between the different scales (K-MPAI, K-MPAI_Rehearsal, and K-MPAI_Modified) were also examined.

Questionnaire administration.

Because not all students responded to the questionnaire at the beginning of a rehearsal, as had been intended, responses from all students were examined using a one-way between-groups analysis of variance to determine if the timing of the administration of the questionnaire had any impact on K-MPAI scores. Levene's statistic (1.89) testing the homogeneity of variances was not significant, and no significant difference in K-MPAI scores according to administration times was found: $F(2, 274) = 1.33$, $p = .266$, indicating that the variation in timing of the survey administration was unlikely to have affected overall results.

Concert proximity.

The intent to capture responses from student musicians within the last 3-4 weeks of the semester was based on the assumption that students' MPA would be most intense as testing neared the students' concert. A scatterplot of K-MPAI scores for all students showed reasonable homoscedasticity (given that the axis for concert proximity was not a smooth continuum but rather progressed in discrete intervals) and a slight linear increase in anxiety as the number of days before the concert diminished. This relationship was further investigated using Pearson product-moment correlation coefficient, which was not significant: $r = -.07$, $n = 275$, $p = 0.261$. Correlational analyses using Pearson product-

moment correlation coefficients for undergraduate music majors ($r = .17, n = 96, p = 0.084$) and undergraduate non-music majors ($r = -.06, n = 154, p = 0.461$) separately were also non-significant.

Impact of age on MPA.

MPA in all students had been observed to decrease with increasing age. A Pearson product-moment correlation coefficient calculation of K-MPAI scores and age, however, yielded an $r = -.02, n = 251, p = 0.702$, two-tailed. Furthermore, a cluster of data around the 20-year mark and relatively fewer data points for older ages meant that a scatterplot of MPA and age did not produce good homoscedasticity. The restriction in age for all of the students in the sample (269 students reported their age; minimum age = 18 years, maximum age = 33 years, mean = 20.59 years, $SD = 2.20$) likely resulted in age not being a significant variable for this study.

Relationship of the K-MPAI, K-MPAI_Rehearsal, and K-MPAI_Modified.

The three scales used to measure different setting manifestations of MPA (K-MPAI, K-MPAI_Rehearsal, and K-MPAI_Modified) were examined using Pearson product-moment correlation coefficient to determine if they were intercorrelated. There was no violation of the assumptions of normality, linearity and homoscedasticity. As expected, due to the common items comprising the three scales, all were highly intercorrelated. There was a strong positive relationship between scores on the K-MPAI and K-MPAI_Rehearsal, indicating that respondents who were most anxious in performance also tended to be most anxious in rehearsal. A 100% correlation between the

K-MPAI and the K-MPAI_Modified signaled that the K-MPAI scores were appropriate for representing MPA across concert and rehearsal settings.

Results

Demographics

In all, 343 musicians were invited to participate and 320 responded, yielding a response rate of 93.3%, of which 168 (52.5 %) were females and 152 (47.5 %) were males. The educational status of the respondents included undergraduate non-music majors (n = 166), undergraduate music majors (n = 108), graduate non-music majors (n = 9), graduate music majors (n = 14), nonstudents who play/sing with students (n = 19) and four undeclared undergraduate students. (Because of the relatively few numbers of nonstudents and the focus of this study on student experiences of MPA – especially non-music major undergraduates', the nonstudents were excluded from analyses.) Table 1 illustrates undergraduate and graduate student participants categorized by sex, age, major, and instrument.

Table 1

Sex, Age, Major, and Instruments Played for Undergraduate and Graduate Students

Characteristic	Undergraduate	Graduate
Sex		
Male	128	10
Female	150	13
Average Age	20.19 (SD = 1.59) years	25.14 (SD = 2.98) years
Music Majors	108	14
Non-Music Majors	166	9
Average Length of Instrument Study	8.91 (SD = 4.70) years	14.55(SD = 3.32) years
Instrument		
Voice	140	0
String	77	13
Woodwind	23	5
Brass	22	3
Piano	6	0
Harp/Guitar	2	0

The 160 instrumentalists played in a range of ensembles: choral (accompanists; n = 2), jazz (n = 4), concert band (n = 19), chamber orchestra (n = 10), and orchestra (n = 126). The 141 singers were divided into the following ensembles: jazz (n = 7), chamber choir (n = 12), and chorus (n = 121). The average age of all student participants was 20.59 (SD = 2.20) years. The average length of time all students had spent playing their main ensemble instrument/singing was 9.33 (SD = 4.84) years. Table 2 indicates K-MPAI, K-MPAI_Rehearsal, and K-MPAI_Modified scores for singers and instrumentalists.

Table 2

Mean Scores for K-MPAI, K-MPAI_Rehearsal, and K-MPAI_Modified by Instrumentalists or Vocalists for All Students

Scale	N	Mean	*SD*	Minimum	Maximum
K-MPAI					
Instrumentalists	147	105.59	35.666	30	212
Vocalists	130	101.02	35.407	24	208
Total	277	103.44	35.554	24	212
K-MPAI_Rehearsal					
Instrumentalists	150	86.81	32.500	19	198
Vocalists	130	85.36	33.589	12	193
Total	280	86.14	32.959	12	198
K-MPAI_Modified					
Instrumentalists	145	149.48	52.121	47	329
Vocalists	128	143.98	54.163	31	309
Total	273	146.90	53.061	31	329

Note. K-MPAI = Kenny Music Performance Anxiety Inventory (40-items); K-MPAI_Rehearsal = Kenny Music Performance Anxiety Inventory (40-items) applied to rehearsal settings only; K-MPAI_Modified (62-items) = Modified Kenny Music Performance Anxiety (includes both concert and rehearsal setting symptom statements).

Prevalence of MPA in Non-Music Major Undergraduates

Of 166 students, 52.5% agreed with the statement "From early in my music studies, I remember being anxious about performing." For performance setting-related symptoms only, the mean score was 57.31 out of a possible score of 132, and for rehearsal setting-related symptoms only the mean score was 41.54 out of a possible score of 132. Furthermore, 164 out of 166 students, (98.8%) answered somewhat agree, agree, or strongly agree to at least one of the questions associated with symptoms of MPA in one or both settings. Only one male and one female student did not agree at all with any symptom statement.

MPA in Non-Music Major Undergraduates

Based on how many students somewhat agreed, agreed, or strongly agreed, the five top symptom-related statements for the concert-related setting were

(i) K-25 "After the performance, I worry about whether I played well enough" (60.9%)

(ii) K-39 "I am concerned about my own judgment of how I will perform" (60.3%)

(iii) K-22 "Prior to, or during a performance, I experience increased heart rate like pounding in my chest" (51.9%)

(iv) K-18 "I am often concerned about a negative reaction from the instructor or audience" (47.1%)

(v) K-7 "Even if I work hard in preparation for a performance, I am likely to make mistakes" (44%).

For rehearsal setting-related anxiety, the top five scoring symptom statements were

(i) K-7 "Even if I work hard in preparation for a rehearsal, I am likely to make mistakes" (53.7%)

(ii) K-39 "I am concerned about my own judgment of how I will perform" (46.5%)

(iii) K-18 "I am often concerned about a negative reaction from the instructor or listener" (44.6%)

(iv) K-25 “After the rehearsal, I worry about whether I played well enough” (33.1%)

(v) K-15 “Thinking about the evaluation I may get interferes with my performance” (26.4%).

Table 3 shows percentages of non-music major undergraduates who somewhat agreed, agreed, or strongly agreed with each of the symptom statements, applied to rehearsal and concert settings.

Table 3

Percentage of Agreement with K-MPAI Symptom Statements under Rehearsal Settings and Concert Settings for Non-Music Major Undergraduates

K-MPAI Item Number	Symptom Statement	Rehearsal Setting	Concert Setting
K_7	Even if I work hard in preparation for a rehearsal/performance, I am likely to make mistakes……..	53.7%	44%
K_10	Prior to, or during a rehearsal/performance, I get feelings akin to panic...……	10.8%	34.9%
K_11	I never know before a rehearsal/concert whether I will perform well……..	19.8%	30.1%
K_12	Prior to, or during a rehearsal/performance, I experience dry mouth…...……..	8.4%	24%
K_14	During a rehearsal/performance I find myself thinking about whether I’ll even get through it……..	10.8%	13.8%
K_15	Thinking about the evaluation I may get interferes with my performance..……..	26.4%	31.9%

K_16	Prior to, or during a rehearsal/performance, I feel sick or faint or have a churning in my stomach……	10.9%	27.1%
K_18	I am often concerned about a negative reaction from the instructor or listener/audience……	44.6%	47.1%
K_21	I worry that one bad rehearsal/performance may ruin my career…….....	9%	15%
K_22	Prior to, or during a rehearsal/performance, I experience increased heart rate like pounding in my chest……..……	12.6%	51.9%
K_25	After the rehearsal/performance, I worry about whether I played well enough..……	33.1%	60.9%
K_26	My worry and nervousness about rehearsal/my performance interferes with my focus and concentration……..	18.6%	36.1%
K_28	I often prepare for a rehearsal/concert with a sense of dread and impending disaster……..	8.4%	13.8%
K_30	Prior to, or during a rehearsal/performance, I have increased muscle tension……	11.4%	31.9%
K_32	After the rehearsal/performance, I replay it in my mind over and over……	16.2%	41.6%
K_34	I worry so much before a rehearsal/performance, I cannot sleep……	2.4%	10.2%
K_36	Prior to, or during a rehearsal/performance, I experience shaking or trembling or tremor…..	7.2%	37.9%
K_39	I am concerned about my own judgment of how I will perform……	46.5%	60.3%

Note. K-MPAI = Kenny Music Performance Anxiety Inventory (40-items).

In addition to the cognitive and somatic symptoms illustrated in the top five symptom-

related statements with which students agreed, there is also evidence that students experienced other somatic symptoms as well as affective and behavioral ones. Nausea during rehearsals was reported by 10.9% of non-music major undergraduates and nausea during concerts was reported by 27.1%. Other somatic symptoms include dry mouth (experienced by 8.4% during rehearsals and 24% during concerts), muscle tension (experienced by 11.4% during rehearsals and 31.9% during concerts), and shaking (experienced by 7.2% during rehearsals and 37.9% during concerts). Students also reported feeling affective symptoms, such as panic (experienced by 10.8% during rehearsals and 34.9% during concerts) and dread (experienced by 8.4% before rehearsals and 13.8% before concerts). Behavioral symptoms included not being able to sleep (experienced by 2.4% before rehearsals and 10.2% before concerts).

Music Performance Breakdowns

The phenomenon of music performance breakdowns was explored with the final hypotheses: "Music performance breakdowns among undergraduate musicians occur more often during solo playing conditions than during ensemble playing conditions," and "Students who report having had a music performance breakdown will have higher levels of MPA than students who deny having had a music performance breakdown;" and the fourth research question: "What are the most common reasons students cite for music performance breakdowns?" In response to the survey question, "Have you ever experienced a music performance breakdown in which you had a memory lapse, a loss of technique, or anxiety so severe that you could not begin or continue with your performance?" 111 of all undergraduate students responded "yes," and 167 responded

"no." The performance-setting circumstances of the music performance breakdowns are shown in Table 4.

Table 4

Performance-Setting Circumstances of Undergraduate Music Performance Breakdowns

Performance Setting	Frequency
Solo	88 (31.7%)
Ensemble	11 (4.0%)
Both	12 (4.3%)
Not applicable	167 (60.1%)
Total	278 (100%)

Of the 111 students who admitted to having a music performance breakdown, most students experienced the breakdown under solo playing conditions (31.7%).

An independent samples t-test was conducted to investigate if there would be a connection between music performance breakdowns and more severe MPA. Equal variances were assumed (Levene's Sig = .91) and a significant difference in K-MPAI scores was determined between students who reported having had a music performance breakdown (M = 115.94, SD = 34.52) and students who denied having had a music performance breakdown (M = 95.09, SD = 33.83; $t(275) = 4.98$, $p < .005$, two tailed). According to Cohen's (1988) guidelines, the magnitude of the differences in the means (mean difference = 20.85, 95% *CI*: 12.61 to 29.08) was moderate (eta squared = .08, where eta squared = $t^2/t^2 + (N1 + N2 - 2)$).

Table 5 shows the most serious issues that resulted in undergraduate students' music performance breakdowns. The frequencies listed are the number of students who marked each of the issues (memory lapse, technique loss, etc.) as the most serious.

Memory lapse was the most popular answer (16.3%), followed by technique loss (11.8%).

Table 5

Most Serious Issue Contributing to Undergraduate Students' Music Performance Breakdowns

Issue	Frequency
Memory Lapse	43 (16.3%)
Technique Loss	31 (11.8%)
Pre-Performance Anxiety –Could Not Continue	4 (1.5%)
Pre-Performance Anxiety- Could Not Start	6 (2.3%)
Pre-Performance Anxiety- Had To Cancel	2 (.8%)
Other	10 (3.8%)
Not Applicable	167 (63.5)
Total	263 (100%)

In addition to examining the performance-settings associated with music performance breakdowns, a research question was pointed at uncovering the prime reasons undergraduate musicians cite for their music performance breakdowns. Memory lapse was ranked first as the most serious issue contributing to a music performance breakdown by 16.3% of 263 undergraduates. Memory lapse was also mentioned frequently in students' descriptions of a worst performing experience. As an example,

one student recalled the circumstances of an early piano recital:

> "Worst performance experience was a piano recital when I was about ten. I was a solo performer for about 15 people and had a memory lapse and had to get my sheet music before I could continue."

This student experienced a memory lapse during a junior voice recital evaluation:

> "I suffered from extreme pre-performance test anxiety to the point I forgot the words to over half of my piece. I stood on stage and froze halfway through a piece. I had a complete emotional breakdown after the performance."

The second most cited serious issue contributing to a music performance breakdown was technique loss (11.8%). A student related his technical problems:

> "On some occasions I completely fall apart as a musician. I lose my technique, I can't play over harmony, I start playing licks. Basically everything shuts down. It's like I forget how to play."

Another student recalled technique issues during a piano competition:

> "(I was) performing for three very serious judges. I had practiced for a long time. The night before I performed probably my best ever. Two minutes in my fingers trip on a crucial part of the piece. I spend the next 15 minutes tumbling through the rest of my repertoire while mentally berating myself for all the mistakes I was making. I didn't win."

Some students had pre-performance anxiety so severe that they could not begin a performance (2.3%). One student told of her experience with this kind of pre-performance anxiety:

> "I participated in voice lessons in high school and pretended to be sick for the solo showcase at the end of the semester (in front of about 50 people) because I was too nervous."

Another student wrote of a series of mishaps that contributed to a complete physical breakdown before a performance was supposed to begin:

> "I was in the 9th grade: end of year jazz concert. I had my first improvised solo of the year, my first time soloing over complex chord changes. I wrote the chord changes down and practiced over them religiously at home. I lost the sheet with the chord changes shortly before we were supposed to go on. During a performance about an hour before ours, of the very good, very advanced band, I began coughing so hard I had to leave. I went to get water but could not stop coughing and heaving. Eventually I threw up my dinner, which was not very much because I usually had stomach issues before performing, and told my teacher I could not perform. After leaving, I felt relief and fine physically. I cried in the car home, disappointed in myself."

Setting-Related MPA

Table 6 shows ensemble concert-setting mean MPA (K-MPAI) and ensemble rehearsal-setting mean MPA (K-MPAI_Rehearsal) for music major undergraduate students, non-music major undergraduate students, and for music major graduate students and non-music major graduate students.

Table 6

Mean, Standard Deviation, Minimum, and Maximum Values for K-MPAI and K-MPAI_Rehearsal by Music Major and Non-Music Major Undergraduate and Graduate Students

Students	*n*	Mean K-MPAI	*SD*	Min.	Max.	*n*	Mean K-MPAI_ Rehearsal	*SD*	Min.	Max.
UMM	98	112.53	38.47	30	212	98	92.51	35.21	23	198
UNM	158	98.04	32.72	24	178	160	82.40	30.93	12	167
GMM	12	106.50	32.58	38	150	12	86.17	25.46	26	121
GNM	8	95.50	41.76	37	171	8	76.50	38.90	29	152

Note. UMM = Undergraduate music majors; UNM = Undergraduate non-music majors; GMM = Graduate music majors; GNM = Graduate non-music majors. K-MPAI = Kenny Music Performance Anxiety Inventory (40-items); K-MPAI_Rehearsal = Kenny Music Performance Anxiety Inventory (40-items) applied to rehearsal settings only.

Scores for concert setting-related anxiety symptoms (K-MPAI) were compared with scores for rehearsal setting-related anxiety symptoms (K-MPAI_Rehearsal) for undergraduate non-music majors. The data representing concert-setting MPA (skewness = .15, kurtosis = -.33, Kolmogorov-Smirnov statistic Sig. = .20) and rehearsal MPA (skewness = .40, kurtosis = .16, Kolmogorov-Smirnov statistic Sig. = .20) for undergraduate non-music majors demonstrated normality, and a paired-samples t-test was conducted to examine the difference in setting-related anxiety scores. The test, applied to 156 of the undergraduate non-music majors, revealed a significant difference between concert setting-related anxiety ($M = 98.24$, $SD = 32.67$) and rehearsal setting-related anxiety ($M = 82.62$, $SD = 30.88$), $t(155) = 10.03$, $p < 0.001$ (two-tailed). The mean difference in scores was 15.62 with a 95% confidence interval ranging from 12.55-18.70.

The eta squared statistic, calculated by eta squared = $t^2/t^2 + (N-1)$ was large (.39), according to Cohen's (1988) guidelines.

Effect of Grading on MPA

Table 7 shows the various ways that students were graded or not graded by their directors for their participation in the ensemble. Because of the very low numbers in three of the grading systems, an independent-samples t-test was used to compare K-MPAI scores only between students who received letter grades and those who were not graded at all. A significant difference in scores was found for students who received letter grades ($M = 107.46$, $SD = 34.86$) and students who were not graded ($M = 97.85$, $SD = 36.85$; $t\ (260) = 2.12$, $p < 0.05$, two-tailed). The magnitude of the differences in the means (mean difference = 9.61, 95% *CI*: .66 to 18.57) was small (eta squared = .02). Eta squared was calculated as $t^2/t^2 + (N1 + N2 - 2)$, and the effect size was judged inconsequential based on Cohen (1988).

Table 7

Type of Grading and Mean K-MPAI Scores for all Students

Type of Grading	N	Mean	*SD*	Minimum	Maximum
Letter Grade	164	107.46	34.861	24	211
Pass/Fail	3	101.00	14.933	90	118
Credit/Non-credit	5	103.80	25.134	77	144
Not Graded	98	97.85	36.849	34	212
Not Sure	2	86.50	53.033	49	124
Total	272	103.71	35.519	24	212

Note. K-MPAI = Kenny Music Performance Anxiety Inventory (40-items).

Impact of Being a Music Major on MPA

An independent-samples t-test was conducted to examine the impact being a music major versus not being a music major had on K-MPAI scores in undergraduates. Equal variances were assumed (Levene's test Sig. = .17). The test showed undergraduate music majors (M = 112.53, SD = 38.47) had significantly higher K-MPAI scores than undergraduate non-music majors (M = 98.04, SD = 32.72); t (254) = 3.22, $p < 0.001$, two-tailed. According to Cohen (1988), the magnitude of the difference in the means (mean difference = 14.49, 95% *CI*: 5.62 to 23.36) was minimal (eta squared = $t^2/t^2 + (N1 + N2 - 2) = .04$). These results indicate the presence of a significant but only slightly higher degree of MPA in undergraduate music majors than in undergraduate non-music majors.

Effect of Performing with Majors on MPA

An independent-samples t-test was used to assess the impact performing with music majors had on K-MPAI scores of undergraduate non-music majors. Although the mean score for K-MPAI of non-music majors who performed with music majors (M = 102.17, SD = 32.47) was larger than the mean K-MPAI score of non-music majors who did not perform with music majors (M = 93.30, SD = 29.04), the difference was not significant: t (121) = 1.38, p = .17, two-tailed. The magnitude of the difference in the means (mean difference = 8.87, 95% *CI*: -3.87 to 21.60) was small (eta squared = .02).

Impact of Sex on MPA

The impact of sex on K-MPAI scores (see Table 8) was investigated using independent samples t-tests. K-MPAI and K-MPAI_Rehearsal scores for all students (including undergraduates and graduates) demonstrated acceptable normality (K-MPAI:

skewness = .32, kurtosis = .05; K-MPAI_Rehearsal: skewness = .63, kurtosis = .76). Independent-samples t-tests were chosen to assess differences. Although scores were higher for females than for males, there was no significant difference found in K-MPAI scores between males ($M = 99.90$, $n = 125$) and females ($M = 106.36$, $n = 152$; $t(275) = -1.51$, $p = 0.13$, two-tailed). There was also a non-significant difference between males and females for K-MPAI_Rehearsal scores (males: $M = 83.78$, $n = 127$; females: $M = 88.10$, $n = 153$; $t(278) = -1.09$, $p = 0.28$, two-tailed).

Table 8

Mean K-MPAI and K-MPAI_Rehearsal Scores by Sex for All Students

Scale	Sex	N	Mean	*SD*
K-MPAI	Male	125	99.90	33.376
	Female	152	106.36	37.105
K-MPAI_Rehearsal	Male	127	83.78	32.111
	Female	153	88.10	33.625

Note. K-MPAI = Kenny Music Performance Anxiety Inventory (40-items); K-MPAI_Rehearsal = Kenny Music Performance Anxiety Inventory (40-items) applied to rehearsal settings only.

Relationship of Self-Efficacy to MPA

The statements, "Even in the most stressful performance situations, I am confident that I will perform well" and "Even in the most stressful rehearsal situations, I am confident that I will perform well," though not comprising a standardized test of self-efficacy, were selected as an approximation of the degree of the respondent's self-efficacy. A scatterplot of concert-setting MPA (K-MPAI scores) and the scoring to the question "Even in the most stressful performance situations, I am confident that I will perform well" demonstrated reasonable homoscedasticity. Higher scores were indicative

of disagreement with this statement, with a score of six indicating, "Strongly disagree." The relationship of concert-specific self-efficacy and concert MPA was examined via Pearson product-moment correlation. A relatively strong relationship was found, $r = .49$, $n = 158$, $p < .0005$, with high levels of concert-setting MPA associated with low levels of concert-setting-specific self-efficacy.

A scatterplot of rehearsal-setting MPA (K-MPAI_Rehearsal) and the scoring to the question "Even in the most stressful rehearsal situations, I am confident that I will perform well" also demonstrated reasonable homoscedasticity. The relationship of rehearsal-specific self-efficacy and rehearsal-setting MPA was explored using Pearson product-moment correlation. A strong correlation was also found between these two variables, $r = .52$, $n = 160$, $p < .0005$, with high levels of rehearsal MPA associated with low levels of rehearsal-related self-efficacy.

Impact of Depression on MPA

The impact of depression (signified by scores on the PRIME-MD depression index questions) on K-MPAI scores (Table 9) was investigated via one-way analysis of variance with post-hoc contrasts for all undergraduate students. A score of "0" indicated that the respondent did not answer "yes" to either depression index question ("During the past month, have you often been bothered by feeling down, depressed, or hopeless?" or "During the past month, have you often been bothered by little interest of pleasure in doing things?"). A score of "1" indicated a positive answer to one of the questions. A score of "2" indicated a positive answer to both questions.

Table 9

PRIME-MD and Mean K-MPAI for Undergraduates

				95% Confidence Interval for Mean			
PRIME-MD	N	Mean K-MPAI	*SD*	Lower Bound	Upper Bound	Minimum	Maximum
No Both Q	113	85.98	30.099	80.37	91.59	24	152
Yes 1 Q	64	98.30	28.988	91.06	105.54	31	168
Yes 2 Q	97	123.36	37.072	115.89	130.83	43	212
Total	274	102.09	36.337	97.77	106.41	24	212

Note. K-MPAI = Kenny Music Performance Anxiety Inventory (40-items).

A Welch test for equality of means was performed due to violation to the assumption of homogeneity of variance (Levene's Sig. = .02). Results indicated that the differences between K-MPAI means for each of the PRIME-MD scores were robust (WT = 31.40, $df = 2, 161.33$, $p < 0.001$). Post-hoc tests revealed that the differences between 0 and 1 ($p = 0.016$), 1 and 2 ($p < 0.001$) and between 0 and 2 ($p < 0.001$) were significant. In addition, there was no overlap between the upper and lower bounds of the 95% confidence interval between the three levels of the PRIME-MD and their corresponding K-MPAI score.

Factor Analysis of the K-MPAI

The seventh hypothesis of the present study was that the factor structure for the instrument used to measure MPA in this study (the *Kenny Music Performance Anxiety Inventory – Revised*; Kenny, 2009) would be stable with those factor structures established previously by Kenny (2011) with professional orchestral musicians and with tertiary-level music students. The Kaiser-Meyer-Olkin value was .88, exceeding Kaiser's

(1970) recommended value of .6; and Bartlett's Test of Sphericity was statistically significant. Also, there were many items with correlation coefficients greater than or equal to .3. Therefore, factor analysis was considered appropriate and the K-MPAI was subjected to a principal components analysis (PCA).

An initial analysis yielded nine components with eigenvalues above 1, explaining 24.84%, 10.29%, 5.66%, 4.53%, 3.80%, 3.29%, 3.01%, 2.71%, and 2.60% of the variance respectively. Collectively, these nine components explained 60.73% of the variance. Examination of a screeplot of eigenvalues and components showed a smooth upward curve commencing around the eighth or ninth component. After Varimax rotation was performed, only one item loaded onto the ninth component. Based on Catell's (1966) scree test and the results of the Varimax rotation, the PCA was repeated with eight items. The eight-item analysis (see table 10) was retained as it provided a comparable structure to previous factor analyses performed for tertiary-level music students (nine factors; Kenny, 2009) and for professional orchestral musicians (eight factors; Kenny, 2011).

The eight-component solution explained a total of 58.13% of the variance. The Varimax rotation revealed a clear structure in which items pertaining to proximal somatic anxiety and worry about performance loaded onto component one, items pertaining to depression and hopelessness (psychological vulnerability) loaded onto component two, items pertaining to worry and dread with negative cognitions/ruminations focused on both self and other scrutiny loaded onto component three, items pertaining to parental empathy loaded onto component four, items pertaining to memory loaded onto component five, items pertaining to generational transmission of anxiety loaded onto

component six, items pertaining to scrutiny by others and general anxiety loaded onto component seven, and items pertaining to trust loaded onto component eight.

Table 10

Factor Structure of the K-MPAI

Factor	1	2	3	4	5	6	7	8
1. Proximal somatic anxiety and worry about performance								
I often prepare for a concert with a sense of dread and impending disaster	.685	(.312)						
Even if I work hard in preparation for a performance, I am likely to make mistakes	.685							
I never know before a concert whether I will perform well	.679							
My worry and nervousness about my performance interferes with my focus and concentration	.677		(.338)					
Prior to, or during a performance, I experience increased heart rate like pounding in my chest	.658		(.316)					
Prior to, or during a performance, I get feelings akin to panic	.628		(.305)					
Prior to, or during a performance, I have increased muscle tension	.609							
Prior to, or during a performance, I experience shaking or trembling or tremor	.580							

Factor	1	2	3	4	5	6	7	8
Thinking about the evaluation I may get interferes with my performance	.577		(.325)					
Prior to, or during a performance, I feel sick or faint or have a churning in my stomach	.570		(.330)					
Even in the most stressful performance situations, I am confident that I will perform well (-)	.535						(.407)	
During a performance I find myself thinking about whether I'll even get through it	.512		(.307)					
Prior to, or during a performance, I experience dry mouth	.401							
2. Depression/ hopelessness (Psychological vulnerability)								
I often feel that I have nothing to look forward to		.797						
I often feel that life has not much to offer me		.791						
I often feel that I am not worth much as a person		.726						
Sometimes I feel depressed without knowing why		.651					(.306)	
I often find it difficult to work up the energy to do things		.567				(.335)		
I generally feel in control of my life (-)	(.307)	.546						
I give up worthwhile performance opportunities		.524						
As a child, I often felt sad		.413		(.355)				

Factor	1	2	3	4	5	6	7	8
3. Worry/dread (Negative cognitions/ ruminations) focused on self/other scrutiny								
I worry that one bad performance may ruin my career			.701					
After the performance, I replay it in my mind over and over			.616					
I am concerned about my own judgment of how I will perform			.589					
After the performance, I worry about whether I played well enough	(.493)		.571					
I worry so much before a performance, I cannot sleep	(.382)		.558					
I am often concerned about a negative reaction from the instructor or listener/audience	(.314)		.557				(.399)	
From early in my music studies, I remember being anxious about performing			.398				(.363)	
I remain committed to performing even though it causes me great anxiety			.384					
4. Parental empathy								
My parents almost always listened to me (-)				.814				
My parents encouraged me to try new things (-)				.762				
My parents were mostly responsive to my needs (-)				.747				
5. Memory								
I am confident playing from memory (-)					.897			

Factor	1	2	3	4	5	6	7	8
When performing without music, my memory is reliable (-)					.868			
6. Generational transmission of anxiety								
Excessive worrying is a characteristic of my family						.810		
One or both of my parents were overly anxious						.757		
7. Other scrutiny/general anxiety								
I am concerned about being scrutinized by others							.631	
Sometimes I feel anxious for no particular reason		(.399)					.508	(.352)
8. Trust								
I find it difficult to depend on others								.734
I find it easy to trust others (-)								.691

Note. K-MPAI = Kenny Music Performance Anxiety Inventory (40-items) (-) Items were reverse scored.

Predictors of MPA

Standard multiple regression was used to determine the predictive capabilities of depression, instrument, sex, and music performance breakdowns for undergraduate students' MPA (as measured by K-MPAI scores). Depression was indicated by having answered "yes" to either or both depression screening questions, instrument signified if the respondent played an instrument or sang, and music performance breakdowns were indicated if a respondent reported having had one or more of these in the past year. Preliminary analyses were conducted to ensure no violation of the assumptions of

normality, linearity, multicollinearity, and homoscedasticity. Depression and K-MPAI scores were moderately correlated (.45), and there was a small correlation between music performance breakdowns (.20) and K-MPAI scores. Correlation between independent variables was low, justifying their retention. Further, tolerance values for all independent variables were well over .10, ranging from .95 to .98, and variance inflation factor values were accordingly quite low. All VIF values ranged from 1.02 to 1.05, indicating that the multicollinearity assumption has not been violated (Pallant, 2010). Further, the scatterplot of the standardized residuals exhibited an acceptable centralized rectangular distribution within -3.3 and 3.3.

The total variance explained by the model was 23.8%, F (4, 262) = 20.43, $p <$ .001. A summary of results is shown in Table 11. All variables contributed significantly to MPA, but depression made the strongest unique contribution to MPA (*beta* = .42, $p <$ 0.001).

Table 11

Summary of Standard Multiple Regression Analysis for Variables Predicting MPA

Variable	*B*	*SE(B)*	*β*	95% *CI*
(Constant)	75.625***	6.680		[62.47, 88.78]
Depression	17.342***	2.257	.424	[12.90, 21.79]
Instrument	8.146*	3.902	.114	[.46, 15.83]
Sex	-9.038*	3.912	-.126	[-16.74, -1.34]
Performance Breakdowns	10.624*	4.979	.118	[.82, 20.43]
R^2	.238			
F	20.425***			

Note. N = 267. CI = confidence interval. MPA measured by the K-MPAI = Kenny Music Performance Anxiety Inventory (40-items). *$p < .05$. ***$p < .001$

Discussion

Prevalence of MPA

This study investigated the prevalence and severity of MPA in non-music major undergraduates and found that the majority of these students did indeed report MPA in their ensemble rehearsals and concert performances. Consistent with Cox and Kenardy (1993) who found that the entirety of their sample experienced performance anxiety, nearly all of the students in the present study (98.8%) reported having at least one symptom associated with MPA in one or both performance settings, and most non-music major undergraduates remembered feeling anxious about performing from early in their studies.

Students in the present study displayed higher levels of MPA compared with other populations that have been assessed with the K-MPAI. K-MPAI scores were 98.04 for non-music major undergraduates, 112.53 for music major undergraduates, and 102.10 for graduate students. The mean score for all students was 103.44. By comparison, the 377 professional Australian orchestral musicians in Kenny and Ackermann's (2013) study had a mean score of 83.5, and 20 undergraduate, master's level, and recently graduated students from Sydney Conservatorium of Music had a mean score of 68 (Kenny, Fortune, & Ackermann, 2011).

The higher mean score for the present study's sample compared with the other samples is somewhat surprising, given that most of the students in this sample were non-music majors and the students responded to the questionnaire statements based on their current ensemble participation (not on solo performing). Non-music majors

(undergraduate and graduate students) in this sample did indeed score lower (n = 166, M = 97.92) than did music majors (n = 110, M = 111.87), but even so, the score for non-music majors was higher than has been seen in other populations. Previous research has demonstrated that ensemble performing tends to be less anxiety provoking than solo performing (e.g. Cox & Kenardy, 1993; and Langendörfer et al.; 2006) and this makes these results even more puzzling. Only the non-students who were excluded from analysis due to their relatively low n and the general focus of this study had scores (n = 16, M = 64.38) somewhat similar to the Kenny, Fortune, and Ackermann study sample.

Putting aside the professional Australian orchestral musicians in Kenny and Ackermann's (2013) study for comparison purposes because of the discrepancy in age and comparing this study's student respondents with the Sydney Conservatorium students, perhaps the difference in concert MPA scores is due to pedagogical differences between this Australian conservatory and the American schools represented in this sample. The teachers and directors of the Australian students may be more successful in reducing effects of MPA, or perhaps not contributing to the MPA of their students. The difference in MPA scores between the Australian students and this group may also have resulted from this study's circumstances of questionnaire completion: immediately before, during, or after a rehearsal; in the rehearsal hall; with the director present. These questionnaire administration circumstances may have intensified the recall and reporting of symptoms more than if students had taken the questionnaire in the relative comfort of their homes, for example.

Influence of Setting on MPA

A key component of the present study, and the basis for the second hypothesis, was the influence of setting on MPA. Previous researchers (Chesky, et al., 2002; Cox & Kenardy, 1993; Kenny, Driscoll, & Ackermann, 2013; Langendörfer et al., 2006; Miller & Chesky, 2004; Nicholson, Cody, & Beck, 2014; Papageorgi et al., 2010; and Wesner et al., 1990) had determined that MPA tends to increase from less public practice and group activities, to more public, solo performances. Not surprisingly, non-music major undergraduates in the present study felt significantly stronger symptoms of MPA related to ensemble concert settings than they did to ensemble rehearsal settings. It is worth noting, however, that 25 non-music major undergraduates reported experiencing more MPA in rehearsal setting than in concert settings. Ensemble conductors may be aware that MPA is a problem for some of their student musicians, but they may assume incorrectly that it is only a factor in concert settings.

Consequences of Grading

The third hypothesis stated that students who are graded for their ensemble participation would experience more MPA than students who are not graded, and this relationship was supported by the results of an independent-samples t-test. Students who received a letter grade demonstrated significantly greater MPA than students who were not graded, but the effect size was small. A poor grade is one of the consequences that might reasonably follow a poor performance; thus students may feel more pressure to perform well and this stress may translate into higher MPA scores. These results are consistent with descriptions of performance anxiety in both the DSM-V (2013) and

Kenny (2011), which indicate evaluation is an important factor in exacerbating MPA. Previous research has also demonstrated that fear of negative evaluation is a significant predictor in MPA (Kenny, Fortune, & Ackermann, 2013; and Nicholson, Cody, & Beck, 2014).

Sex Differences in MPA

Contrary to the fourth hypothesis that female students in the present study would have higher levels of MPA than the male students, sex differences in MPA were not observed. Previous research, for example, Iusca and Dafinoiu (2012), who studied sex differences in MPA in a sample of 130 Romanian undergraduate music students, found that female students had higher levels of MPA overall and a strong and significant negative relationship between MPA and performance quality. Rae and McCambridge (2004) investigated the relationship of MPA to gender in 120 Irish school children (average age 16 years) and also noted that females reported higher MPA than males. Liston et al. (2003) reported a positive correlation between being female and MPA in a sample of 118 undergraduate and postgraduate music performance and music education majors. The critical difference between other studies that have included an analysis of sex and MPA and this one may be that participants in the present study were asked to report on their anxiety relative to concerts and rehearsals with their *current ensemble*. It may be that the lower levels of MPA that tend to occur in ensemble performing (compared to solo performing) reduce the effect of sex on MPA.

Relationship of Self-Efficacy and MPA

The theoretical model of the present study suggested a negative relationship between self-efficacy and risk of developing MPA, leading to the fifth hypothesis, that there would be a negative relationship between self-efficacy and MPA in both ensemble concert and ensemble rehearsal conditions. Results of Pearson product-moment correlations for these students' MPA scores supported this relationship. Rehearsal-specific self-efficacy was strongly correlated with rehearsal-setting MPA, and concert-specific self-efficacy showed a medium strong correlation to concert-setting MPA. The statements used to assess self-efficacy were interpreted as reflecting the discipline- and setting-specific self-efficacy of the respondent.

The results were consistent with Ackermann et al. (2014) who studied 377 Australian professional orchestral musicians. All of the psychological screening tests for anxiety and depression were negatively correlated with the *Core Self Evaluation Scale* (CSE; Judge et al., 2003), "indicating that low self-efficacy is associated with higher psychological morbidity" (p.5). Additionally, previous research by Liston et al. (2003) and McQuade (2008) established self-efficacy as a predictor of MPA.

Depression Indicators and MPA

A significant, robust positive relationship was found between depression indicators and MPA for undergraduates in this sample. Further, there may be quite a few of these musicians for whom additional screening for depression would be advised (according to Whooley et al., 1997). Of all undergraduates, 64 out of 274 who responded (23%) answered in the affirmative to one of the screening questions, and 97 (34.9%)

answered in the affirmative to both screening questions. Whooley et al. recommended that the two-question screen be used "to improve diagnosis of major depression in patients who are at high risk or who present symptoms suggestive of depression" (p. 444). It was expected that a negative response to both questions would make a depression diagnosis very unlikely, as Whooley et al.'s testing found the screen to have a 98% predictive value. The positive predictive value was 33%. If the positive predictive value is applied to the undergraduate students in this study, 33% of 35.6% who answered positively to both screening questions (11.7% of all the undergraduate participants) may be at risk for depression. According to the Anxiety and Depression Association of America, about 6.7% of the US population age 18 and over is affected by major depressive disorder and 1.5% of the US population age 18 and over is affected by persistent depressive disorder, suggesting that the potential rate of depression in these student musicians may be high by comparison.

Kenny et al. (2012) also used the two-question PRIME-MD depression screen in a study of psychological well being in professional orchestral musicians in Australia. Of 376 musicians, 12.8% answered positively to the first screening question, 1.9% answered positively to the second screening question, and 17.4% answered positively to both questions. Students in the present study appear to demonstrate a much higher potential for depression (as measured by the PRIME-MD) than the professional musicians in Kenny et al.'s study.

There are several reasons that might explain this difference in depression rates. One reason could be that professional musicians have self-selected to a higher degree.

Individuals unable to thrive in the musical profession may choose other careers. Further, symptoms may result in audition failures that preclude performance post-schooling. Those who go on to professional careers may have had more time to develop coping skills that aid in the management of MPA and increase their resilience to the stress of performing. The older musicians who have depression or are at risk of depression may also have been under treatment by mental health professionals. Physiological changes and the transition to college life and greater independence can also present new and difficult challenges for students.

Adding complexity to this issue, Wristen (2013) measured rates of depression and anxiety in 287 music majors and minors at a Midwestern state university and determined these rates to be the same as or lower than documented rates in that university's general population. There was a greater tendency among student musicians than non-musicians, however, not to seek treatment on that campus. Examining depression among student musicians and non-musicians at more schools would be useful to ascertain whether depression rates are uniformly high among all students at these schools or whether musicians tend to carry higher rates of depression than non-musicians.

Factor Structure of the K-MPAI-R

The seventh hypothesis posited a similar factor structure for the K-MPAI-R to those found previously by Kenny. Although the factor structure in this study's students (undergraduates and graduates) was not precisely the same as that established with 159 tertiary music and dance students who were attending the National Institute of Creative Arts and Industries, University of Auckland, it was similar. Kenny (2009) found that

> Principal component analysis (with varimax rotation) of the KMPAI revealed three latent factors and 12 underlying factors, as follows: early relationship context comprising generational transmission of anxiety and parental empathy; psychological vulnerability comprising controllability, depression, hopelessness, and trust; and proximal performance concerns comprising somatic anxiety, pre- and post-performance rumination, self/other scrutiny, performance outcome concerns, memory reliability, and commitment to performance. (p. 37)

In the present study, items pertaining to proximal somatic anxiety and worry about performance, which made up the third component of the factor analysis involving the New Zealand students, loaded onto the first component; items pertaining to depression and hopelessness (psychological vulnerability), which made up the first component with the New Zealand students, loaded onto component two; items pertaining to worry and dread with negative cognitions/ruminations focused on both self and other scrutiny, an amalgam of the New Zealand students' components two and eight, loaded onto component three; items pertaining to parental empathy loaded onto component four for both populations; items pertaining to memory loaded onto component five for both populations; items pertaining to generational transmission of anxiety loaded onto component six in this study and component seven for the New Zealand students; items pertaining to scrutiny by others and general anxiety loaded onto component seven, and items pertaining to trust loaded onto component eight. Although the ordering of which items contributed the most variance in scores was different, the top six components in the present study were matched by the top seven components in the New Zealand student

study.

Kenny had also performed a factor analysis of the K-MPAI-R with 357 Australian professional orchestral musicians (Kenny, 2011). The factor structure for that administration of the K-MPAI-R was even closer to what was established by the present study. For both populations the first component was aptly described as proximal somatic anxiety and worry about performance. The second component for the professional musicians was worry/dread, with negative cognitions focused on self and other scrutiny, and this description was found to correspond to the present study's third component. The second component in the present study, depression and hopelessness (psychological vulnerability), was the third component in Kenny's (2011) analysis. Items pertaining to parental empathy and items pertaining to memory, as in the New Zealand student study, loaded onto the fourth and fifth components respectively for the present study and also for that of the professional orchestral musicians. Generational transmission of anxiety was found to describe the sixth component of the factor structure for both the professional orchestral musicians and the present study's students. Components seven and eight (described as anxious apprehension and biological vulnerability for the professional orchestral musicians, and scrutiny by others and general anxiety and trust for the present study's students) however, contrasted with the present study's remaining components. In a comparison of the factor structures obtained for the New Zealand and Australian groups, Kenny (2011) concluded that they were "similar for the six major factors—somatic anxiety, worry/dread, depression/hopelessness (psychological vulnerability), parental empathy, memory and generational transmission of anxiety" (p.

98). The present study confirms the stability of these six factors.

These factors were also recognized within a reduced model by Alzugaray et al. (2015), who administered the 26-item K-MPAI (2004) (translated into Spanish) to 490 Spanish music conservatory students (mean age = 22.62 years). Exploratory factor analysis followed by confirmatory factor analysis resulted in a three-factor model that was deemed a good fit for the sample's data and consistent with Barlow's (2000) model of MPA. The three factors were identified as specific cognitions, associated with stage fright or related to Barlow's specific psychological vulnerability factor; helplessness (including components of depression and uncontrollability), associated with Barlow's general psychological vulnerability factor; and family context, associated with the factor of early interactions and relationships from Kenny's (2009) model. The three subscales were analyzed for reliability and Cronbach's alpha was determined to be 0.786 for the helplessness category, 0.868 for special cognitions, and 0.568 for early relationship context (Alzugaray et al., 2015).

Factor analyses have been performed on other performance anxiety measures. Cheng, Hardy, and Markland (2009) studied 286 participants in a wide range of sport activities and developed a model for sports performance anxiety through confirmatory factor analysis. The model indicated three major processes: cognitive, physiological, and regulatory. Wolfe (1990) used a self-developed Trait Anxiety Scale to measure anxiety in 162 instrumentalists and vocalists. Factor analysis of this scale identified four factors: nervousness/apprehension, arousal/intensity, self-consciousness/distractability, and confidence/competence. Lehrer, Goldman, and Strommen (1990) explored the factor

structure of the Music Performance Anxiety Questionnaire, which had been administered to 238 conservatory, college, church, concert, and part-time professional musicians. A principal components analysis with varimax rotation recovered five factors comprising 49% of the test variance:

1. Planning to cope with anxiety symptoms
2. High standards and a judgmental attitude about performance
3. Worry about anxiety and its effects on performance
4. Concern with the reactions of important others
5. Concern about distraction in oneself and in the audience (p.14).

The studies by Cheng et al. (2009), Wolfe (1990), and Lehrer et al. (1990), were conducted with different anxiety measures than the one used in this study. The populations were also somewhat different, especially the athletes who comprised the sample for Cheng et al. Nevertheless, some commonalities among factor structures can be seen: cognitive issues, especially worry, concern about reactions of others and distractability; physiological issues, described by Wolfe as arousal and by Lehrer et al. as effects on performance; and regulatory issues and how to cope with anxiety. Similar to these are the present study's factors of worry, dread and negative ruminations; proximal somatic anxiety and worry about performance; and scrutiny by others.

Setting and Music Performance Breakdowns

Connected to the hypothesis that students would experience greater levels of MPA during concert conditions than under rehearsal conditions (i.e., that performance setting has an impact on MPA), it was hypothesized that music performance breakdowns

among undergraduate musicians occur more often during solo playing conditions than during ensemble playing conditions. Solo performing has been previously shown to be more anxiety provoking than ensemble performing (Cox & Kenardy, 1993; Kenny et al., 2012; Miller & Chesky, 2004; and Wesner et al., 1990). The hypothesis was supported by data from the present study. Of the students who had music performance breakdowns, more indicated these were associated with solo performance than with ensemble performance. About the same number of students who had music performance breakdowns associated with ensemble performance cited both solo and ensemble conditions as relevant to their music performance breakdowns.

The percentage of students who experienced music performance breakdowns under solo conditions may be greater than the percentage who had breakdowns under ensemble conditions because solo playing can increase the exposure and consequent burden of evaluation felt by musicians. There are no other musicians performing who can provide a distraction from or camouflage of the soloist's mistakes. Additionally, just as the soloist is aware that there is no distraction for the audience from performance mistakes, there is also no distraction (that engaging with other performers can provide) from the soloist's perceptions of MPA symptoms. Stephenson and Quarrier (2005) documented a positive relationship between anxiety sensitivity and performance anxiety. Solo playing may be particularly anxiety triggering for individuals with a significant degree of anxiety sensitivity, as they have nowhere else to focus other than on their own reactions to the stress of performing.

Music Performance Breakdowns and MPA

The present study also corroborated the importance of a sensitizing event in the predisposition of MPA. Osborne and Kenny (2008) analyzed written descriptions of the worst performances of 298 adolescent music students and found that students who reported a negative music performance experience reported higher MPA scores than students who did not report a negative music performance. Students in the present study who reported having had a music performance breakdown were indeed more likely to have higher levels of MPA than students who had denied having had a music performance breakdown (confirming the ninth hypothesis). Osborne and Kenny suggested that exposure to early critical performance evaluations may lead to a specific psychological vulnerability for developing MPA; this appears to be supported by these students' experiences.

Students' Symptoms of MPA

The first research question of the present study was directed at uncovering what kinds of negative symptoms of music performance anxiety, if any, these students experienced. It is possible to get a glimpse of the negative symptoms of MPA these students contend with from their reports of their worst performance experience. Responses to statements on the K-MPAI-R and modified K-MPAI-R also revealed much about the MPA experiences of the students.

Most symptoms were felt more strongly under one performance setting or the other, but some symptoms appeared in the top five symptom-related statements for both performance settings: worry about having played well enough; worry that even with lots

of preparation, mistakes were likely; concern over personal judgment of the strength of the performance; and worry about a negative reaction from the instructor or audience—a concern that would seem to be reflected in this study's findings about the impact of grading on MPA. The only somatic symptom revealed in the top five symptom-related statements was increased heart rate under ensemble concert conditions, although there was evidence that students experience other somatic symptoms (as well as affective and behavioral ones). The cognitive statements showed the most agreement by the greatest number of students. Students experienced worry over bad performances, career success, and the accuracy of their perceptions of the performance, and their worry and nervousness interfered with focus and concentration. Negative cognitions were also found to play a significant role in MPA in Osborne and Kenny's (2008) study of 298 performing arts high school students. The most significant predictor for MPA in these high school students was their trait anxiety scores, followed by the presence of negative cognition.

MPA in Music Majors Versus Non-Music Majors

Undergraduate music majors showed significantly greater levels of total MPA than the non-music majors. This finding was consistent with Osborne et al. (2005), who observed that less advanced students reported lower levels of MPA than more highly trained students. The choice of major, though, did not indicate actual years of experience playing or singing for students in this study. Non-music majors had played their primary instrument (or sung) for an average of 8.83 years and music majors had played their primary instrument (or sung) for an average of 8.88 years. Thus, there was no significant

difference in experience (as measured by years of playing) between non-music majors and music majors.

The reason music majors reported higher levels of MPA might be due to the importance of performing relative to their choice of career, and the consequences of performing poorly. Another possibility may be that non-music majors, who are generally less experienced than music majors, are less equipped to judge performance quality and hence are less critical of their own performing. Osborne and Franklin (2002), in a study of cognitive processes in MPA with a sample of 84 musicians from widely varied backgrounds, found that the performer's sense of the likelihood of a negative evaluation, the consequences of negative evaluation, the discrepancy between the performer's perception of audience standards of performance and perceptions of performance competence in formal performance situations, fear of receiving a negative evaluation, age, and length of time having played solo all significantly predicted MPA scores.

The greatest variance in MPA scores, however, could be attributed to the likelihood of receiving a negative evaluation and the importance of the consequence of that evaluation. Nideffer and Hessler (1978) identified one of the most important factors in predicting MPA to be the importance the performance has for the musician's career. Furthermore, many more music majors received letter grades for their efforts than did non-music majors. The higher incidence of grading among music majors and the importance of performing well has for career aspirations, may therefore account for the greater levels of MPA reported by music majors.

Role of the Director

Another possible factor in the MPA of music majors is the different role the director plays in the development of the musician. Directors of music majors, being aware of these students' career aspirations, may hold more exacting standards for performance than directors of non-music majors. Instructions on how to play or sing passages may be more peremptory (or not given at all) compared with how instructions are offered to non-music majors. Feedback may be less positive and more critical, as the director may be more concerned with improvement than the students' enjoyment of music making.

During administration of the questionnaire, it was observed that the directors of two of the groups with a majority of music majors (and MPA scores at the higher end of the spectrum) were at times quite impatient and held very high expectations for their students. By contrast, one of the directors who did not work with any music majors stressed how important it was for students to feel comfortable and enjoy the rehearsing and performing process. This director's students' scores were among the lowest of the schools. Especially in previous studies involving musicians for whom performance in an ensemble is their main focus (Kenny et al., 2012; and van Kemenade et al., 1995) the conductor was reported as a factor in MPA. Music majors may be more prone to labor under both self-imposed high expectations and the baton of a harsh and demanding conductor, thereby increasing their negative symptoms of MPA.

Performing with Music Majors

Although non-music majors who performed with music majors did demonstrate

higher levels of MPA than those who did not perform with music majors, the difference was not significant. It is worth noting that there were 90 non-music majors who performed with music majors and only 33 who did not perform with music majors. Comparing results from more equal group sizes may have produced different results.

A Comparison of Predictors of MPA

Depression emerged as the strongest predictor of MPA, uniquely explaining 17.1% of the total variance in MPA scores. The comparatively high rates of MPA and scores on the PRIME-MD for students in the present study indicate that students' psychological health should be an important consideration for the educators who come into contact with them. Other variables predicting MPA for this sample were playing versus singing (1.3%, with being an instrumentalist linked to higher levels of MPA), being female or male (1.6%, with being female linked to higher levels of MPA), and having had music performance breakdowns in the past year (1.3%, with having had music performance breakdowns linked to higher levels of MPA than not having had music performance breakdowns). (Experience had also been considered in a preliminary multiple regression analysis, but was not found to contribute unique variance for this sample.)

Comparing these results to those of other analyses, depression was revealed as a predictor of MPA in Kenny et al.'s (2012) examination of professional orchestral musicians, although trait anxiety was the strongest predictor in that sample. Depression was also a predictor in the study of Barbar et al. (2013) of 230 Brazilian amateur and professional musicians (average age = 39). Data from these musicians were subjected to a

logistic regression and of the variables that included general and social anxiety, depression, gender, and type of musician (amateur versus professional), only social anxiety and depression predicted MPA. Barbar et al. determined that musicians with social anxiety were 3.22 times more likely to develop MPA than musicians without social anxiety, and those with depression were 3.87 times more likely to develop MPA than those musicians who were not depressed.

Experience was found to predict MPA in a study of undergraduate and graduate flute students (Kenny et al., 2011) and Biasutti and Concina's (2014) study of 171 advanced conservatory and professional instrumentalists, although it was not a predictor in Kobori, Yoshie, Kudo, and Ohtsaki's (2011) study of 275 professional and amateur Japanese instrumentalists and vocalists. Being male or female, which accounted for a small amount of variance in MPA in the present sample, was also a predictor in Osborne and Kenny's (2008) study of high school performance students, but was not a significant contributor to the model of Kobori et al. or to the analysis by Barbar et al. (2014). Other predictors that have been identified in previous studies include state anxiety (Kenny et al., 2011), trait anxiety (Kenny et al., 2004; Kenny et al., 2012; and Osborne & Kenny, 2008), the presence of negative cognitions (Osborne & Kenny, 2008), social phobia (Kenny et al., 2012; and Nicholson et al., 2014); age (Kenny et al., 2012), performance setting (Kenny et al., 2004), fear of negative evaluation (Kenny, 2011; and Nicholson et al., 2014) coping using social support (Biasutti & Concina, 2014), coping based on avoidance (Biasutti & Concina, 2014; and Kobori et al., 2011), emotion-oriented coping, concern over mistakes, and being a student versus being a professional musician (Kobori

et al., 2011), hours of weekly practice (Biasutti & Concina, 2014), catastrophizing (Liston et al., 2003), and personal/self efficacy (Liston et al., 2003; McQuade, 2008).

Causes of Music Performance Breakdowns

Memory lapse was the most frequent cause of music performance breakdowns, followed by technique loss, anxiety that prevented starting the performance at all, anxiety that prevented continuing a performance, and anxiety that resulted in the cancellation of a performance. That memory lapse was the most frequent cause of music performance breakdowns was consistent with the finding that 30.8% of students somewhat disagreed, disagreed, or strongly disagreed with the statement "I feel confident playing from memory." Technique loss, the second most frequent cause of music performance breakdowns, may be the outcome of any one symptom or combination of cognitive or somatic anxiety symptoms experienced by these students, but may also involve lack of task mastery or tackling repertoire that is beyond their capabilities.

Inside and Outside of School Strategies for MPA

In addition to discussions of MPA in the studio and rehearsal hall, support and encouragement for the student by the teacher, and more frequent performing, many other therapies exist that can help ameliorate MPA. Taborsky (2007) listed some of these in a review of literature on music performance anxiety. They include: cognitive-behavioral, temperature biofeedback training, moderate use of beta-blockers, and more frequent performing.

Sataloff, Rosen, and Levy (1999) discussed the advantages and disadvantages of various types of medical treatment for MPA. Sataloff et al. acknowledged that it is

important for performers to receive training in the management of stress and yet many performers do not receive this training. Antidepressants may be a useful treatment choice for patients with chronic anxiety but prescription of beta-blockers for anxiety remains controversial (Sataloff, Rosen, & Levy, 1999). According to Sataloff et al., because of the negative side effects associated with beta-blockers, such as dryness and effects on heart rate and blood pressure, beta-blockers are generally not indicated for musicians. A reticence to prescribe beta-blockers was also expressed by Manchester (2011) who remarked on the medication's side effects and pointed out that because of the performance "edge" they could provide some people might even consider their prescription to be unethical. Kenny (2011) countered, however, that for the musician whose MPA manifests primarily with somatic symptoms, such as tremors or dry mouth, the correct type and dosage of beta-blockers may relieve symptoms and allow the musician not to perform artificially well, but to perform at optimal capacity.

Cognitive-behavioral therapies have been the focus of several studies of MPA treatments. Kendrick, Craig, Lawson, and Davidson (1982) determined that both behavior rehearsal training and cognitive, attentional training were effective in reducing music performance anxiety. Success at reducing MPA through cognitive therapy was also displayed in a study by Hoffman and Hanrahan (2012). The treatment identified and modified invalid thoughts about musicians' performance. Lee (2002) added that other strategies for coping with music performance anxiety might include systematic desensitization (found effective also in a study by Appel, 1976), acknowledgement of one's autonomy and self-reliance, the power of intense concentration, and the

understanding of performing as a social endeavor that is the combination of the musician and audience functioning together in a friendly community. These therapies can prove especially useful to musicians whose MPA is marked primarily by negative cognitions and for those with poor self-efficacy.

Although many therapies such as cognitive-behavioral (Nagel et al., 1989), temperature biofeedback training, and moderate use of beta blockers (Kenny, 2011) have been shown to reduce MPA, some researchers argue that a treatment plan for many sufferers whose symptoms are not mild, especially those with depression, high trait anxiety, or other comorbid psychological conditions, should include psychotherapy alone or in addition to other therapies. Nagel (2004) asserted that patients and caregivers who seek more immediate and economical solutions to the symptoms of stage fright should not ignore the psychological origins of performance anxiety. In a review of cognitive-behavioral and psychodynamic approaches to MPA, Nagel (2010) continued a defense of the need to consider psychological factors. Nagel (2010) explained, "Looking beneath the neurological and cognitive manifestation of performers' discomfort, one can view performance anxiety as a symptom of unresolved unconscious conflicts buried deeply in the unknowing, outside-of-awareness part of the mind" (p. 144). Nagel (2010) did not deny the value of other therapies in treating MPA. In fact, Nagel (2010) suggested a structured approach to treating performance anxiety that might include biofeedback, exercise, relaxation training, positive self-statements, yoga, meditation, diet, medication, cognitive-behavioral therapy, and psychotherapy.

Intensive short-term dynamic psychotherapy is another treatment option for

musicians with severe, chronic anxiety. Kenny, Arthey, and Abbass (2014) described a case study of a professional musician who had suffered with severe long-term MPA and was successfully treated over 4 months with 10 sessions of intensive short-term dynamic psychotherapy. The origins for this musician's MPA were discerned to dwell in unresolved complex emotions and early attachment problems. Kenny et al. suggested that similar forces might be at work in the moderate to severe MPA of other musicians and recommended the consideration of this type of psychotherapy for those individuals.

Some therapies, such as cognitive-behavioral, psychotherapy, certain types of biofeedback, and pharmacological therapies are administered by therapists and physicians. Other approaches to MPA, especially coping strategies, such as relaxation exercises and visualization, have been guided by music educators (Gratto, 1998; Lehrer et al., 1990; Nideffer & Hessler, 1978). Music educators can also provide additional performing practice opportunities such as audition workshops. Gratto (1998) examined the effectiveness of participating in an audition anxiety workshop that gave students coping ideas, a chance to disclose their anxiety, and extra practice in auditioning as ways to reduce stress. The pre-workshop survey indicated that audition anxiety had been at least frequently experienced by 44% of the students and occasionally experienced by 53% of the students. Of the 11 students who completed the final survey, 64% reported feeling somewhat more relaxed and comfortable at auditions after the workshop and 27% reported feeling much more relaxed and comfortable (Gratto, 1998). Audition anxiety workshops and relaxation and visualization techniques may not address all of the needs of the musician with severe MPA, but they are relatively easily utilized by most music

educators and have the potential to increase the performing comfort of the mildly to moderately anxious student.

Just as audition workshops could prove useful to reducing musicians' performance anxiety, some educators have thought that an entire class on musician health may also be helpful in reducing music-related stress. Zander et al. (2010) carried out a study with students from the School Music Certified Music Teacher and Artistic Training programs at University of Freiburg Germany to investigate if a course on health promotion and problem prevention had a salutary effect on student health. The results of the study indicated that the students who enrolled in the course had significantly fewer psychological problems than students in the comparison groups. In fact, the incidence of psychological problems went down between the first and second measurements for the artistic training students in the intervention group and went up for the same type of students in the comparison group. The success of the course in ameliorating psychological problems was attributed to how the course curriculum was structured (covering relaxation techniques, strategies for coping with stage fright and stress, etc.), and to the effectiveness of the instructor. Zander et al. stated, "She endeavored to build a personal relationship with the students and was interested not only in their performance as students but also their overall well-being" (p. 62).

Music schools may take an even more multi-pronged, global approach than a workshop or class to helping music students with MPA. Nideffer and Hessler (1978) described some then innovative programs at the Eastman School of Music designed to help students cope with performance anxiety. At Eastman, students were given the

researchers' Test of Attentional and Interpersonal Style (TAIS) designed to reveal how the students perceived and responded to performance pressure. The results were shared with the students' teachers so teachers could tailor responses to individual needs. Students were also invited to have one-on-one private conversations about stress concerns with teachers. The researchers recommended pre-testing, as with the TAIS, so the faculty member dealing with the student has some forewarning of potential issues. Eastman has experimented with programs that combine relaxation, biofeedback, visualization, and replacement of negative thoughts and attitudes with positive ones. It was the authors' conclusion that these programs improved performance outcomes and were accepted and regarded favorably by both faculty members and students.

Limitations and Suggestions for Future Research

Geographical.

One limitation of the present study is that sampling only occurred in the mid-Atlantic region of the US. There were differences in MPA scores between Australian musicians and this study's participants, and testing in other regions of the US might indicate whether these differences are nationwide or restricted to the mid-Atlantic. Also, the focus of this study was on MPA experienced by non-music major undergraduate ensemble musicians in rehearsal and concert settings, but data from music major undergraduates and graduate students were examined to provide context for the non-music major undergraduate students' results and to offer other researchers and readers additional information about all of the students in the sample. Optimally there would have been nearly equal numbers of undergraduate and graduate students for these

comparisons. The number of graduate students was relatively small (n = 23), however, compared with undergraduate students (n = 178). Conducting the tests that involved all students with a greater number of graduate students might have yielded different results.

Self-efficacy testing.

Additionally, out of concern for student test-taking fatigue and the necessity of limiting the overall time students would be engaged in responding to the questionnaire during their rehearsals, a separate instrument to test self-efficacy was not used. Based on the analysis of answers to the self-confidence statement in the K-MPAI, however, further study of self-efficacy and how self-efficacy functions within the theoretical model of MPA is warranted. Bandura's theory of self-efficacy (1986) provides a possible explanation for the moderating effect of self-efficacy on MPA.

Self-efficacy theory is a part of Bandura's (1986) social cognitive theory, an extensive model that seeks to explain all human behavior. According to Bandura (1982), "Perceived self-efficacy is concerned with judgments of how well one can execute courses of action required to deal with prospective situations" (p. 122). Bandura (1986) also stated, "Among the types of thoughts that affect action, none is more central or pervasive than people's judgments of their capabilities to deal effectively with different realities" (p. 21). This statement highlights the importance of self-efficacy to behavior. Bandura (1986) cited other factors that affect behavior, including genetic and physiological traits.

Bandura (1986) described phobias as often oriented around events or agents that are relatively unpredictable and could cause harm. Some phobias, however, are related to

fear over one's own actions, their unpredictability or untrustworthiness, and the potential for injuring oneself or someone else (Bandura, 1986). Related to phobias are debilities or anxieties that derive from "perceived inefficacy to control oneself or from brief lapses in one's mental functioning" (Bandura, 1997, p.31). Bandura (1997) expounded that performers may be afraid that they cannot control mental and physical functions well enough to produce a good performance, and stated, "Otherwise skilled actors may regard themselves as vulnerable to forgetting their lines, singers their lyrics, and concert soloists passages in their musical selections" (p. 321). Behavior, including music performance, is regulated by people's internal standards, self-evaluation, and self-efficacy beliefs (Bandura, 1986).

Bandura (1986) put forth that knowledge, skill, and the ability to translate knowledge into action are all insufficient for optimal performance without self-referent thought, or the belief that the individual has some control over what will happen. The belief in the ability to shape performance springs from perceived self-efficacy (Bandura, 1986). Consequently, Bandura (1997) explained, "People experience anxiety when they perceive themselves as ill equipped to manage potentially injurious events" (p. 153). In fact, studies of athletes have shown that perceived self-efficacy is a predictor of anxiety, regardless of how naturally anxiety prone the individual may be (Bandura, 1986).

Perceptions of self-efficacy will affect not just anxiety, but generally what people choose to do (Bandura, 1986). It is unlikely people will attempt something at which they believe they will fail. This can be self-limiting and may stifle development. The self-limiting nature of low perceived self-efficacy might be, for example, a factor in the

decision of a student not to pursue a career in music or even to progress to higher profile, yet still avocational performing opportunities.

Individuals who believe they will succeed at a task— who have strong self-efficacy beliefs— are also more likely to expend more and persistent effort when faced with challenges to completing that task (Bandura, 1986). Bandura (1986) described those with low self-efficacy as tending to dwell on their deficiencies and seeing the deficiencies as greater than they actually are. This can create stress and distract them from using competencies that they do, in fact, possess. Some conditions; though, may stymie performance even when self-efficacy is high. These include a) lack of incentives, b) lack of proper equipment or resources to do the task, and c) other physical or social constraints (Bandura, 1986).

Bandura (1986) described four sources of information that help form self-efficacy: performance achievements, vicarious experiencing through observing others' work, persuasion by others relating to one's capabilities, and physiological states. Bandura pointed out that people who increase self-efficacy through perseverance and/or repeated success in the performance of a given task may find their self-efficacy increase for related tasks as well. Vicarious experience can have the most power to influence self-efficacy when the individual has little experience with the task being considered and people often decide how good they are at a task by comparing their performance to the performances of others (Bandura, 1986). The third source of information, persuasion by others, has the most effect on self-efficacy when it comes from a trusted and credible agent (Bandura, 1986). Bandura emphasized that, optimally, the persuader should be

viewed as a knowledgeable expert and a skilled judge. Bandura added that related to the influence of persuasion by others, societal and cultural expectations of ability and performance can be very powerful. Finally, physiological states affect self-efficacy when feelings of fatigue, windedness, clumsiness, and so on are interpreted as signs that the performer is not very good at the task and that the physical strength or stamina to be successful is lacking (Bandura, 1986). (This misinterpretation by the performer may be identified as anxiety sensitivity by other researchers.)

Bandura (1986) continued by saying feelings of fear may also affect self-efficacy perceptions and people can be led to understand "their somatic arousal in stressful or taxing situations as ominous signs of vulnerability to dysfunction" (p. 401). Fear or anxiety can lessen self-efficacy expectations and the tension, shaking and visceral agitation that may accompany high arousal can further debilitate performance (Bandura, 1997). This can lead to a cycle of anticipatory fearful reactions that do indeed cause dysfunction, further reducing the sense of self-efficacy (Bandura, 1986).

Considering the four sources of information that form self-efficacy in Bandura's (1986) theory of self-efficacy, non-music majors may be at a disadvantage because they may generally have had relatively few performance achievements and they may not have had ample opportunity to vicariously observe and learn from others' work. If they do not have a private teacher they may have missed out on receiving persuasion from a trusted expert that they are indeed capable musicians. If they do not practice very much, they may be more prone to threatening feelings of fatigue and other physiological manifestations of suboptimal technique or little stamina. Furthermore, if non-majors are

performing alongside majors in the same ensemble, they may compare themselves to their more experienced peers, find themselves lacking, and experience a diminishment of self-efficacy. Measuring self-efficacy via an instrument that was developed and validated expressly for this purpose, and including an investigation of how the four sources that form self-efficacy may be at work in undergraduate non-music majors would increase understanding of the interaction between self-efficacy and MPA in this population.

Other potential factors of MPA.

This study also did not include other factors that have been shown to be relevant to MPA, such as social support (Schneider & Chesky, 2011), trait anxiety—which is anxiety proneness in the individual and the tendency to perceive events as dangerous or threatening (Spielberger, 1972) (Alderman et al., 1989; Cox & Kenardy, 1993; Liston et al., 2003; and Kokotsaki & Davidson, 2003), anxiety sensitivity—which is the sensitivity to, or the fear of particular bodily sensations (Stephenson & Quarrier, 2005), psychoticism– marked by lack of empathy, lack of sensitivity toward others, and lack of care for other people (Rae & McCambridge, 2004), neuroticism—having the characteristics of moodiness, touchiness and anxiousness (Eysenck & Rachman, 1965) (Rae & McCambridge, 2004; Steptoe & Fidler, 1987), catastrophizing—the exaggeration of imagined consequences of some relatively minor performing error, accompanied by fearing loss of control (Brugués, 2011b; Liston et al., 2003; Steptoe & Fidler, 1987; Zinn et al., 2000) music difficulty (Appel, 1976; Langendörfer et al., 2006; van Kemenade et al., 1995), practice and preparation (Fehm & Schmidt, 2006; Kenny et al., 2013; Taborsky, 2007), and past experience (in addition to music performance breakdowns)

(Kenny 2011, Kenny et al., 2014; Kenny & Osborne, 2006; Montello, Coons, & Kantor, 1990; Nagel, 2004, 2010; Osborne and Kenny, 2008; and Plaut, 1988).

Conclusion

With regard to MPA, there is indeed some safety in numbers. Students were much more likely to experience a music performance breakdown under solo conditions than under ensemble conditions. In addition, the ensemble performance setting did make a difference in the MPA of these students. On the whole, non-music major undergraduates experienced greater MPA during concert conditions than rehearsal conditions. There were some students whose MPA was greater during rehearsals than during concerts, but mean rehearsal-setting MPA for all non-music major undergraduates was about 84% that of mean concert-setting MPA. One of the most remarkable findings of the study was that these students' K-MPAI scores were substantially higher than the scores of other populations that have been measured with the K-MPAI. Therefore, although there may be relative safety in performing with groups, ensemble rehearsing and performing was by no means free of anxiety for these students. It would be valuable to know if these results were replicable in other groups of American musicians.

Almost all non-music major undergraduates reported at least some symptoms of MPA. Non-music major undergraduate musicians experienced somatic symptoms, such as shaking, dry mouth, nausea, and increased heart rate and muscle tension. They also reported affective symptoms, such as panic and feelings of dread, and behavioral symptoms, such as not being able to sleep and avoiding performances. In general the most widely felt symptoms centered on negative cognitions. Students were worried about

evaluations and negative reactions, they doubted their perceptions of their performance quality, and replayed performances afterward over and over in their minds. Music performance breakdowns were also more often the result of the cognitive effects of MPA. Memory lapse was the most serious issue contributing to undergraduate musicians' music performance breakdowns, and these breakdowns tended to happen more often during solo conditions than during ensemble performing conditions.

Music majors reported higher levels of MPA than non-music majors, suggesting that the career concerns and expectations by self and by directors of music majors might contribute more strongly to MPA than potential lack of training and less developed coping skills contribute to the MPA of the non-music majors. Music majors were also graded more frequently for their ensemble participation than were non-music majors, and being graded was found to correlate with higher levels of MPA. It was speculated that non-music majors who perform with music majors might have more MPA during those performances, but while these non-music majors demonstrated higher levels of MPA than non-music majors who did not perform with music majors, the difference was not significant. Higher degrees of self-efficacy were associated with lower levels of MPA, both in rehearsal and concert settings.

The symptoms of MPA are varied and present significant concerns to students. Students related being filled with nervous apprehension before performing, shaking before it was time to perform, having memory lapses, feeling terrified, and being overwhelmed by all the stresses of school and of performing. The MPA and risk of depression documented by both music majors and non-music majors in this study

provides validation for a curriculum that includes discussions of MPA and health for all musicians.

The first step to helping students, however, is problem awareness. Some students' distress may be patently obvious to the observer, but other students may be skilled at concealing the negative thoughts, emotions, and performance threatening somatic effects of MPA. The teacher's awareness of students' MPA can be developed through the administration of a self-styled diagnostic instrument like the Eastman School of Music Test of Attentional and Interpersonal Style; through the use of the K-MPAI-R (Kenny, 2009), which has well-established reliability and validity; or through some other means, such as the core self-evaluation, recommended by Kenny (2011) as a promising new tool for understanding MPA. Another route to identifying the existence of a problem may be as simple as teacher-student conferences, during which the director/teacher and the student have a discussion about the student's comfort with performing. This kind of discussion is something any music educator can do, and costs nothing more than the time spent with the student.

Education of the music educator about red flags and symptoms of MPA, depression, and other psychological disturbance is also a practical necessity. Music education program planners would be wise to include a class on performers' health in their students' curricula. Teachers and directors may be able to locate workshops and seminars concerned with MPA and student health scheduled during professional conferences. All teachers could benefit from having lists of mental health providers and services for students at their fingertips. Directors and educators need to be aware and

prepared to deal with their students' MPA. They should also be alert to other symptoms of psychological distress and be immediate in offering a referral to a mental health professional, or in offering MPA-reducing strategies, such as relaxation, preparation, and more performing opportunities.

Educators also must be sensitive to how they might be adding to their students' MPA. Some students described a poor playing experience, a harsh reaction from the director, and the negative effect it had on subsequent playing. According to this study's model of MPA, these kinds of transactions have the potential to diminish self-efficacy and create specific psychological vulnerability, predisposing the musician to more MPA, and negatively affecting performance quality and enjoyment. Directors may use tough feedback to spur a student into trying harder or to make a strong and memorable correction. But directors must never forget that the harsh word administered to improve performance may ultimately sabotage it.

Appendices

Appendix A: K-MPAI_Modified

You must be at least 18 years old to respond. Please check or circle your response, or provide information as requested. Your answers should be about the ensemble you have immediately after taking this questionnaire.
Thank you!

Today's Date: _____ / _____ / _____(month/day/year)

1. Sex…… ☐ Male

☐ Female

2. Age…… _____

3. Do you play or do you sing in this ensemble? …… ☐ Play

☐ Sing

4. If you play an instrument (or instruments) in this ensemble, which do you play? ……
1. _____
2. _____

5. Years spent playing the instrument(s) or singing: ……
1. _____
2. _____

6. Is music your declared major area of study? ……..……..…… Yes No

7. Do you perform with music majors in this ensemble? …….. Yes No Unsure

8. Is your performance for this ensemble graded? …… Yes No

9. What is the date of your next important/graded concert with this ensemble? .....
_____ / _____ / _____
(month/day/year)

☐ I do not plan to perform in a concert with this ensemble

10. Have you ever experienced a music performance breakdown in which you had a memory lapse, a loss of technique, or anxiety so severe that you could not begin or continue with your performance? ……

Yes

If Yes, continue to Question 11

No

If No, continue to Question 14

11. If you answered "yes," was this a solo or ensemble performance? ……

☐ Solo ☐ Ensemble

12. If you answered "yes," which of the following statements best describes your situation? Number the issues in order of relevance to your performance breakdown. Place a "1" in the box next to the most serious issue that resulted in your performance breakdown, a "2" in the box next to the second most serious issue that resulted in your performance breakdown, and so on. Only number boxes that are relevant to this performance……

☐ Memory lapse that stopped your playing

☐ Loss of technique or control that stopped your playing

☐ Pre-performance anxiety so severe that you could not continue a performance

☐ Pre-performance anxiety so severe that you could not start a performance

☐ Pre-performance anxiety so severe that you had to cancel a performance in advance

☐ Other. Please describe in the space below:

13. If you answered "yes," how many times have you had any of these experiences in the past 12 months? … _____

14. Please describe your worst performance experience in as much detail as you can remember [type of event, size and type of audience, solo or ensemble performance, preparation for performance, what happened just before and during the performance, what happened afterward, etc.]:

15. During the past month, have you often been bothered by feeling down, depressed, or hopeless? ……. Yes No

16. During the past month, have you often been bothered by little interest or pleasure in doing things? ……. Yes No

Below are some statements about how you feel generally. Please circle one number to indicate how much you agree or disagree with each statement.

		Strongly disagree						Strongly agree
K_1	I generally feel in control of my life	6	5	4	3	2	1	0
K_2	I find it easy to trust others ...	6	5	4	3	2	1	0
K_3	Sometimes I feel depressed without knowing why	0	1	2	3	4	5	6
K_4	I often find it difficult to work up the energy to do things.....	0	1	2	3	4	5	6
K_5	Excessive worrying is a characteristic of my family ...	0	1	2	3	4	5	6
K_6	I often feel that life has not much to offer me.....	0	1	2	3	4	5	6
K_8	I find it difficult to depend on others.....	0	1	2	3	4	5	6
K_9	My parents were mostly responsive to my needs	6	5	4	3	2	1	0
K_13	I often feel that I am not worth much as a person	0	1	2	3	4	5	6
K_19	Sometimes I feel anxious for no particular reason	0	1	2	3	4	5	6
K_20	From early in my music studies, I remember being anxious about performing	0	1	2	3	4	5	6
K_23	My parents almost always listened to me	6	5	4	3	2	1	0
K_24	I give up worthwhile performance opportunities ...	0	1	2	3	4	5	6
K_27	As a child, I often felt sad	0	1	2	3	4	5	6
K_29	One or both of my parents were overly anxious…….……	0	1	2	3	4	5	6

K_31	I often feel that I have nothing to look forward to	0	1	2	3	4	5	6
K_33	My parents encouraged me to try new things	6	5	4	3	2	1	0
K_38	I am concerned about being scrutinized by others ……	0	1	2	3	4	5	6

Below are some statements about how you feel **before or during a rehearsal or a performance**. Please circle one number in the REHEARSAL column and one number in the PERFORMANCE column to indicate how much you agree or disagree with each statement.

		Responses for REHEARSAL							Responses for PERFORMANCE						
		Strongly disagree						Strongly agree	Strongly disagree						Strongly agree
K_7	Even if I work hard in preparation for a rehearsal/performance, I am likely to make mistakes….	0	1	2	3	4	5	6	0	1	2	3	4	5	6
K_10	Prior to, or during a rehearsal/performance, I get feelings akin to panic...	0	1	2	3	4	5	6	0	1	2	3	4	5	6
K_11	I never know before a rehearsal/concert whether I will perform well……..…	0	1	2	3	4	5	6	0	1	2	3	4	5	6
K_12	Prior to, or during a rehearsal/performance, I experience dry mouth……...	0	1	2	3	4	5	6	0	1	2	3	4	5	6
K_14	During a rehearsal/performance I find myself thinking about whether I'll even get through it……...	0	1	2	3	4	5	6	0	1	2	3	4	5	6
K_15	Thinking about the evaluation I may get interferes with my performance……	0	1	2	3	4	5	6	0	1	2	3	4	5	6

K_16	Prior to, or during a rehearsal/performance, I feel sick or faint or have a churning in my stomach…	0	1	2	3	4	5	6	0	1	2	3	4	5	6
K_17	Even in the most stressful rehearsal/performance situations, I am confident that I will perform well…	6	5	4	3	2	1	0	6	5	4	3	2	1	0
K_18	I am often concerned about a negative reaction from the instructor or listener/ audience……..	0	1	2	3	4	5	6	0	1	2	3	4	5	6
K_21	I worry that one bad rehearsal/performance may ruin my career ……	0	1	2	3	4	5	6	0	1	2	3	4	5	6
K_22	Prior to, or during a rehearsal/performance, I experience increased heart rate like pounding in my chest…….……	0	1	2	3	4	5	6	0	1	2	3	4	5	6
K_25	After the rehearsal/ performance, I worry about whether I played well enough…….……..	0	1	2	3	4	5	6	0	1	2	3	4	5	6
K_26	My worry and nervousness about rehearsal/ my performance interferes with my focus and concentration.	0	1	2	3	4	5	6	0	1	2	3	4	5	6
K_28	I often prepare for a rehearsal/concert with a sense of dread and impending disaster……..	0	1	2	3	4	5	6	0	1	2	3	4	5	6
K_30	Prior to, or during a rehearsal/performance, I have increased muscle tension …	0	1	2	3	4	5	6	0	1	2	3	4	5	6
K_32	After the rehearsal/ performance, I replay it in my mind over and over ...	0	1	2	3	4	5	6	0	1	2	3	4	5	6
K_34	I worry so much before a rehearsal/performance, I cannot sleep ……	0	1	2	3	4	5	6	0	1	2	3	4	5	6

K_35	When performing without music, my memory is reliable. ……	6	5	4	3	2	1	0	6	5	4	3	2	1	0
K_36	Prior to, or during a rehearsal/performance, I experience shaking or trembling or tremor ……..	0	1	2	3	4	5	6	0	1	2	3	4	5	6
K_37	I am confident playing from memory……	6	5	4	3	2	1	0	6	5	4	3	2	1	0
K_39	I am concerned about my own judgment of how I will perform……	0	1	2	3	4	5	6	0	1	2	3	4	5	6
K_40	I remain committed to performing even though it causes me great anxiety……	0	1	2	3	4	5	6	0	1	2	3	4	5	6

Appendix B: Consent Form/Information Cover Letter

Music performance anxiety—anxiety that musicians feel associated with performing music, whether in rehearsals or in concerts—can be a troubling condition. It has the potential to diminish both performance quality and enjoyment of music making. The purpose of this research study is to investigate the prevalence and nature of negatively experienced music performance anxiety in undergraduates who perform in ensemble rehearsals and concerts. I am a doctoral student at Boston University and this research study is part of my dissertation work.

The data for the study will be collected through the attached survey. Participation is completely voluntary. Please be confident that your decision to participate or not to participate in this study will not affect your grade. Participation will have no effect on your relationship with your instructor, the department, or your school. If you decide to participate, you may stop filling out the survey for any reason at any time The survey should take between ten and fifteen minutes for you to fill out. Be assured that your name will not be associated in any way with the research findings and only I will see the responses. If you prefer not to participate, you can read an excerpt of my dissertation proposal that explains the possible factors that contribute to music performance anxiety. (If you decide to take the survey, you can still read this excerpt after you finish or take it with you when you leave.)

There are no known risks associated with responding to this survey and results of the study may be beneficial to the learning experiences of students like you who play and/or sing in a school ensemble. In addition to the potential future benefit for students like you, I am donating $1 to Play On, Philly!, a charitable organization that brings music to students in Philadelphia, for each student that participates in the study. The website for Play On Philly (www.playonphilly.org) says about the mission,

> Play On, Philly! (POP) is an innovative education and social initiative that provides opportunities for personal development to children through the study of music. Inspired by the social development and music education program of Venezuela called El Sistema, POP seeks to enrich the lives of Philadelphia youth by providing daily musical instruction in communities that have little access to music education.

Additional forms of this information page are available if you wish to keep a copy. You may also obtain further information about your rights as a research subject by calling the Boston University CRC IRB Office at 617-358-6115.

Please feel free to ask me, my advisor, and/or your instructor any questions you might have. My email address is k.robson@usciences.edu and my office phone is 215-596-7542. My advisor is Dr. Dianna Kenny and her email address is dianna.kenny@sydney.edu.au. I would be very happy to share my research findings with you!

Thank you so much for participating.
Kim Robson, MM

Assistant Professor of Music
Department of Humanities
University of the Sciences
DMA Student, Boston University
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Appendix C: Email Invitation For Directors

Dear Professor _____,

I am a DMA student at Boston University and my dissertation research investigates the prevalence and nature of negatively experienced music performance anxiety in nonmusic major undergraduates who perform in music performance ensembles. In order to achieve meaningful results, I would like to include as many students as possible in the study and I am asking you to consider allowing your students the opportunity to respond to some questions about music performance anxiety. As an active ensemble director myself (at the University of the Sciences in Philadelphia), I know how precious rehearsal time is at all times of the semester. I hope, however, that information about music performance anxiety, which can significantly impact both the quality of life and performance quality of our students, is of sufficient concern to you that you might agree to students taking a short amount of time to respond to this survey. The survey should only be distributed to groups that contain nonmusic majors, or a mix of music majors and nonmusic majors.

If you allow your students the opportunity to participate, this is what you can expect to happen:

1. I will pass out consent forms and surveys to your students at the beginning of a rehearsal, sometime in the final three to four weeks of the semester.

2. Students may choose to participate or not.

2. Students will need a pencil or pen to respond to the survey (which I can provide).

3. The time needed for filling out these forms is about fifteen minutes.

4. I will collect the surveys and happily share results with you and your students.

Rest assured that your students will be under no pressure to participate and responses will remain anonymous. If you would like your ensemble students to have the chance to be part of this study, please let me know the most convenient time for me to visit _____to distribute the surveys. Please also let me know the size of the ensemble and if it includes both music majors and nonmusic majors, or only nonmusic majors. Thank you for your time and consideration. I look forward to hearing from you soon.

Sincerely,

Kim Robson, MM
Assistant Professor of Music

Department of Humanities
University of the Sciences in Philadelphia
DMA Student, Boston University
215-596-7542 k.robson@usciences.edu

Appendix D: **Instruments Played by Undergraduate and Graduate Students**

Instrument	Undergraduate	Graduate
alto saxophone	1	0
bass trombone	0	1
bassoon	3	1
cello	12	2
clarinet	4	2
cymbals	1	0
double bass	8	0
flute	9	1
French horn	8	0
guitar	1	0
harp	1	0
oboe	5	1
percussion	7	0
piano	6	0
saxophone	1	0
timpani	0	1
trombone	6	1
trumpet	6	1
tuba	2	0
viola	15	6
violin	42	5
voice	140	0

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