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Performance Anxiety: A Longitudinal Study of the Roles of Personality and Experience in Musicians

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Abstract

Severe anxiety may impair functioning in diverse endeavors such as public speaking, athletics, test-taking, sexual relations, and artistic performance. We extend previous research on performance anxiety to explore the role of higher-order and primary personality traits and years of training on performance anxiety in musicians, prospectively and over repeated observations. Personality was assessed with the Multidimensional Personality Questionnaire, and experience sampling was used to collect repeated measures of anxiety just prior to musical performances of varying type and importance. Multilevel analysis, controlling for known covariates, indicated that Negative Emotionality predicted more than 50% of individual differences in music performance anxiety. An interaction showed that performance anxiety associated with personality disposition was offset by years of formal training. Performance anxiety decreased over successive performances under varying circumstances, suggesting that the diary format of self-monitoring may have therapeutic potential.

Keywords

personality, anxiety, hierarchical linear modeling/multilevel modeling, longitudinal methodology, temperament, emotion

Deri (1962) quotes a young student who describes the subjective experience of stage fright or "music enemy number one": "The platform does something to me. The vacuum up there seems to suck the marrow out of my bones, to numb my fingers and, worst of all, to put my memory out of commission" (p. 94). As the quote graphically illustrates, performance anxiety may be a serious impediment for musicians. Indeed, stage fright is a serious problem for many performers at all ages and levels of experience from childhood (Ryan, 2005) to adolescence (Fehm & Schmidt, 2006) and in professional life (Kenny, 2006).

From a clinical perspective, music performance anxiety (MPA) at severe levels may meet diagnostic criteria for social anxiety disorder (American Psychiatric Association, 1994) and may conform to a distinct subtype of social phobia similar to public speaking anxiety (Blöte, Kint, Miers, & Westenberg, 2009). However, for the purposes of the present study we take a psychometric approach, considering personality traits and affective states as dimensional constructs consistent with a continuum of severity model (see Rettew, 2000).

Previous research has found trait-like personal characteristics to be associated with performance anxiety, including perfectionism (Stoeber & Eismann, 2007), catastrophic thinking and Neuroticism (Steptoe & Fidler, 1987), trait anxiety and social phobia (Cox & Kenardy, 1993), and performance importance (Baumeister & Showers, 1986). Our aim was to investigate the basic, broad-based personality underpinnings of MPA, measured comprehensively and prospectively. We chose methodology designed to incorporate repeated measures of MPA while accounting for multiple covariates at both the performance and performer levels.

Anxiety: States and Traits

Factor-analytic work has shown that variance in discrete emotions (Izard, 1972) and basic affect reflects two independent factors: Positive Affect (PA) and Negative Affect (NA) (Costa & McCrae, 1980; Watson, Clark, & Carey, 1988; Watson, Clark, & Tellegen, 1988a; Watson & Tellegen, 1985; Watson, Wiese, Vaidya, & Tellegen, 1999). A commonly used measure of performance anxiety, conceptualized as state anxiety, is the State Trait Anxiety Inventory A-State Scale (A-State; Spielberger, Gorsuch, & Lushene, 1970). The A-State is highly correlated with general NA but is also inversely related to PA, thus lacking adequate discriminant validity (Watson & Clark, 1984). Transient or state anxiety is a multidimensional

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construct but is generally independent of PA (Watson & Clark, 1984).

Factor analysis of mood questionnaires demonstrates that PA and NA are multifaceted states, subsuming a variety of lower order discrete emotions. Anxiety is the core emotional marker of high NA (Tellegen, 1985; Tellegen, Watson, & Clark, 1999; Watson, Clark, & Carey, 1988), with pure-emotional descriptors including "upset" and "fearful." However, as markers of temperament, states of PA and NA also include interpersonal components (Tellegen et al., 1999). The social-interpersonal aspects of NA are captured by descriptors such as "ashamed" and "guilty." The basic features of state anxiety "include a *feeling* of fear, a *wish* to escape, and a *perception* of impending harm appraised as virtually inescapable. We call this 'state anxiety,' and define 'trait anxiety' as proneness to experience this state in daily life" (Tellegen & Waller, 2008, pp. 268-269).

Personality

PA and NA are differentially related to the basic higher order personality traits of extroversion and Neuroticism (or Negative Emotionality [NEM]) (Costa & McCrae, 1980; Tellegen, 1982). Tellegen and Waller (2008) recently reported a three-factor model of personality operationalized in the Multidimensional Personality Questionnaire (MPQ). The three-factor model is based on NEM, Positive Emotionality (PEM), and Constraint (CON) (Tellegen, 1985). The NEM and PEM domains are explicitly temperamental, incorporating dispositions to experience positive and negative emotions. Two primary scales, Wellbeing and Stress Reaction, represent counterparts to PA and NA, within NEM and PEM, respectively. PEM is associated with the primary traits of Wellbeing, Social Potency and Achievement (agency), and Social Closeness (communion). NEM is related to broad individual differences in stress reactivity, mood, and self-concept, essentially a stable disposition to experience Negative Affect across both nonstress and overtly stressful situations (Watson & Clark, 1984). NEM is associated with the primary traits of Stress Reaction (SR) and Alienation (AL) (estrangement) and less strongly with Aggression. SR is the most salient "pure-emotional" marker of NEM, related to individual differences in the frequency and intensity of negative emotional states such as anxiety, anger, distress, and guilt feelings in everyday life. AL reflects the social-interpersonal disposition to experience the world as malevolent and to believe one has been betrayed, used, and deceived by others (Tellegen & Waller, 2008).

The Present Study

Perceived stress correlates positively with intraindividual fluctuations in NA (Watson, 1988). We hypothesized that the broad personality domain of NEM and its subscales SR and AL would predict *in situ* MPA operationalized as NA. Our aim was primarily to examine the lower order factors driving an expected association between dispositional NEM and self-rated state NA. We predicted that SR would be sensitive to the affective component of performance anxiety and that AL would also predict anxiety in the public performance context. Related to the two-factor model of affect described above, we predicted that neither PEM nor any of its subscales would be associated with MPA. That is, high-NEM musicians would not necessarily show low PEM.

Previous research has shown that performance experience and years of instrumental or vocal study are negatively associated with performance anxiety (Kokotsaki & Davidson, 2003; Salmon, Schrodt, & Wright, 1989; Wolfe, 1989). We revisited this variable to test the predictive power of training and experience on performance anxiety over repeated measures. We predicted that additional performance experience and training, defined as years of instrumental or vocal study, would be negatively associated with performance anxiety. We also examined intraindividual change in anxiety to explore the effect of self-monitoring through diaries on the experience of performance anxiety over an extended period of observation. Several studies have found that females report significantly higher MPA than males (e.g., Osborne & Franklin, 2002); however, we made no predictions based on sex because of our modest sample of predominately female musicians.

Method

Participants

Undergraduate music performance majors were recruited on a rolling basis through visits to all music performance courses and ensemble practices and notices posted in music rehearsal spaces. Forty-three students completed the baseline assessment; however, six participants failed to continue in the study, leaving a sample of 37 (73% female; mean age = 20 years, SD = 1.3 years). We used nonparametric Wilcoxon rank sum tests due to unequal sampling variance in the two groups. There were no significant differences between dropouts and the final sample in demographics or personality scores (all $p > .14$). Participants were compensated for their participation with feedback on their personality results and a gift card worth $20.

Measures

Personality. Participants completed the MPQ (Tellegen & Waller, 2008), a broad-based personality inventory composed of 276 dichotomous mostly true-false items. The MPQ measures 11 primary traits, 10 of which load on three higher order factors: PEM, NEM, and CON, as described previously. The MPQ is widely used in personality research and has demonstrated excellent psychometric properties, with a median alpha coefficient of .85 and 1-month test-retest correlation of .89. The primary scales are relatively independent ($r = .00$ to .48, $M = .16$) (Tellegen, 1982). Although designed as a normal personality inventory, the MPQ has shown relevance to clinical assessment (DiLalla, Gottesman, & Carey, 1993; DiLalla, Gottesman, Carey, & Vogler, 1993) and has been shown to be

Table 1. Descriptive Statistics for the Study Sample

	Mean (*SD*) or Percentage
Age	20 (1.3)
Female	73%
Diaries submitted	13.7 (3.1)
Years of study	8.0 (4.1)
Instrument	
Orchestral	47%
Vocal	39%
Piano/organ	14%
Performance type	
Solo	56%
Small ensemble	17%
Large ensemble	27%
Audience	
Instructor only	30%
General public	40%
Fellow students	21%
Professional jury	9%
Memory	
From memory	30%
From score	56%
Unspecified	15%

particularly sensitive to variables with affective content (Witt & Donnellan, 2008).

Performance anxiety and covariates. Single-page "diaries" were used to index performance anxiety with the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988b) using the NA subscale with moment instructions: "Indicate to what extent you are feeling this way right now, that is, at the present moment." The NA mood terms are *distressed, upset, hostile, irritable, scared, afraid, ashamed, guilty, nervous*, and *jittery*. Respondents rate the extent to which they experienced each mood term on a 5-point scale (*very slightly or not at all* to *very much*).

Based on previous research, we chose as covariates at the performance level audience and performance type (Baumeister & Showers, 1986; LeBlanc, Jin, Obert, & Siivola, 1997) and performance from memory versus musical score. At the individual level we included sex, primary instrument, and years of study (Salmon et al., 1989; Wolfe, 1989). Diaries contained checkboxes to facilitate quick recording of this information.

Procedure

Participants completed the MPQ and a questionnaire to report age, sex, primary instrument, and years of instrumental or vocal study and received brief individual instructions on the use of performance diaries. Participants were asked to complete 15 diaries over the course of the school year and to submit each diary to a locked box in the music department office as soon as possible after each performance. Paper diaries were used instead of computerized data collection for practical reasons. Diaries could be easily carried into rehearsal spaces in sheet music or an instrument case. Because performance anxiety has been shown to peak at 1 hour prior to or during performance (Salmon et al., 1989) or during the walk onstage (Ryan, 1998), instructions emphasized completion just prior to performance, no longer than 1 hour before walking onstage. Pilot testing by research assistants indicated that diaries took less than 2 minutes to complete. Adherence was monitored, and reminders were sent by e-mail if diaries were not submitted as expected.

Data Analysis

Our goal was to measure both interindividual and intraindividual performance anxiety under varying performance conditions over repeated measures. Data were analyzed with a series of mixed-effects linear regression models using the PROC MIXED procedure in SAS Version 9.1 (SAS Institute Inc., 2008). Repeated measurements of anxiety (NA) at the performance level (Level 1) were nested in each individual (Level 2). Model fitting utilized maximum likelihood estimation and an unstructured covariance structure, which accounted for the correlation of measurements within each participant. The intercept for each participant's baseline anxiety was allowed to vary randomly; all other study variables were treated as fixed effects. Years of study was mean-centered so that time-variant situational variables could be interpreted as the average change in anxiety for musician i at performance j with an average number of years of study (8 years). The variable for time, diary number, was analyzed as "diary number minus one" for interpretability of the intercept coefficients.

Comparative model fit was assessed using variance statistics and Akaike's information criterion (AIC). The variance explained at a particular level represents the proportional reduction in variance comparing the null (intercept-only) model to the alternative model with additional parameters. AIC is a goodness-of-fit measure that penalizes models for variance unaccounted for as well as the number of parameters in a model. Therefore, a lower AIC indicates a better balance of fit and parsimony.

Results

Thirty-seven participants submitted 508 diaries ($M = 13.7$, $SD = 3.1$) over the course of one school year. Musician, audience, and performance characteristics are summarized in Table 1. Regression coefficients, standard errors, variance statistics, and levels of significance for multilevel models are presented in Table 2. All participants' protocols met MPQ validity criteria as described by Patrick, Curtin, and Tellegen (2002). As a check on selection bias, we compared our volunteer participants' MPQ profiles with those of a sample of 230 students who participated in a concurrent study at the same college. The comparison group was a more "captive" sample who participated in research for credit toward a course requirement (Sadler, Hunger, & Miller, 2010). Our musician sample

Table 2. Multilevel-Mixed Effects Models

	Model 1: Covariates Only		Model 2: Covariates and NEM		Model 3: Covariates and SR		Model 4: Covariates and AL	
Predictor	β	*SE*	β	*SE*	β	*SE*	β	*SE*
Intercept	10.79***	1.30	8.19***	1.35	9.88***	1.17	10.72***	0.78
Negative Emotionality	—	—	0.29***	0.07			—	—
Stress Reaction	—	—	—	—	0.67***	0.16	—	—
Alienation	—	—	—	—	—	—	0.67***	0.16
Sex								
Male (Ref)			—	—	—	—	—	—
Female	0.13	0.93	—	—	—	—	—	—
Years of study (centered)	–0.07	0.12	0.52	0.31	0.57*	0.23	0.08	0.14
Instrument								
Vocal (Ref)								
Orchestral	3.03**	1.07	1.48*	0.72	1.39†	0.79	1.86*	0.78
Piano/organ	2.57†	1.37	—	—	—	—	—	—
Performance type								
Solo	3.41***	0.68	2.91***	0.56	2.83***	0.57	2.99***	0.57
Small ensemble	1.00	0.70	—	—	—	—	—	—
Large ensemble (Ref)								
Audience type								
Instructors (Ref)								
Students	3.51***	0.62	3.66***	0.60	3.64***	0.60	3.64***	0.60
Juried recital	3.96***	0.82	4.26***	0.78	4.10***	0.79	4.08***	0.77
General public	3.19***	0.68	2.88***	0.65	2.77***	0.66	3.02***	0.66
Memory								
From score (Ref)			—	—	—	—	—	—
From memory	0.62	0.56	—	—	—	—	—	—
Diary number	–0.13**	0.05	–0.12**	0.05	–0.12**	0.05	–0.12**	0.05
NEM × Centered Years	—	—	–0.02*	0.01			—	—
SR × Centered Years	—	—	—	—	–0.05**	0.02	—	—
AL × Centered Years	—	—	—	—	—	—	–0.06†	0.04
Variance components and Akaike's information criterion (AIC)								
AIC	3,027.9		3,008.1		3,014.2		3,014.8	
Variance explained at L1	14.5%		13.9%		13.9%		13.8%	
Variance explained at L2	–2.0%		52.0%		38.2%		37.4%	

Note: L1 and L2 refer to Level 1 and Level 2 of the multilevel model.
β = unstandardized regression coefficients; *SE* = standard error of regression coefficient; Ref = reference group. Dashes indicate that the variable was not included in the model. NEM = Negative Emotionality; SR = Stress Reaction; AL = alienation.
† $p < .10$.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

reported significantly higher levels of Absorption (openness to expanded or altered experiences) ($p = .02$) and lower levels of Aggression ($p < .001$). No other differences in MPQ traits approached significance, suggesting that our sample was generally representative of their background population.

We reasoned that obtaining a baseline measure of NA from our sample would not be comparable to situation-specific sampling. In performance situations, attention is narrowed to focus on the demanding task at hand (e.g., Eysenck, Derakshan, Santos, & Calvo, 2007) rather than positive and negative feelings about life in general. To compare our sample's criterion NA under stress with a relevant baseline measure of NA under nonstress conditions, we tested our sample's mean NA ($M = 16.2$, $SD = 2.6$) with normative data for the PANAS student sample with moment time instructions ($M = 14.8$, $SD = 5.4$) (Watson, Clark, & Tellegen, 1988b). Performance-contingent NA was significantly higher than the standardization student norm for NA under nonstress conditions, $p < .0001$.

In the exploratory phase of the analysis, we fit multilevel models predicting performance anxiety over time with each of the MPQ higher order domains and primary traits. As expected, performance anxiety was associated with NEM but with neither PEM nor any of its primary traits. Also, as predicted, the NEM subscales SR and AL were significantly

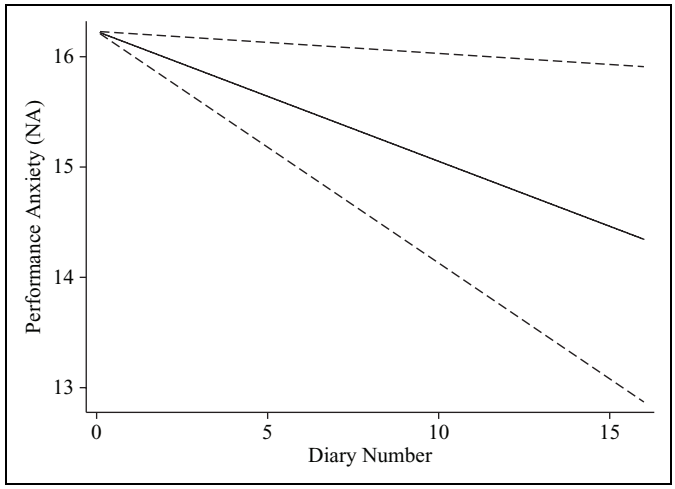

Figure 1. Average change in music performance anxiety (NA) over the course of the study
The intercept was derived by averaging across performance and demographic covariates and using the mean score for Negative Emotionality (NEM). Dotted lines represent 95% confidence limits. NA = Negative Affect.

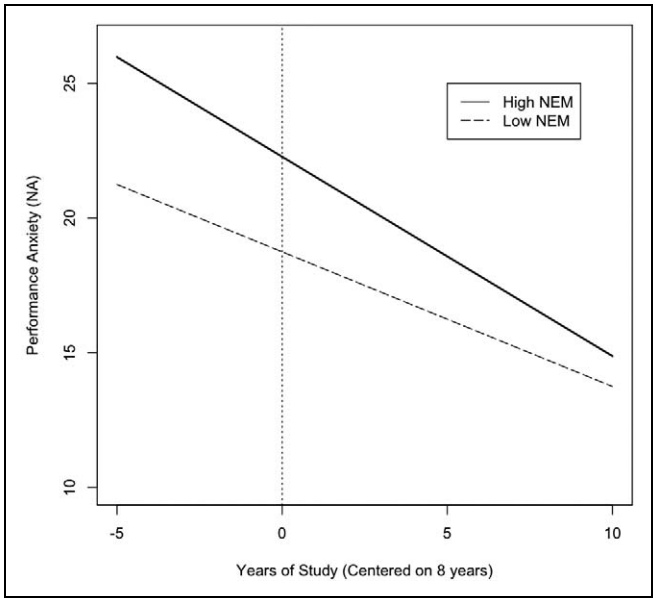

Figure 2. Interaction between Negative Emotionality (NEM) and centered years of study
High and low NEM scores are prototypical values for performers who scored ± 0.5 *SD* from the mean. Intercepts were derived by averaging across performance characteristics and situational and demographic covariates. Positive or negative values of centered years of study reflect the number of years of study above or below the sample mean (M = 8 years). NA = Negative Affect.

associated with performance anxiety. Years of study and number of diaries submitted were uncorrelated at .19, $p = .26$, and there was no significant interaction between NEM and PEM, $p = 0.632$.

To determine the unique variation accounted for by personality traits, we included only performance level covariates (i.e. audience characteristics, performance type, performance from score or memory), primary instrument, years of study, and sex in the first formal model. These factors accounted for 15% of the within-person variability in MPA scores but none of the between-person variance (see Table 2). Performance anxiety decreased monotonically over successive performances, $p < .01$ (Figure 1). Surprisingly, there was no significant main effect of years of study on anxiety across performances, $p = .54$.

Nonsignificant predictors from Model 1 were dropped, and we entered NEM and an interaction term between NEM and years of study in a second model. NEM significantly predicted MPA $p < .0001$. The interaction between NEM and years of study indicated that nearly all of the variability between musicians in performance anxiety associated with NEM was offset with approximately 10 years of additional study above the sample mean of 8 years, $p < .05$ (Figure 2). NEM and its interaction with years of study accounted for 52% of the residual variance in MPA between individuals. The effects of performance characteristics on anxiety were similar to the previous model (see Table 2). The model equations for the second model (the NEM model) are presented below:

Level 1 submodel:

$$Y_{ij} = \pi_{0i} + \pi_{1i}(\textit{diary number})_{ij} + \pi_{2i}(\textit{audience})_{ij} + \pi_{3i}(\textit{performance type})_{ij} + \varepsilon_{ij}.$$

Level 2 submodels:

$$\pi_{0i} = \gamma_{00} + \gamma_{01}(\textit{piano})_i + \gamma_{02}(\textit{orchestra})_i + \gamma_{03}(\textit{centered years})_i + \gamma_{04}(\textit{NEM})_i + \gamma_{05}(\textit{NEM} \times \textit{centered years})_i + \zeta_{0i}$$

$$\pi_{1i} = \gamma_{10}$$

$$\pi_{2i} = \gamma_{20}(\textit{students})_{ij} + \gamma_{21}(\textit{public})_{ij} + \gamma_{22}(\textit{juried recital})_{ij}$$

$$\pi_{3i} = \gamma_{30}(\textit{solo})_{ij} + \gamma_{31}(\textit{small ensemble})_{ij},$$

where Y_{ij} is the performance anxiety of musician i for performance j, ε_{ij} represents the deviation from the linear trend (random residual component), and ζ_{0i} is the random variable for the variance between musicians in their baseline anxiety (intercept) values. ε_{ij} and ζ_{0i} are both normally and independently distributed with a mean of zero.

We explored the effects of NEM primary traits SR and AL on performance anxiety accounting for performance covariates and an interaction between these traits and years of study. SR and AL significantly predicted MPA ($p < .0001$) and an interaction effect between years of study and personality was observed for SR, $p < .01$. However, the SR model and AL model predicted approximately 14% less between-person variance than the NEM model. Situational covariates did not differ markedly from the previous models. Both the AIC and

variance accounted for at the musician level (Level 2) favored NEM as a more potent predictor of performance anxiety than SR or AL alone.

Discussion

To our knowledge, the present investigation is the first to study broad-based personality and music anxiety. Results supported our first hypothesis: Negative emotional temperament constitutes an important predisposition to the occupational hazard of music performance anxiety. NEM was strongly associated with increased performance anxiety, driven by the NEM subscales SR and AL, indicating that performance anxiety involves both emotional and social-interpersonal components. The influence of NEM was independent of PEM. Musicians with low MPA did not show significantly higher levels of PEM, as might be expected if PEM offered protection against MPA. Similarly, Hughes and colleagues found that performance anxiety was associated with physiological arousal but not with low Positive Affect/anhedonia (Hughes, Heimberg, Coles, Gibb, Liebowitz, & Schneier, 2006). This clear divergence supports the two-factor model of affect (Diener, Smith, & Fujita, 1995; Tellegen, 1985; Tellegen et al., 1999) and provides additional evidence for the discriminant validity between MPQ PEM and NEM.

The joint correlation of NEM subscales SR and AL points to characteristics of frequent and heightened negative emotion and feelings of victimization and betrayal in interpersonal relationships. Brodsky, Sloboda, and Waterman (1994) also found that introverted and unsociable performers experienced greater performance anxiety. Interestingly, an almost identical pattern of MPQ personality correlates has been associated with self-handicapping, a self-presentation or ''impression management'' tactic in which an individual places or claims obstacles to success, allowing the individual to excuse failure or take greater credit for success (Sadler et al., 2010).

With respect to our second hypothesis, there was no main effect of years of formal training on performance anxiety. Further exploration revealed an interaction, indicating that individuals' trait predisposition to performance anxiety was associated with less performance anxiety with increased years of study, presumably as instrumental or vocal technical proficiency increased. However, repertoire difficulty tends to increase with technical progress, making this finding difficult to interpret. High-NEM performers reported greater levels of performance anxiety than low-NEM performers generally. However, with approximately 10 years of study above the sample mean, high-NEM musicians reported about the same level of performance MPA as low-NEM performers with equivalent years of study; low-NEM performers reported relatively stable levels of anxiety across performances regardless of years of experience (see Figure 2).

We found a significant decline in anxiety over the course of the study. On average, musicians reported 11% less MPA at the end of the study than at the beginning, controlling for performance covariates. Decreases in NA as a function of time (successive performances) may reflect self-monitoring, a component of cognitive-behavioral therapy in which systematically observing one's thoughts and behaviors can lead to therapeutic change (Korotitsch & Nelson-Gray, 1999). Additional research is necessary to clarify this effect to determine how musicians struggling with performance anxiety might benefit from monitoring their emotions.

Several limitations must be acknowledged. All music performance majors were invited to participate in the study. But despite an intensive recruitment effort, generous incentives, and low attrition, our sample size was modest. Selection would be substantially biased if performance anxiety among those musicians who volunteered differed from that of musicians who declined to participate. Volunteers may be more conscientious and more secure in their performance skills, whereas more anxious musicians might fear that participation would increase their nervousness and compromise performance quality (Mulligan, Schneider, & Wolfe, 2000).

In diary studies it is always possible for participants to ''backfill'' or complete diaries after the event of interest has occurred or even at the end of the study period. It was not possible to keep a detailed calendar of each participant's performance schedule over the course of the study. We attempted to minimize backfilling by collecting diaries daily, tracking participation, and sending frequent reminder e-mails, particularly if diaries were not submitted as expected. Although attrition during the study was minimal and compliance with data collection protocols was high, periodic individual interviews might help to increase retention and a sense of shared responsibility for data collection between participants and investigators.

The present study did not include measures of ''somatic'' anxiety needed to explore the relationships between personality, subjective anxiety, and physiological reactions in the performance setting. Additionally, performance quality and repertoire difficulty ratings from performer's instructors would allow a test of the differential effects of personality on MPA and performance quality, controlling for repertoire difficulty. Because moderate levels of anxiety can be adaptive and may even improve performance quality (Wolfe, 1989), these additional variables should be included in future studies.

The present findings may have pedagogical or treatment implications. On debriefing, none of our participants reported that focusing on their emotional state just before performances interfered in their ability to perform, and many felt that the process had improved their self-understanding. Furthermore, performance anxiety decreased over successive performances. Musicians with problematic performance anxiety of various types may benefit from self-monitoring through the use of performance diaries. We would suggest that stage fright be discussed openly and early in performing arts instruction to help identify students for whom it is a significant problem. As noted, the personality correlates of MPA include social inhibition, hypersensitivity to negative evaluation, and frequent and intense negative emotional states experienced and expressed in everyday life. Teachers might be alert to such signs that may signal problems with performance anxiety.

In summary, the present study provides a first step in the process of understanding the importance of normal personality as a foundation for individual differences in music performance anxiety.

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