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Honors Thesis

MINDFUL MUSICIANS: TRAIT MINDFULNESS, DELIBERATE PRACTICE,
ANXIETY, AND DEPRESSION LEVELS IN COLLEGE MUSICIANS

by
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Submitted to Brigham Young University in partial fulfillment
of graduation requirements for University Honors

Psychology Department
Brigham Young University
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ABSTRACT

MINDFUL MUSICIANS: TRAIT MINDFULNESS, DELIBERATE PRACTICE,
ANXIETY, AND DEPRESSION LEVELS IN COLLEGE MUSICIANS

Sally S. Wynn

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Bachelor of Science

Background. Mindfulness is understood as a capacity to cultivate moment-to-moment awareness with a sense of nonjudgement, curiosity, and kindness. Anxiety and depression are prevalent in the undergraduate musician population, despite positive effects on mental health that are often associated with listening to music. This study explored factors of music practice including instrument category, practice time, and the use of deliberate practice techniques. Our objective was to test the relationships between dispositional mindfulness, musicianship, and mental health among college instrumental musicians. I hypothesized first, that dispositional mindfulness would be positively associated with musicianship; second, that mindfulness would be negatively associated with mental health outcomes (anxiety and depressive symptoms); and third, that musicianship would be negatively associated with mental health.

Methods. Questionnaire data on demographics, dispositional mindfulness, musicianship (instrument played, deliberate practice, practice time), and mental health (anxiety, and

depressive symptoms) were collected from 128 instrumental musician undergraduates at a large private university. Hypotheses were tested using ANOVAs and linear regressions.

Results. Regarding the associations between mindfulness and musicianship, trait mindfulness was not associated with instrument category or practice time. However, mindfulness was significantly and positively associated with deliberate practice. As expected, the data supported previously reported findings showing significant negative associations between trait mindfulness and mental health including both anxiety and depressive symptoms. There were no significant associations between musicianship and mental health variables.

Conclusions. This is the first research I am aware of that has shown an association between dispositional mindfulness and musicianship measured by deliberate music practice. In the setting of this cross-sectional study, it's not possible to infer directionality or causality regarding this relationship. However, future longitudinal studies may uncover these aspects of the relationship. These findings replicate previous research demonstrating a significant negative relationship between mindfulness and mental distress among undergraduate students. These findings suggest future research should explore the potential benefits of mindfulness intervention to support deliberate practice among musicians and to mitigate the mental health difficulties that many musicians face. It is also possible that interventions to promote deliberative practice could increase mindfulness among musicians, another hypothesis worthy of future exploration.

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Mindful Musicians: Trait Mindfulness, Deliberate Practice, Anxiety, and Depression Levels in College Musicians

Music has been an integral part of human society since records have existed. It has been hypothesized that music was created for four purposes: dance, personal or communal entertainment, communication, and ritual (Montagu, 2017). These purposes are often social activities and people use music to drive connection and community. These connections, as well as many other benefits of music have led to the field of music therapy. Music therapy has been used to alleviate anxiety symptoms extremely effectively and to significantly reduce depressive symptoms (Lu et al., 2021; Tang et al., 2020). However, these benefits of music therapy are not necessarily benefitting the people who create the music. Musicians have been found to have higher depression and anxiety levels than the normal population, often attributed to the stress and anxiety that comes from being a professional musician in a gig work environment (Nicholson et al., 2014; Vaag et al., 2015). Despite using their craft to benefit society, musicians have elevated levels of mental distress.

Mental distress in musicians includes performance anxiety. There is an abundance of research focusing on performance anxiety in musicians because of high prevalence in the population. Different studies have reported from 16.5% to 60% of musicians report performance anxiety (Fernholz et al., 2019). However, performance anxiety is only part of the mental distress affecting musicians. Generalized anxiety and depression are the most common mental illnesses in the United States, and musicians are not exempt. Approximately 21% of all United States adults experienced mental illness within the span of 12 months, with 8% having experienced depression, and 19% experiencing any form

of an anxiety disorder (National Alliance on Mental Illness, 2021). These percentages are significantly elevated in college populations in the United States, with 21% of students reporting major depression and 34% reporting an anxiety disorder pre-Covid-19 (Eisenberg et al., 2021, Lee et al., 2021). During and after the pandemic, rates of anxiety and depressive symptoms increased dramatically among young adults, though studies differ regarding statistical incidences. Because of the prevalence of anxiety and depression throughout the United States, there has also been expanding research on the development of interventions to effectively alleviate some of the problems associated with these disorders.

A genre of interventions that have been shown to be helpful for patients experiencing anxiety or depression are mindfulness interventions. Mindfulness is often defined as “the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment” (Kabat-Zinn, 2003, p 145). In a systematic review and meta-analysis of 142 randomized clinical trials, Goldberg et al. (2018) found that post-treatment, patients who were treated with a mindfulness intervention had equivalent results to patients treated with commonly used clinical treatments, and in some instances had superior results, supporting the idea that mindfulness interventions are a legitimate and valid treatment for many psychological disorders. These positive results do not significantly change based on the length of mindfulness practice, showing that just by beginning mindfulness practice for short amounts of time, (i.e. 5-minute practice, 4 times within 2 weeks) positive benefits can accrue quickly (Strohmaier et al., 2020). It has also been found that overall state mindfulness is negatively related to stress, anxiety and depression (Sharma &

Kumra, 2022). This suggests that people with stronger mindfulness tendencies are less likely to be diagnosed with anxiety or depression, and that practicing mindfulness lessens the symptoms of anxiety and depression.

Much like the deliberate and regular practice of meditation that is part of learning mindfulness, musical practice is a major part of a musician's life. Those who do not practice are often not referred to as musicians within research studies, because practicing is a critical part of developing and maintaining skills that allow for performances (Büdenbender & Kreutz, 2016). Previous research has found that weekly practice time was moderately negatively associated with musical achievement, suggesting that more practice time means poorer performance, with the hypothesis that those practicing most frequently were probably not practicing effectively (Bonneville- Roussy & Bouffard, 2015). However, weekly practice time is seen by music teachers to be essential for student's growth in their skills and strongly encourage all of their students to practice more than most students actually do (Kostka, 2002). While excessive practicing may cause problems in performance, very few will argue that practice time is not essential to the development of an individual's skills.

While practice time is important, deliberate practice is essential to improvement. Deliberate practice, as originally defined by Ericsson, is when an individual and their coach "identify specific goals for improving particular aspects of performance and design training activities that allow the performer to gradually refine performance with feedback and opportunities for repetition" (Ericsson, 2006, p. 696). This deliberate practice leads to productive carefully planned practice time. Practicing deliberately requires attention to the tasks and results of those tasks, with careful adjustment after each repetition. In

musicians, deliberate practice significantly improves performance and achievement. When deliberate practice time is analyzed against non-structured practice time, deliberate practice shows consistent correlations with musical achievement while non-structured practice time does not (Bonneville-Roussy Bouffard, 2015). Deliberate practice can explain up to 21% of the variance in musical performance ($\bar{r} = .48$, $p < .001$, Macnamara et al., 2014). This attention and awareness from deliberate practice can increase musical achievement and performance with some minor adjustments to practice methods. Thus, deliberate practice can be seen as a beneficial way to utilize the attention and awareness.

Paying attention, practicing and being aware only includes part of the scope of mindfulness. Mindfulness in a more traditional Buddhist sense is described as an interaction with the mind, body and external world (Khoury et al., 2017). The focus on the two-way directional relationship between the mind and body is critical for Buddhist mindfulness. This body awareness is not as central in many westernized mindfulness-based interventions (MBI). However, being in tune with the body and its influences on the mind, as well as the mind's influence on it can bring deeper mindfulness and overall awareness. Following the definition of mindfulness as purposeful attention and awareness in the moment, as well as interacting with the body, musicians seem to be the perfect candidates for mindful practices. Practicing and performing an instrument requires attention to the sounds created, timing, movements, surrounding performers, the notes on the page, and in some instruments, even the breath requires attention. There are many similarities between mindfulness and music practice, as identified by Steinfeld and Brewer, such as the mentorship and guidance of a teacher, the experience of the self in silence, and the honing of a technique for greater self-understanding and refinement

(2015). Many of the things that require close mental attention also require close physical attention.

The attention required to create music is intense, and in personal experience, it is almost impossible to get distracted. This forced mind-body mindfulness may have the effect of increasing dispositional mindfulness among musicians, and this may have salutatory effects on the psychological well-being of musicians. In addition, increased state mindfulness may occur during the practice of an instrument, possibly alleviating some, but not all of the mental distress inherent in being a musician. Vaag et al. (2015) found that keyboard and string instrumentalists have the highest levels of psychological distress. These instruments do not require attention to breathing like the woodwind and brass instruments do, possibly affecting their mindfulness scores. Deeper mindfulness may accrue when more body systems (e.g., including the respiratory system) are crucially used as part of music practice (Khoury et al., 2017). Wind musicians utilize their lungs, mouths, and often their tongue movements, along with their finger placements, music reading, and auditory feedback and adjustments. String or percussion instruments do not typically use their lungs, mouths, or tongues to physically move their instruments, possibly leaving them with fewer bodily stimuli. It is thus reasonable to hypothesize that wind musicians may experience differential levels of trait and state mindfulness because of the physical nature of their practice. Of relevance, it has been shown that heightened levels of state mindfulness that occur during meditation practice are associated with increases in trait mindfulness over time (Kiken et al., 2015). If practicing an instrument is similar to state mindfulness practice, musicians whose practice is likely to require

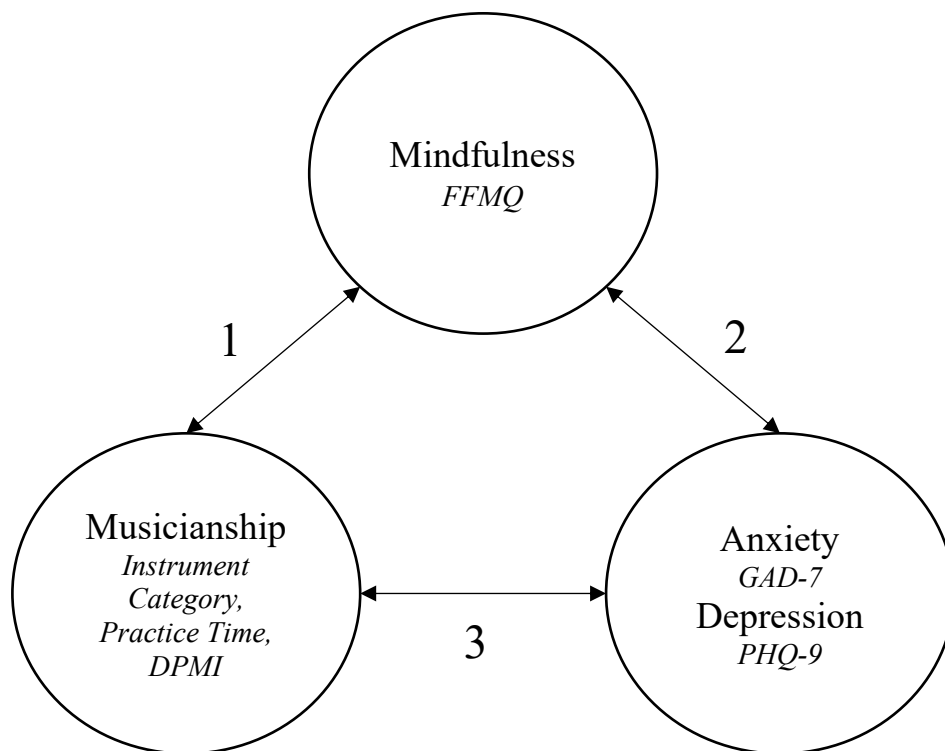
enhanced state mindfulness may also experience increasing trait mindfulness scores over time. Based on these known associations, I hypothesized that:

1. Mindfulness will be significantly and positively correlated with musicianship (wind instrument category, practice time and deliberate practice)
2. Mindfulness will be negatively correlated with anxiety and depression in a college musician population.
3. Measures of musicianship and mental health will be significantly negatively correlated.

These hypotheses are depicted visually in Figure 1.

Figure 1

Theoretical Model



Note: All items in italics are the questionnaires used to identify the levels of each variable. The large numbers indicate the hypothesis measuring the relationships.

Methods

Participants

The survey was distributed by Brigham Young University's (BYU) School of Music email newsletter, as well as by individual professors to their performance ensembles. Approximately 500 students were on the distribution list, with around 275 being instrumentalists, the target audience.

Exclusion Criteria

Participant's instrument category and instruments were determined using the same categories and instruments as presented in Kuckelkorn et al. (2021). Vocal musicians were excluded from the study. Participants were asked the musician rank item (Which title best describes you?) from the Ollen Musical Sophistication Index (Ollen, 2006). In previous research this item was found to be the best single item measure to estimate musical sophistication (Zhang & Schubert, 2019). Participants who answered either "nonmusician" or "music-loving nonmusician" were excluded for the purposes of this study. In a literature review, Zhang et al. (2020) found that music psychologists classified musicians as people who have trained on their instrument of choice for 6 years, i.e., in most comparative studies between musicians and non-musicians. Based on this classification, participants were asked how many years they had trained on their instrument. Those who had trained for fewer than 6 years were excluded. Replicating Bűdenbender & Kreutz (2016), participants were considered musicians if they had practiced an hour or more during the current week and were excluded if they had practiced less. Participants were offered \$10 for study completion.

Completed Demographics

There were 128 complete responses out of the estimated 275 possible participants, putting participation at approximately 46%. Out of the 128 students who completed the survey and met inclusion criteria, 59.4% reported female biological sex and 57.8% identified as female, with 83.6% of the total sample identifying as heterosexual. The typical participant was white (93.0%), non-Hispanic (93.8%), and citizen of the United States (94.5%). Participants were 20.79 years old on average, never married (87.5%), and were members of the Church of Jesus Christ and Latter-Day Saints (97.7%), which is the expected rate at this religious institution. Most participants (70.3%) had full time student status with a current enrollment of 12.5-16 credit hours. Among the participants, 50.8% reported a GPA from 3.7 to 3.99. In addition to being full-time students, most participants worked (64.8%) and volunteered (68.0%). Average reported practice time for musicians was 11.11 hours per week. See supplemental demographics (Table 1), and distributions of instrument categories (Figure 2).

Table 1

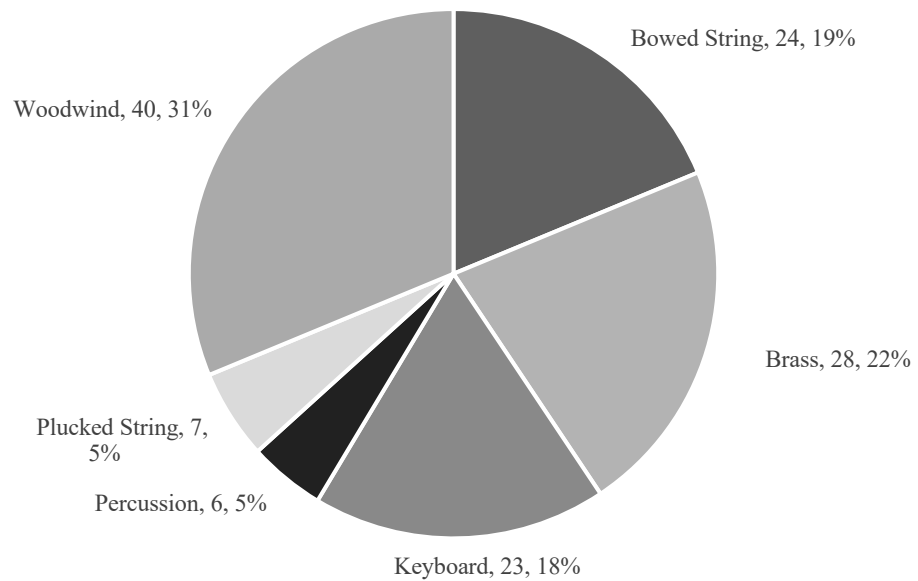
Supplementary Demographics

Demographic	N = 128	%
Major		
Life Sciences	3	2.3
Engineering	4	3.1
Physical and Mathematical Sciences	7	5.4
Family Home and Social Sciences	3	2.3
Fine Arts and Communications (besides music)	1	0.7
Music	23	17.9
Commercial Music	5	3.9
Music Composition	6	4.7
Music Education	25	19.5
Music Performance	35	27.3
Open Major	5	3.9
Incomplete	11	8.6

Demographic	N = 128	%
Completed Credits		
0-29.9	37	28.9
30-59.9	30	23.4
60-89.9	26	20.3
90 and over	35	27.3
Shared Room		
No; Personal bedroom	32	25.0
Yes; Separate beds in the same room	80	62.5
Yes; Sleep in same bed with roommate/spouse/partner	16	12.5
Title		
Amateur Musician	9	7.0
Professional Musician	16	12.5
Semiprofessional Musician	54	42.2
Serious Amateur Musician	49	38.3

Figure 2

Distribution of Instrument Category in Completed Data



Note: Labels are instrument category, number sampled, and percentages within each category.

Measures

Mindfulness

Based on the conclusions of the metanalysis and systematic review by Baer et al. (2019) on the sensitivity of mindfulness questionnaires, both the Cognitive Affective Mindfulness Scale—Revised (CAMS-R; Hayes & Feldman, 2004) and the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006) were used to measure mindfulness. Both measures are sensitive to change over time during mindfulness interventions, suggesting that they are more reliable measures of mindfulness (Baer et al., 2019). The FFMQ asked participants to respond on a 5-point Likert scale (1=never or rarely true, 5=very often or always true) of their best opinion of what generally describes them. Higher scores indicated higher levels of trait mindfulness.

Musicianship

Instrument category was self-identified by the participant using categories identified by Kuckelkorn et al. (2021), including woodwind, brass, bowed string, plucked string, percussion, and keyboard. Practice time was reported in terms of hours practiced in the previous week. As a final measure of musicianship, participants were asked to respond to the questions in the Deliberate Practice in Music Inventory (DPMI) which was developed by Passarotto et al. (2022; Appendix 1). This measure was developed to see how effectively musicians practiced. It has high levels of convergent validity with measures of musical expertise (see Appendix 1). This measure has four subscales including mindless practice, process improvement, practice competences, and task decomposition. Each subscale measures a different aspect of deliberate practice.

Participants were asked to respond to each of 23 statements using a 7-point Likert scale. Higher scores indicate higher levels of deliberate practice.

Anxiety

In order to measure levels of anxiety, each participant was asked to complete the Generalized Anxiety Disorder 7-item (GAD-7) scale. The GAD-7 was developed by Spitzer et al. (2006). It had high internal consistency (Cronbach $\alpha = .92$) and test-retest reliability (intraclass correlation = 0.83) in the original publication (Spitzer et al., 2006). In subsequent studies it has been shown to have high convergent and discriminant validity, as well as good sensitivity to change and a strong one-factor model (Rutter & Brown, 2016, Dear et al., 2011). Participants were asked to identify how often they had experienced each statement in the previous 2 weeks using a Likert scale from 0-3 (0=Not at all, 1= Several days, 2= over half the days, 3=nearly every day). The higher participants scored, the higher their levels of anxiety.

Depressive Symptoms

Each participant was asked to complete the Patient Health Questionnaire-9 (PHQ-9) to measure levels of depression. The PHQ-9 is the depression section of the Patient Health Questionnaire, which is a self-administered version of the Primary Care Evaluation of Mental Disorders (Spitzer et al., 1999). The PHQ-9 was isolated and analyzed as an effective depression measure, with excellent test-retest reliability (correlation = 0.84) and excellent internal reliability (Cronbach $\alpha = 0.86$) (Kroenke et al. 2001). In a recent cross-sectional study by Sun et al. (2022) it was shown that the reliability and validity of the PHQ-9 are still very high (Cronbach $\alpha = 0.84$, cumulative variance 63.11%). Participants were asked to identify how often they had experienced

each statement in the previous 2 weeks using a Likert scale from 0-3 (0=Not at all, 1=Several days, 2= over half the days, 3=nearly every day). The higher participants scored, the higher their levels of depression.

Procedure

The survey was distributed by faculty and administration from BYU's School of Music to their students. It was distributed using the data collection software Qualtrics (www.Qualtrics.com). Before beginning the survey, each participant received information about the study and provided informed consent. The questionnaire included self-reports on demographics, instrument category, practice time, and deliberate music practice (DPMI). Participants also completed the FFMQ, the GAD-7 and the PHQ-9. Once the survey was complete, participants were redirected to a different survey to receive compensation. On average, participants spent 16.47 minutes completing the survey. Because the survey was administered digitally, participants used their own electronic devices and took the survey in many locations, so timing and location were not standardized.

Statistical Analysis

The data was double checked for accuracy before the calculation of summary scores on all measures. There were 191 responses after removing duplicate data. Thirty-six vocal musicians were excluded from the analysis, three participants had their responses removed as they had not practiced the week before, and four survey responses were removed per exclusion criteria because as the participant had played their instrument for less than six years. Incomplete responses were treated as follows: if more than half of responses for any scale were missing, all data from the participant were

removed from analyses. Data from 20 participants were removed due to incomplete responses, leaving the total number of analyzed participants at 128. In cases for which less than half of subscale responses were missing for any single participant, missing values were replaced using that individual's mean score from the relevant subscale. This procedure was followed for 13 participants. All calculations were made using the IBM SPSS Statistics software, version 29.0. T-tests were run to compare demographic characteristics of complete versus incomplete (excluded subject's) responses.

Descriptive statistics were used to confirm that data met assumptions for the statistical tests planned for use in testing the hypotheses. Assumptions of normality for regression and ANOVA were met for all analyses. A preliminary bivariate correlation was run between the PHQ-9 and the GAD-7 (depression and anxiety) scores to see if running further analyses differentiating the two were necessary.

Mindfulness and musicianship

To test the hypotheses that instrument category would be associated with mindfulness, a one-way between groups analysis of variance (ANOVA) was run using instrument categories alongside FFMQ scores. A linear regression between practice time and the FFMQ was run to measure the relationship between practice time and mindfulness. A linear regression between the scores for DPMI and FFMQ was run to measure the relationships between deliberate practice and mindfulness. A series of post hoc regressions comparing the subscales of the DPMI and total FFMQ were run, as well as another series of regressions comparing the subscales of the FFMQ and the total DPMI.

Mindfulness and mental distress

A linear regression was run between the mindfulness (FFMQ) and anxiety/depression (GAD-7, PHQ-9) measures.

Musicianship and mental distress

A one-way ANOVA was run between instrument categories and the GAD-7 and PHQ-9 scores to see the relationship between instrument category and mental health outcomes. Regressions between practice time and the GAD-7 and PHQ-9 were run to measure the relationship between time practiced and mental health outcomes. Linear regressions were also run between the DPMI and PHQ-9, DPMI, and GAD-7, to measure the relationship between deliberate practice and anxiety and depression scores.

Secondary Analyses

Regressions between practice time and the DPMI were run to test the relationship between these two measures of musicianship. A post hoc series of regressions between the subscales of the DPMI and practice time were run. Another one-way ANOVA was run between instrument categories and practice time to see if practice was different between instrument categories. A last one-way ANOVA was run between instrument categories and DPMI scores to see if deliberative practice scores were different between the instrument categories.

Results

The T-tests run between the complete and incomplete/exclusion data showed that initially, non-completers were more likely to be employed ($p = .047$), and less likely to share a room ($p = .050$).

Upon visual inspection for normality assumptions, the PHQ-9 and GAD-7 had what seemed to be significant skew, so although skewness was not >1 , (PHQ-9 skewness

= .907, GAD-7 skewness = .557), the PHQ-9 and GAD-7 scores were transformed using square root transformation. Analyses were run twice, once with raw data and again with transformed data: none of the analyses differed using the transformed data, so results from raw data are reported here.

All other scalar data (FFMQ, Practice Time, DPMI) met the assumptions of normality. Within the preliminary bivariate correlations, the PHQ-9 and GAD-7 measures were significantly correlated, $r(133) = .77$, $p < .001$. Despite this correlation, both measures were used for hypothesis testing given that anxiety and depression among college students have discreet ecological validity.

Mindfulness and musicianship

A one way between-subjects ANOVA found no significant difference between instrument categories in mindfulness ($F(5, 122) = 1.331$, $p = 0.255$). As the p-value was not significant, no post-hoc tests were required. Simple regressions run to identify the relationships between mindfulness and measures of musicality found no significant relationship between practice time and mindfulness. There was a significant positive association between deliberate practice and mindfulness (see Table 2).

Table 2

Results of Regressions Testing the Relationships Between Mindfulness and Musicality Measures

Musicality Measures	R ²	F	β	p
Practice Time	.000	.002	.004	.961
DPMI	.109	15.375	.330	<.001*

Note: * indicates significance at .001

Post hoc analyses were conducted on the relationships between DPMI and FFMQ to explore relationships among the subscales of the DPMI (i.e. mindless practice, process

improvement, practice competences and task decomposition; Table 3). Significant relationships were found between mindfulness and all the DMPI subscales.

Table 3

Results of Post hoc Regressions Testing the Relationships Between Mindfulness and Deliberate Practice

DMPI subscales	R ²	F	β	p
Mindless Practice	.054	7.200	-.232	.008*
Process Improvement	.066	8.843	.256	.004**
Practice Competences	.106	14.921	.325	<.001***
Task Decomposition	.041	5.419	.203	.022*

Note: *** indicates significance at .001, ** significant at .005, * significant at .05

Post hoc analyses were conducted on the relationships between FFMQ and DPPI to explore relationships among the subscales of the FFMQ (i.e. Acting with Awareness, Observing, Describing, Nonjudging, Nonreactivity, Table 4). Significant relationships were found between DPPI and acting with awareness, observing, and nonjudging.

Table 4

Results of Post hoc Regressions Testing the Relationships Between Deliberate Practice and Mindfulness

FFMQ Subscales	R ²	F	β	p
Acting with Awareness	.045	5.975	.213	.015*
Observing	.098	14.724	.323	<.001**
Describing	.006	1.776	.118	.185
Nonjudging	.043	6.732	.225	.011*
Nonreactivity	.010	2.275	.133	.134

Note: ** indicates significance at .001, * significant at .05

Mindfulness and mental distress

Regressions analyzing the relationships between mindfulness and mental distress were both significant in the predicted direction (Table 5).

Table 5

Results of Regressions Testing the Relationships Between Mindfulness and Mental Distress

Measures of Mental Distress	R ²	F	β	p
GAD-7	.306	55.568	-.553	<.001**
PHQ-9	.280	48.934	-.529	<.001**

Note: ** indicates significance at .001

Musicianship and mental distress

A one way between-subjects ANOVA found no significant difference between instrument category and mental distress levels (GAD-7, PHQ-9). Given this, no post-hoc tests were needed (See Table 6).

Table 6

Results of ANOVA Testing the Differences Between Instrument Categories in Mental Distress

Dependent Variable	df	F	p	η ²
GAD-7	122	0.639	0.670	.026
PHQ-9	122	0.463	0.803	.019

Regressions between practice time and mental distress found no significant associations of practice time with either anxiety or depressive symptoms. There were no significant associations found between deliberate practice and mental distress (see Table 7).

Table 7

Results of Regressions Testing the Relationships Between Musicality and Mental Distress

Variables	R ²	F	β	p
Practice Time				
GAD-7	.011	1.408	.107	.238
PHQ-9	.002	.194	.040	.660
DPMI				
GAD-7	.002	.253	.045	.616
PHQ-9	.008	.961	.087	.329

Secondary Analyses

Because regression analyzing associations between practice time and the DPMI were significant, so post hoc analyses were conducted to examine associations of practice time and each subscale of the DPMI (mindless practice, process improvement, practice competences and task decomposition). The only significant relationship between mindfulness and a DPMI subscale was that noted for mindfulness process improvement, as seen in Table 8.

Table 8

Results of Regressions Testing the Relationships Between Practice Time and Deliberate Practice

DPMI and Subscales	R ²	F	β	p
DPMI Overall	.069	9.048	.263	.003*
Mindless Practice	.002	.237	-.044	.628
Process Improvement	.126	17.519	.354	<.001**
Practice Competences	.007	.852	.083	.358
Task Decomposition	.011	1.297	.103	.257

Note: **indicates significance at .001, *indicates significance at .05

The one-way ANOVAs between measures of musicality showed no significant associations of instrument category with practice time or DPMI scores (see Table 9).

Table 9

Results of ANOVA Testing the Differences Between Instrument Categories in Musicianship

Dependent Variable	df	F	p	η ²
Practice Time	118	1.829	0.112	.077
DPMI	122	1.138	0.344	.046

Discussion

The purpose of this study was to identify the interrelationships between trait mindfulness, musicianship, and mental health outcomes. The data suggest some possible sample bias toward students who did not work in addition to attending college, and

toward those students who had the privilege of living in a single, non-shared room. Both employment and living with a roommate are potential distractors that could have interfered with survey completion.

Interestingly, there was not a significant association between instrument category and trait mindfulness. Rather, it seems that all instrumental musicians reported similar levels of mindfulness regardless of the type of instrument they play. There were also no significant relationships found between practice time and mindfulness ($p = .961$), showing that practice time is not significantly related to levels of trait mindfulness in any way.

However, deliberate practice was significantly and positively associated with trait mindfulness ($p = <.001$). Despite considerable extant research on deliberate practice, I believe these results represent the first scientific study of associations of deliberate practice with mindfulness. This is an exciting new finding that has many possible practical implications. Performance quality has been associated with deliberate practice. Thus, instrumentalists who are more mindful may tend to be better performers, although more research is needed to develop our understanding of this relationship. It has been found in previous research that when instrumentalists are able to be expressive and mindful in their performances, both they and their audiences prefer that performance to a performance where the instrumentalists must stick to a rigid (e.g., non-emotional) performance, which would suggest that a mindful attention is essential for good performance (Langer et al., 2009). This also suggests that a mindfulness intervention could improve deliberate practice and performance, and/or that a deliberate practice training could raise mindfulness levels.

In post hoc analysis, each of the subscales of the DPMI were explored for associations with mindfulness. Mindless practice, process improvement, practice competences, and task decomposition were all significantly associated with trait mindfulness in the predicted direction. This suggests a general rather than specific association of mindfulness with aspects of deliberate practice. Another post hoc analysis explored the subscales of the FFMQ with the DPMI. Acting with awareness, observing, and nonjudging were all significantly associated with deliberate practice in the predicted direction, while describing and nonreactivity were not. This suggests that not all aspects of mindfulness are related with deliberate practice, showing that describing and nonreactivity are not significant parts of deliberate practice.

The present study reaffirms previous research that shows a significant negative relationship between mindfulness and anxiety/depression scores (Mesmer-Magnus et al., 2017; Paul et al., 2012; Carpenter et al., 2019). Participants in mindfulness-based stress reduction interventions have often responded with alleviation of depressive symptoms (Sephton et al., 2007). Dispositional mindfulness has also been previously found to be significantly associated with greater psychological well-being and lower levels of perceived stress among college students (Zimmaro et al., 2016). In musicians, it has also been shown in previous research that performance quality is reduced with as performance anxiety increases, and that mindfulness interventions were effective in reducing performance anxiety. In addition, higher trait mindfulness predicts lower performance anxiety (Lecuona de la Cruz & Rodríguez-Carvajal, 2014; Diaz, 2018).

I found no significant differences between the instrument categories and levels of anxiety and depression. Thus, the results of this study suggest that mental distress in the

current sample was not correlated with instrument category. This finding differs from the findings of Vaag et al. (2015) who found that vocalists, keyboard, and string musicians had elevated levels of psychological distress compared to brass and woodwind instruments (2015). Buttsworth and Smith found that string musicians had more anxiety than brass musicians, and that keyboard players were more emotionally stable overall, a finding that was also not supported by the current results (1995). One explanation for this discrepancy may be that the populations measured by Vaag et al. (2015) and Buttsworth and Smith (1995) were professional musicians while the present study assessed a student population. If, as our data suggests, there are no relationships between instrument category and mental health outcomes within a college musician population, there is a need for future research that explores when differences in mental distress may arise in the career trajectory of professional musicians.

Practice time was also not significantly correlated with anxiety or depression, suggesting that that amount of time that an individual practices is not linked with levels of distress in this sample. This is particularly interesting, as it may be expected that musicians who suffer from anxiety and/or depression may be less likely to manage demanding practice schedules. Some symptoms of a depressive episode include loss of interest and pleasure in formerly enjoyable activities, decreased concentration, and fatigue; all of which would point towards less motivation to practice and less practice time (American Psychiatric Association, 2022).

Interestingly, the anxiety and depression inventories were not associated with deliberate practice scores. It could be conjectured that while deliberate practice and mindfulness are associated, instrumentalists experience far more in their life besides their

practice time, so while the trait mindfulness is associated with deliberate practice skills, anxiety and depression may function outside of deliberate practice in other areas of life, explaining the absence of any association between deliberate practice and trait mindfulness.

Interestingly, secondary analyses showed that deliberate practice was positively associated with practice time, suggesting that instrumentalists who practice deliberately also practice more. Of the DPMI subscales, only process improvement was associated with practice time. Whereas past research found that weekly practice time was moderately negatively associated with musical achievement, (i.e., more practice time was previously linked with poorer performance; Bonneville-Roussy & Bouffard, 2015), the present study suggests that the instrumentalists who practiced more also practiced deliberately, increasing their chances of better performance. It is also interesting to note that while deliberate practice was correlated with practice time, there was no correlation between mindfulness and practice time.

The instrument categories were not associated with practice time in this study. This finding concurs with those of previous research showing no significant differences between categories and suggesting – at least in this sample -- that instrumental musicians all tend to have similar routines regarding practice, as well as similar levels of trait mindfulness and mental distress.

Limitations

There are at least three possible limitations to the present study. The first is the cross sectional, correlational nature of the study: I cannot infer directionality or causality from these data. The second is that these findings are from a population of musicians that

had very little diversity, limiting the generalizability. A larger sample size in a more general instrumental audience would significantly improve the generalizability of the findings. As the study was conducted among undergraduate musicians, I am not able to generalize outside of a college musician population (e.g., I can make no inferences regarding professional musicians). The third limitation is that while the questionnaires were distributed to all of the population, only 46% of our instrumentalist population completed the questionnaires, and there are possible sample biases due to distractions related to roommates and the burdens of work taken on in addition to college classes.

Implications

Despite these limitations, these results suggest several theoretical and practical implications, the first regarding possibly unhelpful stereotypes related to instrument categories. As Cribb and Gregory found, stereotypes related to instrument categories are prevalent (1999). The stereotype that brass players do not have much anxiety, and the string players are often on edge, at least in this population has been shown to be insignificant. Stereotype threat might cause problems for instrumentalists in these categories. Previous research on gender differences in the expression of anxiety and depression has shown that individuals present their anxiety or depression in the way they are stereotypically expected to, which can cause complications in finding help and healing (Chevron et al., 1978). This finding could be generalized towards the stereotypes known to be associated with instrumental musicians: a musician may be likely to act out their stereotype rather than living free from these unnecessary assumptions.

A major strength of this study was that the Deliberate Practice in Music Inventory (DPMI) has not been a subject of much research, so all findings including this deliberate practice inventory are new and novel findings that beg for more analyses and research. The relationship between deliberate practice and mindfulness, as well as deliberate practice and practice time both suggest some possible interventions. A seminar for musicians teaching deliberate practice skills to improve practice effectivity could both lengthen practice time, lead to better performance, and increase mindfulness levels. Or a mindfulness training could lead to more deliberate practice. By utilizing already established practice time for mindfulness growth, some of the negative effects on musician mental well-being could be mitigated. The direction or possibility of causality would need to be identified in future research, but more mindfulness and deliberate practice would be beneficial for musician's mental health and performance outcomes. Future research is needed to see if deliberate practice interventions could not only elevate mindfulness levels, but also possibly lower anxiety and depression levels.

While this study did not find any significant differences between instrument categories, this research is noteworthy in that it found new relationships between deliberate practice and mindfulness, and deliberate practice and practice time in musicians. Future research analyzing these relationships within a more generalized instrumental musician population is needed, but these findings should begin the discussion on how to use practice already in place to further positive mental health outcomes among musicians.

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Appendix

Deliberate Practice in Music Inventory

Process Improvement

3. The work I do on a piece, is part of a long-term practicing plan.
4. I analyze technical problems.
5. I check the effectiveness of the technique I am using.
6. Problems require specific thinking and planning.
7. I invest time in analyzing and understanding problems.
11. I evaluate the effectiveness of my practice.
12. If a problem does not get better, I change my strategy.
19. I analyze the way I practice in order to improve.
20. I refine the way I practice.
21. I read academic papers about practice.

Practice Competences

1. I know what I am doing.
2. I know what I need to achieve.
8. I know how to fix all the problems I find.
- R9. I do not know how to achieve what I want.
- R10. I do not know how to fix problems.
22. I know how to use my body efficiently to play music.

Mindless Practice

13. I playthrough a piece mindlessly, over and over.
14. I repeat passages without a purpose.

15. I repeat mistakes without fixing them.

23. I rush my musical work.

Task Decomposition

16. I divide difficult passages into smaller tasks.

17. If a problem is difficult to fix, I try to break it up into smaller ones.

18. I focus on short problematic passages.