Professional status matters: Differences in flow proneness between professional and amateur contemporary musicians

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Achieving peak performance for musicians often requires getting into a state of flow. Experiencing this state depends on various genetic and environmental factors; however, the importance of one's professional status in relation to flow remains unexplored. Therefore, we investigated the differences in flow proneness between professional and amateur musicians in a large sample (N = 664) of contemporary musicians. We found that professional musicians were significantly more flow prone in music than their amateur counterparts, and artists were significantly more flow prone than record producers. Further, professional musicians were more flow prone in their daily lives, suggesting a potential crossover effect of pursuing a flow-inducing activity to a professional level. Instrument, genre, and type of training did not influence flow proneness, and finally, trait anxiety was not significantly higher in professional musicians. Overall, this study highlights the positive consequences of pursuing music professionally and provides insight into the nuances of music professions that may influence flow proneness.

Keywords: flow state; music; Csikszentmihalyi; individual differences; anxiety; professional musician; flow proneness

Introduction

Feeling lost in the music or being ‘in the zone’ are expressions familiar to many musicians and are often anecdotal instances of flow state (Chirico et al., 2015). Flow is a level of consciousness defined by total absorption, high yet effortless performance, and is intrinsically enjoyable (Csikszentmihalyi, 1990). It can be achieved during daily activities (Csikszentmihalyi & Rathunde, 1993) but is frequently attained by those proficient in pursuits such as climbing, surgery, or music (Csikszentmihalyi, 1975). Music-making of all varieties is known to induce flow (Forbes, 2021; MacDonald et al., 2006) and is particularly beneficial in highly creative scenarios (Doyle, 2017). When flow is present, the beholder experiences effortless yet precise actions, particularly during demanding situations, and is highly desirable. Although some people are naturally more flow prone, with the heritability rate thought to be between 29-35% (Mosing, Magnusson, et al., 2012), there are also links to flow-conducing personality factors such as conscientiousness, openness (de Manzano et al., 2013; Ullén et al., 2012), emotional intelligence and low trait anxiety (Marin & Bhattacharya, 2013; Rakei et al., 2022). Furthermore, there are positive associations with environmental factors in musicians, such as the hours dedicated to musical practice (Marin & Bhattacharya, 2013) and general musical training (Rakei et al., 2022; Tan et al., 2021).

Professional musicians face particular stresses and anxieties, such as persistent work instability and irregular pay (Gross & Musgrave, 2020). However, flow-prone musicians may secure the motivation from positive flow experiences to continue pursuing their professional careers in the face of adversity. While flow is usually achieved during intrinsically motivating activities, sometimes referred to as autotelic activities (Csikszentmihalyi, 1990), studies have found that people generally experience more flow at work than during leisure activities (Csikszentmihalyi, 1975; Engeser & Baumann, 2016). The competitive and demanding work

environment may be an ideal setting for flow. Social convention tells us that work is mandatory and thus boring, whereas leisure is inherently enjoyable. However, this paradox may be less present in creative and autonomic occupations, such as music, where lifelong passions are pursued professionally, and skill mastery creates life satisfaction (Delle Fave et al., 2011). Flow may, therefore, be more attainable by those 'following their dream' than those pursuing a passion in their spare time.

Furthermore, skill in a particular area is imperative for achieving flow (Csikszentmihalyi, 1997), and highly trained musicians are more prone to flow states (O'Neill, 1999; Rakei et al., 2022; Tan et al., 2021). The more one practices, the more opportunities one has to find the 'challenge-skill balance,' which is a fundamental component of flow (Engeser & Rheinberg, 2008; Fullagar et al., 2013). The challenge-skill balance requires the difficulty of the task to slightly stretch the skill level of the subject, fostering the demand for focus (Csikszentmihalyi, 1990). Professional musicians spend more time cultivating their musical abilities (Ericsson et al., 1993; Lehmann & Ericsson, 1997; Sloboda et al., 1996) and may, therefore, be more flow prone than amateurs who have less time to dedicate to mastering their instrument. Sinnamon et al. (2012) found that elite music students scored significantly higher in the challenge-skill balance and clear goals flow dimensions than their amateur counterparts, although their overall flow scores were not significantly different.

Flow experiences have many similarities throughout unrelated activities (Csikszentmihalyi, 1975), yet the environment in which it occurs may directly affect the prevalence of those experiences. Receiving unambiguous feedback and clear goals are two of the nine flow dimensions (Nakamura & Csikszentmihalyi, 2009), and these may contribute to proneness differences arising from contrasting professional settings. For example, a violinist receives immediate sensory feedback when playing their instrument; the moment they are out of tune or time, they can modulate their playing to increase the accuracy of their performance. On the other hand, record producers have more ambiguous feedback as the success of their work may be based on interhuman feedback – how happy their client is with the work – creating a more complex feedback channel. Furthermore, working with other individuals may restrict flow opportunities compared to musicians who work alone, have greater control over their environment, and have clear goals. However, to our knowledge, no research has explored the difference in flow proneness among music professionals.

The recognition of music's healing benefits is widely established (Andrade & Bhattacharya, 2018; Thaut, 2015); however, for professional musicians, these benefits of music may be counteracted by mental stress, anxiety, and financial instability (Berg et al., 2022). Musicians frequently contend with music performance anxiety (MPA), commonly referred to as stage fright, which is known to have an inverse

relationship with flow proneness (Cohen & Bodner, 2018). Anxiety is often described as the antithesis of flow (Csikszentmihalyi, 1975, 1990), and musicians who achieve flow regularly report a greater sense of wellbeing (Fritz & Avsec, 2007), along with lower levels of anxiety, both at the trait (Rakei et al., 2022) and at the state level – MPA in this case (Cohen & Bodner, 2018; Kirchner et al., 2008). Cohen and Bodner (2018, 2019b, 2019a) have suggested the possibility of utilising flow as a means to managing MPA and have found differences in both anxiety and flow amongst orchestral musicians. Understanding these distinctions in anxiety and flow within a contemporary musical context is important, as the dynamics of roles, musical genres and instruments do not have direct parallels. While it is plausible that achieving a flow state could be harnessed as a tool to alleviate anxiety, it remains unclear whether achieving a flow state in performance would mitigate stage fright or if pre-existing anxiety would prevent the flow state from occurring.

The primary purpose of this study is to examine the differences in flow proneness and trait anxiety amongst professional and amateur musicians in a large sample of contemporary musicians. We predicted that (i) professional musicians would be more flow prone in relation to musical activities than amateurs due to their higher skill mastery and professional satisfaction, and (ii) this increased flow proneness in musical activities would extend to other activities in their daily lives, suggesting a transfer of flow state into their daily experiences. We also predicted that (iii) distinctive music professions would have different flow proneness due to the diverse work environments experienced by career musicians, such as, music composer working alone, music teacher working with children, or session musician working with other musicians. In addition, we explored whether the main instrument and main genre impacted flow proneness and predicted that (iv) the formal classical training, known for its systematic and exhaustive techniques, would increase flow proneness. Finally, we investigated trait anxiety levels and predicted that (v) professional musicians would have higher levels of trait anxiety, particularly in careers characterized by low self-agency and financial instability, such as session musicians and artists (vi).

Materials and methods

Participants

The final set of participants was 664 contemporary musicians; see Table 1 for details. The musicians were identified as contemporary based on their chosen primary genre; musicians who selected classical were excluded from this study, as our research focused primarily on the experiences of contemporary musicians. Musicians were also asked about their training, specifically if they had received classical training, defined as "a

number of years of formal training in classical music." The sample size to achieve 80% power with an effect size of $r = .30$ (Cohen & Bodner, 2018; Kranjčev & Vukasović Hlupić, 2021; Tan et al., 2021) for Analysis of Covariance (ANCOVA) was 190 (Faul et al., 2007); therefore, our sample size was sufficient. Data were collected from 15 March 2021 until 1 June 2021.

Table 1. Participant summary

Age	18-73 ($M = 26.24$, $SD = 6.93$)	
Gender	***N***	**%**
Male	469	71%
Female	186	28%
Other	9	1%
Location		
United Kingdom	227	34%
United States	86	13%
Germany	48	7%
Australia	44	7%
Other	259	39%
Professional Status		
Yes	370	56%
No	294	44%
Music Profession		
Artists	141	21%
Session Musicians	50	8%
Record Producers	43	6%
Singers	40	6%
Other	35	5%
Music Teachers	34	5%
Composers	20	3%
Music Therapists	4	1%
DJs	3	<1%
Classical Training		
No	391	59%
Yes	273	41%
Main Genre		
R&B/Soul	185	28%
Alternative/Indie	143	22%
Jazz	116	17%
Pop	59	9%
Electronica	42	6%
Rock	28	4%
Hip Hop/Rap	23	3%
Folk	21	3%
Other	47	8%
Main Instrument		
Guitar	214	32%
Singers	161	24%
Pianist/Keyboard Player	109	16%
Drummers	71	11%
Bass Guitarist/Double Bassists	57	9%
Wind Players	12	2%
Other	40	6%

Materials

As part of a larger research project [redacted], participants were recruited and asked about their demographics and musical background before completing a series of questionnaires. The questionnaires were randomly assigned in blocks of varying importance. The first block included flow proneness, trait anxiety, emotional intelligence, musical sophistication, and personality, while the following blocks included the locus of control, grit, and flow in daily life, with flow mindset being the final questionnaire. Only flow proneness, trait anxiety and flow in daily life were analysed in the current study.

Demographic data and questions about musical background were collected at the beginning of the study, including the participant's main instrument, the genre of music played, classical training, the age of starting to play or sing, and whether they were a musical professional. The final question regarding the music profession refers to (i) whether they are a professional musician and (ii) the profession in which they were engaged.

Dispositional flow, or flow proneness, was measured using the *Dispositional Flow Scale-2* (DFS-2) (Jackson & Eklund, 2002), which includes 36 items related to the nine dimensions of flow. Participants were asked to draw up their thoughts and feelings while playing their instrument, whether composing, practising, improvising, or performing. The question was intentionally open, as musicians may experience flow in any or all of these scenarios. Participants rated their responses on a 5-point scale between Never and Always.

Trait anxiety was measured using the trait half of the *State-Trait Anxiety Inventory Y-2* (STAI-T) (Spielberger et al., 1983), which includes 20 items rated on a 4-point scale between Almost never to Almost always.

Flow in daily life was measured using the short version of the DFS-2 (Jackson et al., 2008), with participants answering 9 items corresponding to the nine dimensions of flow on a 5-point scale between Never and Always.

Procedure

We collected data online via Qualtrics®. Participants were recruited by advertising our study on the social media accounts of contemporary professional musicians acquainted with the experimenter. The survey language was English. First, participants were presented with an information sheet and the General Data Protection Regulation (GDPR) form. Subsequently, informed consent was obtained before the participants agreed to proceed with the experiment. After completing the survey, participants were allowed to submit their email addresses for a prize draw; all responses were anonymized before data screening. The study protocol was approved by the Local Ethics Committee of the Psychology Department of Goldsmiths, University of London.

Statistical analyses

The analysis was performed using Jamovi for MacOS (The jamovi project, 2021). The Mahalanobis distance analysis identified nine multivariate outliers removed from the dataset, leaving $N = 664$ as our final sample size for subsequent analysis. In addition, ANCOVA was used to compare the two groups, professional and amateur musicians, in their flow proneness in music and flow proneness in daily life, whilst controlling for age and gender. Gender results were converted into integers for this test. Independent samples *t*-tests were used to identify significant differences in the flow dimensions between artists and record producers. We used a Mann-Whitney U test for trait anxiety as the measure was not normally distributed. Pearson's correlation (*r)* estimated the strength of the relationship between daily flow and musical flow, and we computed Fisher's z score to investigate the differences between the professional and amateur musicians.

A one-way ANOVA measured the differences in flow dimensions between professional and amateur musicians. Another one-way ANOVA was used to identify whether the type of music profession (amongst professionals only) was predictive of musical flow proneness. The Levene's test was non-significant ($p = .865$), suggesting that the groups had equal variances, and therefore Fisher's ANOVA and Tukey's post hoc test were used. Further ANOVA models were run on the whole dataset with the main instrument and main genre as predictors and musical flow as the dependent variable. Separate models were run for each predictor as the *k*-1 requirement for ANOVA meant that different groups were included for each analysis. A subsequent one-way ANOVA on professionals only examined differences in trait anxiety between professions. The assumptions were met for all ANOVA models.

As multiple *t*-tests and ANOVA models were used in this study, we controlled for type-1 errors by applying the false discovery method (Benjamini & Hochberg, 1995) at $\alpha=0.05$; the corrected two-tailed *a* level was set at .023.

Results

In our final data set, we had six-hundred and sixty-four contemporary musicians; participants, on average, took 30.16 min to complete the survey. Group-wise (professional, amateur) descriptive statistics of musical flow, daily flow, and trait anxiety are shown in Table 2. Musical flow and daily flow were normally distributed but trait anxiety was not, therefore, appropriate non-parametric tests were used where relevant. McDonald's ω (McDonald, 1999) demonstrated that all variables had acceptable reliability ($0.75 < \omega < 0.93$).

Table 2. Descriptive statistics of musical flow, daily flow and trait anxiety

	Professional Status	Mean	SD	Min	Max	ω
Musical Flow	Total	3.59	0.44	2.03	5.00	0.92
	Amateur	3.49	0.44	2.03	4.72	0.92
	Professional	3.67	0.43	2.75	5.00	0.92
Daily Flow	Total	3.46	0.47	1.89	5.00	0.75
	Amateur	3.36	0.46	1.89	4.67	0.73
	Professional	3.54	0.46	2.00	5.00	0.76
Trait Anxiety	Total	47.80	10.44	20.00	79.00	0.92
	Amateur	48.65	10.94	25.00	79.00	0.93
	Professional	47.13	9.99	20.00	71.00	0.91

Total N = 664, *Amateur N* = 294, *Professional N* = 370; *standard deviation (SD), minimum (Min), maximum (Max), ω = McDonald's omega*

Professional musicians reported higher musical flow proneness than amateur musicians, even after controlling for age and gender ($F(1,660) = 30.59$, $p < .001$, $\eta^2 = 0.044$) (Fig. 1). There was also a significant difference in the daily flow proneness between professional and amateur musicians ($F(1,660) = 26.41$, $p < .001$, $\eta^2 = 0.038$) (Fig. 1). A significant correlation was found between musical flow and daily flow ($r = 0.57$, $p < .001$), and this was larger in professional musicians ($r = 0.58$, $p < .001$) than in amateurs ($r = 0.52$, $p < .001$), but the difference between the two correlations was not significant (Fisher's $z = 1.1$, $p = .271$). Furthermore, professional musicians scored significantly higher than amateurs in every flow dimension except loss of self-consciousness, transformation of time, and autotelic experience (Table 3). The largest differences were in challenge-skill balance ($\eta^2 = 0.08$) and clear goals ($\eta^2 = 0.08$).

[Fig. 1 here]

Table 3. Descriptive statistics of the 9 flow dimensions and a one-way ANOVA comparing amateur and professionals

Flow Dimension	Professional Status	Mean	SD	ω	F(1, 662)	p
Challenge-skill balance	Total	3.52	0.59	0.75		
	Amateur	3.34	0.58	0.75	53.01	<.001
	Professional	3.67	0.56	0.72		
Merging action-awareness	Total	3.56	0.62	0.75		
	Amateur	3.45	0.63	0.76	16.31	<.001
	Professional	3.64	0.59	0.73		
Clear goals	Total	3.58	0.73	0.84		
	Amateur	3.35	0.74	0.83	55.89	<.001
	Professional	3.77	0.68	0.82		
Unambiguous feedback	Total	3.75	0.76	0.88		
	Amateur	3.64	0.77	0.89	11.44	<.001
	Professional	3.84	0.74	0.86		
Concentration on task	Total	3.63	0.70	0.84		

	Amateur	3.55	0.75	0.84	5.30	0.022
	Professional	3.68	0.66	0.83		
Sense of control	Total	3.57	0.63	0.81		
	Amateur	3.47	0.64	0.80	13.48	<.001
	Professional	3.65	0.61	0.82		
Loss of self-consciousness	Total	2.82	0.89	0.87		
	Amateur	2.77	0.88	0.87	1.45	0.229
	Professional	2.86	0.90	0.87		
Transformation of time	Total	3.73	0.78	0.86		
	Amateur	3.69	0.80	0.87	1.26	0.262
	Professional	3.76	0.78	0.86		
Autotelic experience	Total	4.17	0.60	0.81		
	Amateur	4.15	0.60	0.81	0.56	0.455
	Professional	4.19	0.61	0.81		

Total N = 664, *Amateur n* = 294, *Professional n* = 370; *standard deviation (SD), ω = McDonald's omega*

Next, we investigated the effect of the musical profession on flow proneness by a one-way ANOVA. Due to the *k*-1 requirement for ANOVA (where *k* is the number of groups), we included the six professions that met this specification (a minimum of 8 participants per group); artist (n = 141), session musician (n = 50), record producer (n = 43), singer (n = 40), music teacher (n = 34) and composer (n = 20). We found a statistically significant difference in the musical flow proneness of different music professions ($F(5, 322) = 2.80$, $p = .017$, $\eta^2 = 0.04$). Tukey's post hoc HSD test revealed that the musical flow proneness of artists ($M = 3.75$, $SD = 0.43$) was significantly higher ($p = .006$) than record producers ($M = 3.49$, $SD = 0.44$). While singers and composers also had high musical flow proneness (Fig. 2), they were not significantly higher than record producers (p = .101, $p = .380$ respectively); no other between-group mean differences were significant. Further, posthoc testing looked at the nine flow dimension scores of artists and record producers to determine which elements of flow had the biggest influence over the increased flow proneness of artists. Independent *t*-tests revealed that the only significant differences were in "unambiguous feedback" (artist; $M = 3.89$, $SD = 0.73$, record producer; $M = 3.48$, $SD = 0.77$, $t(182) = 3.15$, $p = .002$) and "clear goals" (artist; $M = 3.86$, $SD = 0.69$, record producer; $M = 3.43$, $SD = 0.61$, $t(182) = 3.36$, $p < .001$).

[Fig. 2 here]

Another one-way ANOVA was conducted to assess the musical flow proneness of all participants across different genres of music. A minimum of 13 participants per group were required for this analysis; therefore, we included the following groups; R&B/soul (n = 185), alternative/indie (n = 143), jazz (n = 116),

pop (n = 59), electronica (n = 42), rock (n = 28), hip hop/rap (n = 23) and folk (n = 21). There was no statistically significant difference in musical flow proneness between genres ($F(7, 609) = 1.67$, $p = .114$).

A subsequent one-way ANOVA compared the effect of the main instrument on musical flow proneness. A minimum of 11 participants per group were required for this analysis, and we included the following instrument groups: guitar (n = 214), singer (n = 161), piano/keyboard (n = 109), drums (n = 71) and bass guitar/double bass (n = 57). Results indicated that musical flow proneness was not significantly different between different instrumentalists ($F(4, 217) = 1.18$, $p = .321$). In order to assess whether classical training significantly affected musical flow proneness, an independent samples t-test was conducted. We found no statistical difference ($t(662) = -1.25$, $p = .213$) between musicians with classical training ($M = 3.62$, $SD = 0.41$) and those without it ($M = 3.57$, $SD = 0.46$).

Finally, we explored the trait anxiety values. As the normality assumption was not met ($W = 0.99$, $p = .01$), we performed a Mann-Whitney U test. We did not find any difference in trait anxiety ($t(662) = 50272$, $p = .093$) between the professionals ($M = 47.13$, $SD = 10.94$) and the amateurs ($M = 48.65$, $SD = 9.99$). A one-way ANOVA was performed within the professional group (using the same grouping parameters as the previous music profession ANOVA) to investigate trait anxiety across music professions. We did not observe any significant difference in trait anxiety values between music professions ($F(5, 322) = 1.17$, $p = .325$), however, we did observe some fluctuations in the mean values of trait anxiety scores (Fig. 3); for example, session musicians had slightly higher mean trait anxiety scores ($M = 49.18$, $SD = 9.44$) than other professions, whereas music teachers ($M = 44.68$, $SD = 11.07$) and singers ($M = 45.35$, $SD = 9.66$) had slightly lower scores.

[Fig. 3 here]

Discussion

This study investigated whether flow proneness differed between professional and amateur musicians and between different musical professions. We looked at flow in both music-making and daily activities. Further, we investigated the influence of instruments, musical genres, and formal classical training on flow proneness. Finally, we explored the difference in trait anxiety levels. The key findings are as follows. (i) Professional musicians reported higher musical flow proneness and (ii) daily flow proneness than amateur musicians. (iii) Musical flow differed amongst professions, with artists being more flow prone than record producers. (iii) Singers and composers also had a high flow proneness, although no other within-group difference was significant. (iv) Classical training was not associated with more musical flow proneness. Finally,

(v) there was no significant difference in trait anxiety levels between professional and amateur musicians, and (vi) trait anxiety did not differ significantly between professions. In the spaces below, we discuss these findings and include some limitations of our study.

As predicted, professional musicians experience musical flow states more frequently than amateur musicians. Several potential influences are worth considering; a career in music may increase determination and pressure to cultivate skills, thus providing more opportunities to reach the challenge-skill balance (Engeser & Rheinberg, 2008). Our findings support this, as professional musicians had significantly higher challenge-skill balance scores than amateur musicians, echoing findings in highly trained music students (Sinnamon et al., 2012). There may be a greater risk involved in professional music-making, such as performing live in front of an audience, and risk often necessitates a higher level of concentration. This need for intense concentration drives the merging of action and awareness dimension - when actions become automatic and effortless (Csikszentmihalyi, 1990) - which we found to be higher in professionals. Furthermore, the increased level of control some professionals have over their regular environment may explain the higher clear goals and the sense of control scores in professionals. These factors may be domain-general, wherein professional status is closely tied to expertise, which serves as the mechanism underlying the increased flow proneness in professionals. Expertise has been a subject of discussion since Csikszentmihalyi (1990) originally introduced the concept of flow. It is important to clarify that flow differs from peak performance (Privette, 1983) in that flow is characterised by its effortless nature, intense enjoyment and intrinsic motivation, while peak performance is characterised by superior functioning. Professional musicians are thought to have higher levels of intrinsic motivation (Appelgren et al., 2019), potentially leading to more active engagement compared to amateurs, who may pursue music on a more passive level. However, the flow dimension of autotelic experience was equally pronounced for both professionals and amateurs, suggesting that music as an activity can be intrinsically rewarding irrespective of motivation and professional status. There are wide-ranging discussions regarding the therapeutic benefits of music-making through creativity (Tomaino, 2013; Wilhelmsen, 2012) and self-expression (Epp, 2007), which may contribute to their general wellbeing (Musgrave, 2022). Furthermore, wellbeing may also be improved through experiencing flow states (Martin Sedlár, 2014), not only from music-making but potentially from any activity that is a focus of motivation or enjoyment.

Professional musicians experience a higher degree of flow proneness than amateurs in both their music-making and their daily lives, suggesting the possibility of a spillover effect (Galizzi & Whitmarsh, 2019). This effect implies that the advantages gained from pursuing a passion as a career or mastering a skill to a

professional level extend into the daily lives of music professionals. Conversely, it is plausible that individuals who are naturally prone to flow may be more inclined to pursue a professional career in music. The positive impact of frequent flow experiences on happiness and wellbeing (Asakawa, 2010; Csíkszentmihályi, 2002; Fritz & Avsec, 2007; Martin Sedlár, 2014), or simply the flow experiences themselves, may serve as motivation for young musicians to dedicate more hours to perfecting their craft, ultimately attaining professional opportunities. It is important to note here that our findings do not allow inferring the direction of causation. However, considering that there are genetic factors influencing flow proneness (Mosing, Magnusson, et al., 2012) and expertise, as proposed by the multifactorial gene-environment interaction model (Ullén et al., 2016), which encompasses various factors including motivation, intelligence and deliberate practice, the likelihood of achieving professional status may also have a hereditary component; however, this aspect is beyond the scope of the present study.

Through exploratory analysis, we found that there was no difference in flow proneness between the musicians' chosen main instrument or genre. However, post hoc contrasts on music professions revealed that artists achieve more flow than record producers, which could be explained by differences in autonomy and freedom to express themselves creatively. The flow dimensions driving this difference were clear goals and unambiguous feedback. Record producers working with a lead artist often facilitate others' goals and will need to be emotionally in tune with their collaborators to decode their feedback and goals to achieve these necessary conditions for flow to occur. In comparison, artists have clear personal goals and receive feedback in more intrapersonal ways, allowing them greater control over their flow experiences. Previous research suggests that different groups of instrumentalists had different flow proneness, with MPA exerting a moderating effect; string players had lower flow and higher MPA than percussionists (Cohen & Bodner, 2018). The roles and responsibilities of certain orchestral instrumentalists may elicit more MPA than others and, therefore, may prevent or reduce flow. Studying contemporary band set-ups in a live environment may reveal whether performance anxiety impacts flow experiences for certain types of instrumentalists or for musicians with higher or more ambiguous demands. Future studies could observe whether effective MPA management can help increase flow experiences for less-prone individuals.

We also explored whether musicians who had received training in classical music were more flow prone than their non-classically trained counterparts. Classical training often involves rigorous and disciplined pedagogy traditionally considered superior in producing highly skilled musicians (Johnson, 2002). Skill, as mentioned previously, is an important feature of flow proneness in musicians (Cohen & Bodner, 2019b).

However, our data revealed that flow proneness was not impacted by whether contemporary musicians received classical training or not. Hypothetically, those who did not receive classical training may have innate motivation sufficient for skill mastery, or other training styles, such as jazz, may be equally as effective at producing skilled musicians; future research should explore this further.

Anxiety affects a substantial proportion of musicians, between 54-71% (Gross & Musgrave, 2020; Loveday et al., 2022), and there are several particular stressors, such as instability of work and pressure from the public eye, which may exclusively burden professionals. Our study explored trait anxiety in amateur and professional musicians and found no significant differences suggesting that anxiety at the trait level does not affect the low mental wellbeing witnessed in career musicians (Musgrave, 2022). Our results are in line with the recent study by Loveday et al. (2022) investigating anxiety, depression and wellbeing in professional and nonprofessional musicians. However, they identified significantly higher levels of depression and lower wellbeing in professional musicians, which they attributed to the prevalence of stressors specific to the music industry rather than underlying trait-level influences. Of note, trait anxiety exhibits a negative relationship with flow proneness (Rakei et al., 2022) and flow experiences have been shown to potentially mitigate MPA (Cohen & Bodner, 2018, 2019b, 2019a). Therefore, the higher flow proneness in professional musicians in our study may serve as a protective mechanism counteracting anxiety and the stressors specific to the music industry experienced by professionals. Contrary to our initial prediction, we did not find significant differences in trait anxiety levels between music professions, suggesting that the specific stressors associated with individual professions within the music industry may not have a substantial impact on the overall tendency to experience anxiety. However, Loveday et al. (2022) found that solo or lead artists had higher levels of state anxiety and depression scores than other types of musicians, although principal orchestral players had higher flow than tutti players (Cohen & Bodner, 2018). Therefore, further research is needed to understand these nuances between anxiety and flow with different musical roles. It is worth noting that the negative correlation between flow and anxiety may have multiple contributions to consider beyond professional status or specific music profession, such as personality (Heller et al., 2015; Smith & Rickard, 2004), genetic predispositions (Gyurkovics et al., 2016; Jardine et al., 1984; Mosing, Pedersen, et al., 2012) and emotional intelligence (Marin & Bhattacharya, 2013; Rakei et al., 2022).

Our study has several limitations as follows. First, we used the short version of the DFS-2 scale for the daily flow questionnaire, restricting direct comparisons between the two flow measures – musical flow and daily flow. Full-length scales would have been more appropriate if they are to be evaluated side by side. Second, our

study focused strategically on contemporary musicians only, so caution must be exercised before generalising our findings to other types of musicians. Earlier research on musical flow proneness focuses exclusively on classical musicians (Cohen & Bodner, 2018; Fritz & Avsec, 2007; Marin & Bhattacharya, 2013) and we believe it is important to recognise that contemporary musicians have different employment opportunities, training, motivation and commitment to music than classical musicians (Rakei et al., 2022). Third, we did not measure the state anxiety. Most entertainment venues were closed due to the coronavirus pandemic during our data collection, and it was deemed inappropriate to include the state anxiety questionnaire as musicians would not have had a recent musical experience to refer to. Nevertheless, the absence of state anxiety data may limit our understanding of our participants' immediate anxiety levels during the data collection period. Fourth, there are a number of other variables that may warrant exploration in future research, such as interoception, musician's awareness of their own or fellow musicians' thought processes, and how frequently individuals play music alone or with others. These factors could provide valuable insights into the intricacies of flow in musical contexts. Fifth, our operationalisation of professional status could have been more effectively controlled using other validated measures, such as the Creative Achievement Questionnaire (Carson et al., 2013) or the Inventory of Creative Activities and Achievements (Diedrich et al., 2018). Finally, our measurement of anxiety focused exclusively on trait anxiety; consequently, our null findings should be cautiously interpreted and restricted to only trait anxiety. Future studies could explore the link between flow and creativity anxiety in musicians (Daker et al., 2020), which has been shown to be complex in other creative domains, such as dance (Thomson & Jaque, 2023).

In conclusion, our research reports a significant difference in flow proneness in both music-making and daily activities between amateur and professional contemporary musicians. Professional musicians achieve flow more regularly than amateur musicians, which may be influenced by skill mastery or life satisfaction from pursuing a creative passion as a career. Alternatively, there may be an opposite causal relationship where flow prone individuals are more likely to become professional musicians, i.e., the lasting positive effects of flow experiences drive the musician to continue practising and eventually mastering their instrument. There may also be a third variable influencing flow proneness, such as conscientiousness, which could propel one into a professional career and increase flow proneness concurrently. The increased daily flow experiences among professional musicians could indicate a spillover effect from pursuing a career that aligns with their passion and mastery of a specific skill. Alternatively, individuals prone to experiencing flow may engage in activities that foster it more frequently, regardless of the chosen activity type. Furthermore, we find that artists have

statistically higher flow proneness than record producers but that no other within-group profession was significantly higher than another. The instrument, genre, and classical training were not predictive of flow proneness, and trait anxiety was not higher in professional musicians than in amateurs. Further research will be needed to establish the causes of the increased flow proneness in professional contemporary musicians, which may offer unique insights into achieving more flow and, therefore, greater wellbeing.

Disclosure statement

The authors report there are no competing interests to declare.

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Data availability statement

The data that support the findings of this study were part of a larger research project and are openly available in OSF https://doi.org/10.17605/OSF.IO/3MPFD.

References

Andrade, P. E., & Bhattacharya, J. (2018). Not Cure But Heal: Music and Medicine. In A. Cheung-Hoi Yu & L. Li (Eds.), *Systems Neuroscience* (pp. 283–307). Springer International Publishing. https://doi.org/10.1007/978-3-319-94593-4_11

Appelgren, A., Osika, W., Theorell, T., Madison, G., & Bojner Horwitz, E. (2019). Tuning in on motivation: Differences between non-musicians, amateurs, and professional musicians. *Psychology of Music*, *47*(6), 864–873. https://doi.org/10.1177/0305735619861435

Asakawa, K. (2010). Flow experience, culture, and well-being: How do autotelic Japanese college students feel, behave, and think in their daily lives? *Journal of Happiness Studies*, *11*(2), 205–223. https://doi.org/10.1007/s10902-008-9132-3

Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: A practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society: Series B (Methodological)*, *57*(1), 289–300. https://doi.org/10.1111/j.2517-6161.1995.tb02031.x

Berg, L., King, B., Koenig, J., & McRoberts, R. L. (2022). Musician occupational and financial stress and mental health burden. *Psychology of Music*, *50*(6), 1801–1815. https://doi.org/10.1177/03057356211064642

Carson, S. H., Peterson, J. B., & Higgins, D. M. (2013). *Creative Achievement Questionnaire* [dataset]. https://doi.org/10.1037/t05569-000

Chirico, A., Serino, S., Cipresso, P., Gaggioli, A., & Riva, G. (2015). When music "flows". State and trait in musical performance, composition and listening: A systematic review. *Frontiers in Psychology*, *6*. https://doi.org/10.3389/fpsyg.2015.00906

Cohen, S., & Bodner, E. (2018). The relationship between flow and music performance anxiety amongst professional classical orchestral musicians. *Psychology of Music*, *47*(3), 420–435. https://doi.org/10.1177/0305735618754689

Cohen, S., & Bodner, E. (2019a). Flow and music performance anxiety: The influence of contextual and background variables. *Musicae Scientiae*, 1029864919838600. https://doi.org/10.1177/1029864919838600

Cohen, S., & Bodner, E. (2019b). Music performance skills: A two-pronged approach – facilitating optimal music performance and reducing music performance anxiety. *Psychology of Music*, *47*(4), 521–538. https://doi.org/10.1177/0305735618765349

Csikszentmihalyi, M. (1975). *Beyond boredom and anxiety* (pp. xxx, 231). Jossey-Bass.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience* (Nachdr.). Harper [and] Row.

Csikszentmihalyi, M. (1997). *Finding flow: The psychology of engagement with everyday life* (1. ed., [Nachdr.]). BasicBooks.

Csíkszentmihályi, M. (2002). *Flow: The Classic Work on How to Achieve Happiness*. Undefined. /paper/Flow%3A-The-Classic-Work-on-How-to-Achieve-Happiness-Cs%C3%ADkszentmih%C3%A1lyi/f2b60c23af5215493f4e6011c6ca7137bd8079a3

Csikszentmihalyi, M., & Rathunde, K. (1993). The measurement of flow in everyday life: Toward a theory of emergent motivation. In *Nebraska Symposium on Motivation, 1992: Developmental perspectives on motivation* (pp. 57–97). University of Nebraska Press.

Daker, R. J., Cortes, R. A., Lyons, I. M., & Green, A. E. (2020). Creativity anxiety: Evidence for anxiety that is specific to creative thinking, from STEM to the arts. *Journal of Experimental Psychology: General*, *149*(1), 42–57. https://doi.org/10.1037/xge0000630

de Manzano, Ö., Cervenka, S., Jucaite, A., Hellenäs, O., Farde, L., & Ullén, F. (2013). Individual differences in the proneness to have flow experiences are linked to dopamine D2-receptor availability in the dorsal striatum. *NeuroImage*, *67*, 1–6. https://doi.org/10.1016/j.neuroimage.2012.10.072

Delle Fave, A., Massimini, F., & Bassi, M. (2011). Work: A paradox in flow research. In *Psychological Selection and Optimal Experience Across Cultures.* (pp. 155–175). Springer Netherlands. https://doi.org/10.1007/978-90-481-9876-4_8

Diedrich, J., Jauk, E., Silvia, P. J., Gredlein, J. M., Neubauer, A. C., & Benedek, M. (2018). Assessment of real-life creativity: The Inventory of Creative Activities and Achievements (ICAA). *Psychology of Aesthetics, Creativity, and the Arts*, *12*(3), 304–316. https://doi.org/10.1037/aca0000137

Doyle, C. L. (2017). Creative Flow as a Unique Cognitive Process. *Frontiers in Psychology*, *8*, 1348. https://doi.org/10.3389/fpsyg.2017.01348

Engeser, S., & Baumann, N. (2016). Fluctuation of flow and affect in everyday life: A second look at the paradox of work. *Journal of Happiness Studies*, *17*(1), 105–124. https://doi.org/10.1007/s10902-014-9586-4

Engeser, S., & Rheinberg, F. (2008). Flow, performance and moderators of challenge-skill balance. *Motivation and Emotion*, *32*(3), 158–172. https://doi.org/10.1007/s11031-008-9102-4

Epp, E. (2007). Locating the Autonomous Voice: Self-Expression in Music-Centered Music Therapy. *Voices: A World Forum for Music Therapy*, *7*(1), Article 1. https://doi.org/10.15845/voices.v7i1.463

Ericsson, K., Krampe, R., & Tesch-Roemer, C. (1993). The Role of Deliberate Practice in the Acquisition of Expert Performance. *Psychological Review*, *100*, 363–406. https://doi.org/10.1037//0033-295X.100.3.363

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–191. https://doi.org/10.3758/BF03193146

Forbes, M. (2021). Giving voice to jazz singers' experiences of flow in improvisation. *Psychology of Music*, *49*(4), 789–803. https://doi.org/10.1177/0305735619899137

Fritz, B. S., & Avsec, A. (2007). The experience of flow and subjective well-being of music students. *Psihološka Obzorja / Horizons of Psychology*, *16*(2), 5–17.

Fullagar, C. J., Knight, P. A., & Sovern, H. S. (2013). Challenge/skill balance, flow, and performance anxiety. *Applied Psychology: An International Review*, *62*(2), 236–259. https://doi.org/10.1111/j.1464-0597.2012.00494.x

Galizzi, M. M., & Whitmarsh, L. (2019). How to Measure Behavioral Spillovers: A Methodological Review and Checklist. *Frontiers in Psychology*, *10*. https://www.frontiersin.org/articles/10.3389/fpsyg.2019.00342

Gross, S., & Musgrave, G. (2020). *Can music make you sick? Measuring the price of musical ambition*. University of Westminster Press. https://www.uwestminsterpress.co.uk/site/books/m/10.16997/book43/

Gyurkovics, M., Kotyuk, E., Katonai, E. R., Horvath, E. Z., Vereczkei, A., & Szekely, A. (2016). Individual differences in flow proneness are linked to a dopamine D2 receptor gene variant. *Consciousness and Cognition*, *42*, 1–8. https://doi.org/10.1016/j.concog.2016.02.014

Heller, K., Bullerjahn, C., & von Georgi, R. (2015). The Relationship Between Personality Traits, Flow-Experience, and Different Aspects of Practice Behavior of Amateur Vocal Students. *Frontiers in Psychology*, *6*, 1901. https://doi.org/10.3389/fpsyg.2015.01901

Jackson, S. A., & Eklund, R. C. (2002). Assessing flow in physical activity: The Flow State Scale-2 and Dispositional Flow Scale-2. *Journal of Sport & Exercise Psychology*, *24*(2), 133–150.

Jackson, S. A., Martin, A., & Eklund, R. (2008). Long and short measures of flow: The construct validity of the FSS-2, DFS-2, and new brief counterparts. *Journal of Sport & Exercise Psychology*, *30*, 561–587. https://doi.org/10.1123/jsep.30.5.561

Jardine, R., Martin, N. G., Henderson, A. S., & Rao, D. C. (1984). Genetic covariation between neuroticism and the symptoms of anxiety and depression. *Genetic Epidemiology*, *1*(2), 89–107. https://doi.org/10.1002/gepi.1370010202

Johnson, J. (2002). *Who needs classical music?: Cultural choice and musical value*. Oxford University Press.

Kirchner, J. M., Bloom, A. J., & Skutnick-Henley, P. (2008). The relationship between performance anxiety and flow. *Medical Problems of Performing Artists*, *23*(2), 59–66.

Kranjčev, M., & Vukasović Hlupić, T. (2021). Personality, anxiety, and cognitive failures as predictors of flow proneness. *Personality and Individual Differences*, *179*, 110888. https://doi.org/10.1016/j.paid.2021.110888

Lehmann, A. C., & Ericsson, K. A. (1997). Research on expert performance and deliberate practice: Implications for the education of amateur musicians and music students. *Psychomusicology: A Journal of Research in Music Cognition*, *16*, 40–58. https://doi.org/10.1037/h0094068

Loveday, C., Musgrave, G., & Gross, S.-A. (2022). Predicting anxiety, depression, and wellbeing in professional and nonprofessional musicians. *Psychology of Music*, 03057356221096506. https://doi.org/10.1177/03057356221096506

MacDonald, R., Byrne, C., & Carlton, L. (2006). Creativity and flow in musical composition: An empirical investigation. *Psychology of Music*, *34*(3), 292–306. https://doi.org/10.1177/0305735606064838

Marin, M. M., & Bhattacharya, J. (2013). Getting into the musical zone: Trait emotional intelligence and amount of practice predict flow in pianists. *Frontiers in Psychology*, *4*. https://doi.org/10.3389/fpsyg.2013.00853

Martin Sedlár. (2014). Relationships between Flow Experience, Life Meaningfulness and Subjective Well-being in Music Students. *Psychology and Its Contexts*, *5*(1), 89–104.

McDonald, R. P. (1999). *Test theory: A unified treatment*. L. Erlbaum Associates.

Mosing, M. A., Magnusson, P. K. E., Pedersen, N. L., Nakamura, J., Madison, G., & Ullén, F. (2012). Heritability of proneness for psychological flow experiences. *Personality and Individual Differences*, *53*(5), 699–704. https://doi.org/10.1016/j.paid.2012.05.035

Mosing, M. A., Pedersen, N. L., Cesarini, D., Johannesson, M., Magnusson, P. K. E., Nakamura, J., Madison, G., & Ullén, F. (2012). Genetic and environmental influences on the relationship between flow proneness, locus of control and behavioral inhibition. *PLOS ONE*, *7*(11), e47958. https://doi.org/10.1371/journal.pone.0047958

Musgrave, G. (2022). Music and wellbeing vs. musicians' wellbeing: Examining the paradox of music-making positively impacting wellbeing, but musicians suffering from poor mental health. *Cultural Trends*, *0*(0), 1–16. https://doi.org/10.1080/09548963.2022.2058354

Nakamura, J., & Csikszentmihalyi, M. (2009). Flow theory and research. In *Oxford handbook of positive psychology, 2nd ed* (pp. 195–206). Oxford University Press.

O'Neill, S. (1999). Flow theory and the development of musical performance skills. *Bulletin of the Council for Research in Music Education*, *141*, 129–134.

Privette, G. (1983). Peak experience, peak performance, and flow: A comparative analysis of positive human experiences. *Journal of Personality and Social Psychology*, *45*, 1361–1368. https://doi.org/10.1037/0022-3514.45.6.1361

Rakei, A., Tan, J., & Bhattacharya, J. (2022). Flow in contemporary musicians: Individual differences in flow proneness, anxiety, and emotional intelligence. *PLOS ONE*, *17*(3), e0265936. https://doi.org/10.1371/journal.pone.0265936

Sinnamon, S., Moran, A., & O'Connell, M. (2012). Flow among musicians: Measuring peak experiences of student performers. *Journal of Research in Music Education*, *60*(1), 6–25. https://doi.org/10.1177/0022429411434931

Sloboda, J. A., Davidson, J. W., Howe, M. J. A., & Moore, D. G. (1996). The role of practice in the development of performing musicians. *British Journal of Psychology*, *87*(2), 287–309. https://doi.org/10.1111/j.2044-8295.1996.tb02591.x

Smith, A. J., & Rickard, N. S. (2004). Prediction of Music Performance Anxiety via Personality and Trait Anxiety in Young Musicians. *Australian Journal of Music Education*, *1*, 3–12. https://doi.org/10.3316/informit.674028509507292

Spielberger, C., Gorsuch, R., Lushene, R., Vagg, P., & Jacobs, G. (1983). Manual for the State-Trait Anxiety Inventory (Form Y1 – Y2). In *Palo Alto, CA: Consulting Psychologists Press; Vol. IV*.

Tan, J., Yap, K., & Bhattacharya, J. (2021). What does it take to flow? Investigating links between grit, growth mindset, and flow in musicians. *Music & Science*, *4*, 2059204321989529. https://doi.org/10.1177/2059204321989529

Thaut, M. H. (2015). Chapter 8—Music as therapy in early history. In E. Altenmüller, S. Finger, & F. Boller (Eds.), *Progress in Brain Research* (Vol. 217, pp. 143–158). Elsevier. https://doi.org/10.1016/bs.pbr.2014.11.025

The jamovi project. (2021). *Jamovi* (Version 1.6.23.0) [Computer software]. https://www.jamovi.org)

Thomson, P., & Jaque, S. V. (2023). Creativity and Flow: Not a Simple Relationship. *The Journal of Creative Behavior*, *57*(3), 397–408. https://doi.org/10.1002/jocb.586

Tomaino, C. M. (2013). Creativity and improvisation as therapeutic tools within music therapy. *Annals of the New York Academy of Sciences*, *1303*(1), 84–86. https://doi.org/10.1111/nyas.12224

Ullén, F., de Manzano, Ö., Almeida, R., Magnusson, P. K. E., Pedersen, N. L., Nakamura, J., Csíkszentmihályi, M., & Madison, G. (2012). Proneness for psychological flow in everyday life: Associations with personality and intelligence. *Personality and Individual Differences*, *52*(2), 167–172. https://doi.org/10.1016/j.paid.2011.10.003

Ullén, F., Harmat, L., Theorell, T., & Madison, G. (2016). Flow and individual differences – A phenotypic analysis of data from more than 10,000 twin individuals. *Flow Experience*, 267–288. https://doi.org/10.1007/978-3-319-28634-1_17

Wilhelmsen, C. (2012). *Flow and Music Therapy Improvisation—A qualitative study of music therapists' experiences of flow during improvisation in music therapy*. https://bora.uib.no/bora-xmlui/handle/1956/7141

Tables

Table 1. Participant summary

Age	18-73 (*M* = 26.24, *SD* = 6.93)	
Gender	***N***	**%**
Male	469	71%
Female	186	28%
Other	9	1%
Location		
United Kingdom	227	34%
United States	86	13%
Germany	48	7%
Australia	44	7%
Other	259	39%
Professional Status		
Yes	370	56%
No	294	44%
Music Profession		
Artists	141	21%
Session Musicians	50	8%
Record Producers	43	6%
Singers	40	6%
Other	35	5%
Music Teachers	34	5%
Composers	20	3%
Music Therapists	4	1%
DJs	3	<1%
Classical Training		
No	391	59%
Yes	273	41%
Main Genre		
R&B/Soul	185	28%
Alternative/Indie	143	22%
Jazz	116	17%
Pop	59	9%
Electronica	42	6%
Rock	28	4%
Hip Hop/Rap	23	3%
Folk	21	3%
Other	47	8%
Main Instrument		
Guitar	214	32%
Singers	161	24%

Pianist/Keyboard Player	109	16%
Drummers	71	11%
Bass Guitarist/Double Bassists	57	9%
Wind Players	12	2%
Other	40	6%

Table 2. Descriptive statistics of musical flow, daily flow and trait anxiety

	Professional Status	**Mean**	**SD**	**Min**	**Max**	***ω***
Musical Flow	Total	3.59	0.44	2.03	5.00	0.92
	Amateur	3.49	0.44	2.03	4.72	0.92
	Professional	3.67	0.43	2.75	5.00	0.92
Daily Flow	Total	3.46	0.47	1.89	5.00	0.75
	Amateur	3.36	0.46	1.89	4.67	0.73
	Professional	3.54	0.46	2.00	5.00	0.76
Trait Anxiety	Total	47.80	10.44	20.00	79.00	0.92
	Amateur	48.65	10.94	25.00	79.00	0.93
	Professional	47.13	9.99	20.00	71.00	0.91

Total N = 664, *Amateur N* = 294, *Professional N* = 370; *standard deviation (SD), minimum (Min), maximum (Max), ω = McDonald's omega*

Table 3. Descriptive statistics of the 9 flow dimensions and a one-way ANOVA comparing amateur and professionals

Flow Dimension	Professional Status	Mean	SD	*ω*	*F(1, 662)*	*p*
Challenge-skill balance	Total	3.52	0.59	0.75		
	Amateur	3.34	0.58	0.75	53.01	<.001
	Professional	3.67	0.56	0.72		
Merging action-awareness	Total	3.56	0.62	0.75		
	Amateur	3.45	0.63	0.76	16.31	<.001
	Professional	3.64	0.59	0.73		
Clear goals	Total	3.58	0.73	0.84		
	Amateur	3.35	0.74	0.83	55.89	<.001
	Professional	3.77	0.68	0.82		
Unambiguous feedback	Total	3.75	0.76	0.88		
	Amateur	3.64	0.77	0.89	11.44	<.001
	Professional	3.84	0.74	0.86		
Concentration on task	Total	3.63	0.70	0.84		
	Amateur	3.55	0.75	0.84	5.30	0.022
	Professional	3.68	0.66	0.83		
Sense of control	Total	3.57	0.63	0.81		
	Amateur	3.47	0.64	0.80	13.48	<.001
	Professional	3.65	0.61	0.82		
Loss of self-consciousness	Total	2.82	0.89	0.87		
	Amateur	2.77	0.88	0.87	1.45	0.229
	Professional	2.86	0.90	0.87		
Transformation of time	Total	3.73	0.78	0.86		
	Amateur	3.69	0.80	0.87	1.26	0.262
	Professional	3.76	0.78	0.86		
Autotelic experience	Total	4.17	0.60	0.81		
	Amateur	4.15	0.60	0.81	0.56	0.455
	Professional	4.19	0.61	0.81		

Total N = 664, *Amateur n* = 294, *Professional n* = 370; *standard deviation (SD), ω = McDonald's omega*

Figures

Fig. 1

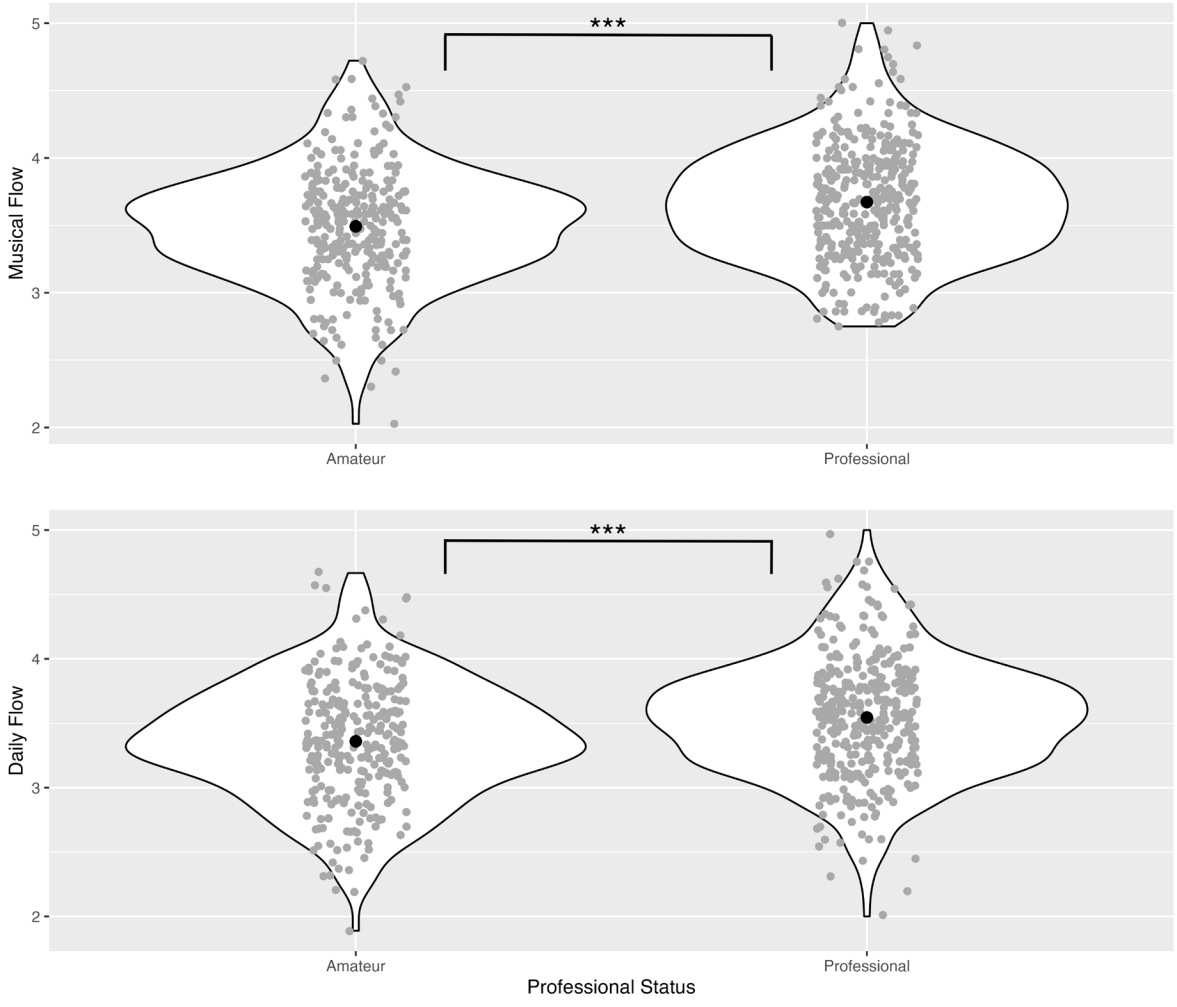

Fig. 2

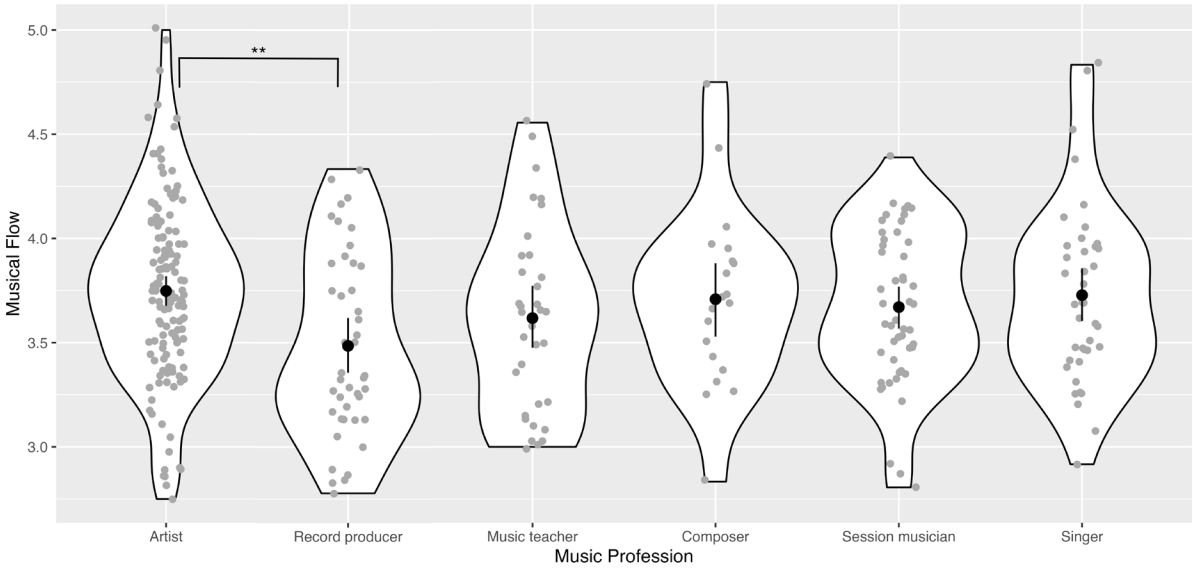

Fig. 3

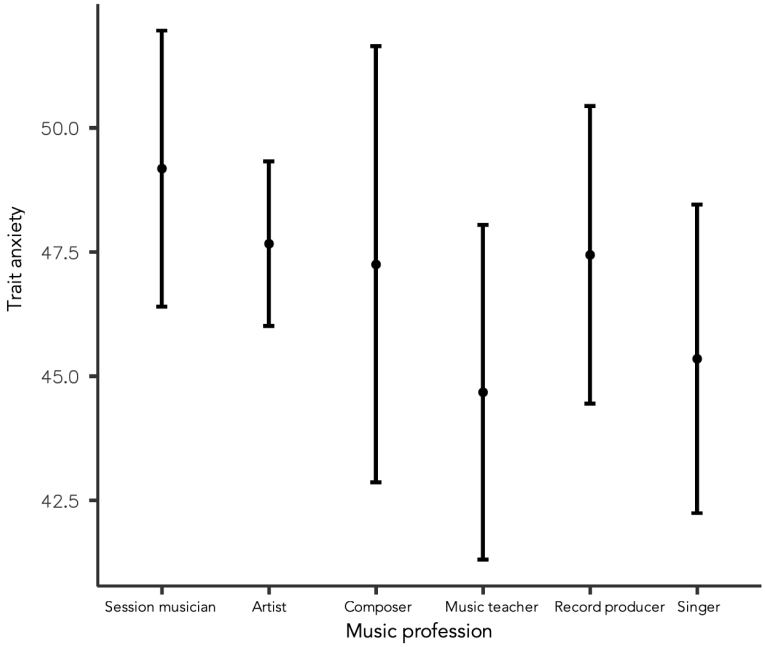

Figure captions

Fig 1. Musical flow and daily flow violin plots showing means and data distribution by professional status
Fig 2. Musical flow violin plot by music profession with 95% confidence intervals
Fig 3. Trait anxiety means of music professionals with 95% confidence intervals