A Lifespan Perspective on Passion for Music in Musicians

Arielle Bonneville-Roussy*

Christophe Gagné

Chantal Eden

Laurence Latreille-Gagné

Robert J. Vallerand

Department of Psychology

Université du Québec à Montréal, Canada

This manuscript is available as a preprint on PsyArXiv and has not yet undergone peer review.

Date: January 14th, 2026

*Corresponding author:

Arielle Bonneville-Roussy, Ph.D.
Department of Psychology
Université du Québec à Montréal
Pavillon Sherbrooke
Montréal, QC, Canada H2X 3P2
Email: bonneville-roussy.arielle@uqam.ca

Acknowledgements

The authors would like to thank the participating musicians and the institutions that facilitated data collection. This project was supported in part by funding from the Social Sciences and Humanities Research Council of Canada (SSHRC), grant number 71073801, the SEMPRE Reg and Molly Buck Award, and the Starting Grant from the University of Quebec in Montreal to the first author. Arielle Bonneville-Roussy played a lead role in conceptualization, data curation, formal analysis, methodology, project administration, writing, and editing. Christophe Gagné, Chantal Eden, Robert J. Vallerand, and Laurence Latreille contributed to conceptualization, writing, and editing.

Abstract

This study examined how passion for music and solitary practice vary across the musical lifespan in a large sample of elite trainee and professional musicians spanning 59 years of age. Drawing on the Dualistic Model of Passion, we investigated age-, experience-, and gender-related variations in harmonious passion (HP) and obsessive passion (OP), and examined how HP and OP related to weekly solitary practice. Data were drawn from a cross-sectional survey of 682 elite trainee aged between 15 and professional classical musicians recruited in Canada and the United Kingdom, and analyzed using multivariate regression and structural equation modeling approaches. Results indicated distinct developmental patterns for the two forms of passion and their links to practice. HP varied as a function of age and experience, whereas OP remained largely stable and was higher among men. With respect to practice, OP, but not HP, was positively associated with weekly solitary practice, and this association strengthened with age. An interaction between age and experience further showed that age-related variations in practice depended on accumulated expertise, such that practice increased with age primarily among less experienced musicians while remaining relatively stable among highly experienced musicians. Together, these findings highlight the existence of distinct developmental pathways linking HP, OP and practice behaviour across the musical lifespan.

Keywords: passion for music; musical practice; lifespan development; musicians; expertise

Do musicians engage with music differently as they age? Although it is often assumed that younger musicians devote more time to practice than seasoned professionals, surprisingly little is known about how motivational forces evolve across adulthood to sustain long-term musical engagement. Decades of research have examined how deliberate practice contributes to expertise, yet age-related trends in the underlying psychological drivers, particularly passion, remain largely unexplored. Among elite musicians, accounts of lifelong commitment to music frequently emphasize not sacrifice or discipline, but an enduring sense of meaning and purpose.

From a lifespan developmental perspective, engagement in complex activities such as music evolves in response to changing biological, psychological, and social constraints across adulthood. Baltes's Lifespan Perspective on Human Development conceptualises development as a dynamic process of gains and losses shaped by shifting life contexts and adaptive regulation of motivation (Baltes, Lindenberger, & Staudinger, 2006). Within this framework, sustaining long-term musical engagement requires flexible motivational resources, positioning passion for music (Bonneville-Roussy, Lavigne & Vallerand, 2011Vallerand et al., 2003) as a central construct for understanding lifelong involvement.

The present study examines how passion for music unfolds across the musical lifespan in a large sample of elite trainee and professional musicians aged 15 to 74 years. Specifically, we investigate age- and experience-related variation in harmonious passion (HP) and obsessive passion (OP), examine whether these patterns differ by gender, and assess how HP and OP are associated with weekly solitary practice time. In doing so, we aim to evaluate the substantive usefulness of a lifespan perspective on passion by linking motivational trajectories to one of the most central and effortful behaviors in musicians' careers.

The Dualistic Model of Passion

Passion, as defined by the Dualistic Model of Passion (DMP; Vallerand, 2015; Vallerand et al., 2003), refers to a strong inclination toward an activity that is deeply valued, meaningful, self-defining, in which individuals dedicate considerable amounts of time and energy. Drawing from Self-Determination Theory (Ryan & Deci, 2017), the DMP posits that passion develops through internalization, a process by which individuals integrate meaningful activities into their sense of self. Two forms of passion are proposed. HP emerges from autonomous internalization: the person chooses to engage in the activity freely and without pressure, allowing it to coexist with other life domains. OP, on the other hand, results from controlled internalization, where engagement is driven by pressure, either internal (e.g., self-worth) or external (e.g., social expectations). While both forms involve high levels of commitment, they differ in how flexibly the activity is pursued.

HP has been linked to flexible persistence, well-being, adaptive coping, greater life satisfaction, psychological resilience, positive affect, and enhanced flow experiences

during activity engagement (Bonneville-Roussy et al., 2011; Vallerand et al., 2022; Philippe et al., 2009; Lafrenière et al., 2012; Carbonneau et al., 2008). Individuals with HP tend to integrate their passionate activities freely within their daily lives (Vallerand et al., 2003; Schellenberg et al., 2013). In contrast, OP has been associated with rigid persistence and various negative psychological consequences (e.g. increased anxiety, and performance-related stress (Bonneville-Roussy et al., 2014; Chichekian & Vallerand, 2022; Vallerand et al., 2008; Donahue et al., 2012; Curran et al., 2015; Schellenberg & Bailis, 2015). OP often results from controlled internalization of a passion, causing the activity to conflict with other life domains and produce maladaptive emotional and behavioral outcomes. Both forms of passion are deeply embedded in musicians' narratives and may play distinct roles across different life stages.

Passion is ubiquitous among musicians. Studies in music have shown that over 95% of musicians report being passionate about music (e.g. Bonneville-Roussy et al., 2011), far more than is typical in other domains. In music, HP has been associated with greater psychological well-being, and positive psychological outcomes, as it allows musicians to engage in their art without internal conflict (Bonneville-Roussy et al., 2011, 2013, 2020). Conversely, in the same studies, OP has been linked to performance anxiety, avoidance coping, and less adaptive practice strategies. Powell, Olsen, and Vallerand (2024) further demonstrated that OP predicted negative emotions during music engagement, while HP enhanced life satisfaction and emotional regulation. These studies have confirmed that the type of passion significantly shapes many aspects of musical involvement. However, while passion is nearly universal among musicians, the type of passion and its consequences may shift with age and experience.

Lifespan Development of Passion for Music

Drawing on the DMP (Vallerand, 2010) and Baltes' (1987) lifespan theory, Bonneville-Roussy & Vallerand (2018) posited that HP and OP may fluctuate across late adolescence and adulthood according to the demands and constraints of the musical career and the external environment.

Late adolescence and the beginning of adulthood is typically marked by specialization and increased investment in musical activities. Most aspiring musicians have accumulated hundreds of hours of practice by this point (Ericsson & Charness, 1994; Lehmann et al., 2018), and passion for music becomes a key motivational driver. However, during this phase, HP and OP are often intertwined, as adolescents navigate autonomy and pressure from teachers, parents, and peers (Bonneville-Roussy & Vallerand, 2018). The dynamic interplay between personal values and external expectations shapes how passion is internalized.

In the second quarter of the 20s, musicians begin the transition to professional life, a period characterized by heightened performance demands and uncertainty. In music, this stage involves focused investment in selected goals, such as performance mastery or professional recognition, at the expense of other pursuits. In this context, passion becomes critical to maintaining motivation. However, OP may be more likely to emerge when external validation (e.g., audition outcomes, contracts) dominates the motivational landscape (Bonneville-Roussy et al., 2013; Bonneville-Roussy & Vallerand, 2018; Manturzewska, 1990).

As musicians reach midlife, they enter what Baltes (1987) would describe as a phase of consolidation and reorganization. Professional roles stabilize, and individuals

face increased life complexity: family responsibilities, health considerations, and changing career demands. This stage corresponds to the refinement phase in musical development (Bonneville-Roussy & Vallerand, 2018), where musicians may practice less in terms of hours but with greater efficiency and purpose. Here, HP plays a protective role, enabling sustained engagement through flexible goal adjustment and realistic self-regulation (Chichekian & Vallerand, 2022; Vellacott & Ballantyne, 2022).

In later adulthood, musicians may gradually withdraw from high-intensity professional activity. Consistent with research on the DMP in later adulthood (Rousseau & Vallerand, 2008), this phase may involve a shift toward maintenance of skills and retirement, where HP may be more prevalent. HP may remain high, supporting continued identity coherence and well-being. OP, conversely, may become harder to sustain, as performance-based contingencies lose salience.

In summary, this lifespan developmental perspective situates passion at the heart of long-term musical engagement (Bonneville-Roussy & Vallerand, 2018). From this perspective, HP and OP are likely to show different trajectories with age, according to the environmental demands and constraints of the musical profession. HP is likely to rise through to late adulthood. On the contrary, due to the career demands that become less constraining as musicians, develop, OP is likely to start high in adolescence and young adulthood, where it should slowly decrease up until retirement.

Beyond its theoretical relevance, examining how passion unfolds over time may yield valuable insights for understanding sustained musical engagement (Bonneville-Roussy & Vallerand, 2018). In this context, solitary practice, one of the most consistent and effortful behaviors in a musical career, serves as a relevant behavioral indicator of

musical engagement (Ericsson et al., 1993; Bonneville-Roussy et al., 2011). By investigating how different types of passion shape solitary practice across the adult lifespan, researchers can gain a better understanding of the mechanisms that support or hinder long-term involvement in a passionate activity (Vallerand, 2015; Chichekian & Vallerand, 2022).

Practice Across the Musical Lifespan

Practice is a central and effortful behavior in musicians' development and professional lives. Extensive research has established deliberate practice as a key mechanism underlying the acquisition and maintenance of musical expertise (Ericsson et al., 1993; Ericsson & Charness, 1994, Platz et al., 2014). Although the deliberate practice framework has been criticized and refined in recent years, particularly with respect to its explanatory scope and the role of other individual differences (Hambrick et al., 2014; Macnamara et al., 2014; Hambrick et al., 2016), solitary practice remains one of the core musical behaviours for the vast majority of musicians. However, much of this work has focused on the early phases of skill acquisition, with comparatively less attention given to how practice is sustained across later stages of the musical lifespan. Evidence for gender differences in practice quantity is inconsistent, research has found no statistically reliable differences in weekly practice time between female and male musicians, suggesting that gender effects may be more pronounced for motivational experiences surrounding practice than for hours alone (Hallam, 2017; Santos Silva et al., 2024; Valenzuela et al., 2020).

Importantly, greater amounts of practice cannot necessarily be equated with adaptive engagement. Research has repeatedly shown that high practice volume, when

not accompanied by efficient strategies and flexible engagement, can be associated with physical injury, and psychological strain (Ackermann & Driscoll, 2010; Krampe & Ericsson, 1996; Zaza, 1998). This distinction is critical for interpreting the role of music practice over a musician's career.

Career-development perspectives have suggested that practice is unlikely to remain constant across adulthood. Because chronological ageand accumulated musical experience reflect career-related processes in music, especially with different instruments starting at very different ages, they may show independent associations with musical behaviour across the musical lifespan (Gembris, 2023). Accordingly, age and experience may alter both the quantity and the function of practice. Qualitative work has indicated that professional musicians often shift from high-volume practice toward more selective, goal-directed, and efficiency-oriented forms of practice as their careers progress (Manturzewska, 1990; Hallam, 1995). Experimental and observational studies further suggest that older expert musicians maintain performance levels despite engaging in fewer hours of practice, consistent with greater reliance on refined strategies and accumulated expertise (Krampe & Ericsson, 1996). More recent work in professional and advanced musicians supports the view that practice quantity tends to decline with increasing expertise and career stage, while practice quality and self-regulation become more central (Bonneville-Roussy et al, 2015; Manturzewska, 1990; Mornell et al., 2020; Vellacott & Ballantyne, 2022). Evidence regarding gender differences in practice quantity is less consistent, with several large-scale and professional samples reporting minimal or no gender differences in weekly practice time (Bonneville-Roussy et al.,

2011; Platz et al., 2014), supporting the examination of gender as a variable needing further investigation.

Within this context, passion may represent a critical motivational mechanism shaping practice behaviour across the musical lifespan. As one of the most consistent and demanding activities in musicians' careers, solitary practice provides a meaningful behavioural indicator through which to examine how HP and OP relate to sustained engagement over time (Bonneville-Roussy et al., 2011; Vallerand, 2015). Examining practice in conjunction with passion therefore offers a concrete way to assess how motivational processes translate into long-term behavioral investment in music.

The present study

The primary aim of this study was to examine how music practice evolves throughout musicians' lifespan. The fundamental premise of this research is that passion serves as the primary motivational force driving musicians through their career. We also exemplify the impact of HP and OP with the amount of solitary practice musicians report by age and years of experience. Although there is some evidence that practice decreases with expertise levels (dos Santos Silva et al., 2024; Mornell et al., 2020; Vellacott & Ballantyne, 2022), there has been little quantitative research on this subject. Furthermore, no research has investigated the factors that drive musicians' practice after they have reached expertise. We posit that passion is one of those factors (Vallerand et al., 2015).

To do this, we draw on a large sample of trainee and professional musicians aged 15 and 74 years with up to 60 years of experience with their musical instruments. Practice was operationalized as the total amount of weekly practice (practice quantity), and the

development of expertise was operationalized in two ways: the musician's age and their number of years of experience with their principal musical instruments.

Objectives

Our objectives were threefold. First, we examined how HP and OP for music vary as a function of age, years of experience, and gender. In line with the literature reviewed above, we hypothesized that HP would increase with age and experience (Hypothesis 1.1), whereas OP would decrease with age and experience (Hypothesis 1.2). Because prior findings regarding gender differences in passion have been mixed, no specific hypotheses were formulated with respect to gender.

Second, we examined how weekly solitary practice time is associated with HP, OP, age, years of experience, and gender. We hypothesized that both HP and OP would be positively associated with practice time, with OP showing the stronger association (Hypothesis 2.1). We further hypothesized that weekly practice time would decrease with age and experience (Hypothesis 2.2).

Third, we evaluated whether HP and OP moderate the relationships between age, experience, and weekly solitary practice time, potentially influencing the duration of practice across the musical lifespan. As the present study is the first to examine moderation effects of age, experience, and gender on the associations between HP, OP, and practice time, no specific hypotheses were advanced for these moderation effects.

Method

Participants

A total of 682 elite classical musicians were included in the present study. They were recruited between 2006 and 2023 as part of a vast research program on the psychological correlates of music performance. Musicians were recruited in the UK and Canada. Music students were full-time performance students recruited from renowned conservatories, universities, and summer music academies in those countries, with prior consent from the institutions. Professional musicians had full-time careers as music performers and either taught in the aforementioned music schools or were recruited by word of mouth in orchestras in Canada. Descriptive statistics are presented in Table 1. In a nutshell, musicians had a mean age of 24 years (range: 15-74), had on average 13 years of experience (range: 0-52), started their musical instrument at an average of 10 years old and 49% of them identified as females.

Participants who volunteered provided their responses to questionnaires on paper or online. The paper-based questionnaires were provided in confidential envelopes, including an explanatory letter, and the questionnaire was returned to a research assistant anonymously. Online questionnaires were anonymous.

Ethics

This research spanned involved approval from the ethics boards of the following instutions: [masked].

Measures

Descriptive statistics of the measures are found in Table 1.

Age was measured with one question “What is your age (in years)?” . **Experience** was measured with one question (answered in years): “For how long have you been playing

your instrument?”**. Gender** was measured with one question “What is your sex”, with two response choices coded 0 (male) and 1 (female).

Passion. The Passion for Music Scale (Bonneville-Roussy & Vallerand, 2020; Vallerand et al., 2003) was used in the present study. It features two subscales with six items each that evaluate harmonious passion (for example, “Playing my instrument is in harmony with the other activities in my life ") and obsessive passion (for example, “‘I have difficulties controlling my urge to play my instrument”). Responses are recorded on a seven-point Likert scale, from 1 (“I completely disagree”) to 7 (“I completely agree”). The scale has been validated in prior research, confirming its reliability and factorial validity ((Bonneville-Roussy et al., 2011; Bonneville-Roussy & Vallerand, 2020)). For the present study, the internal consistency was satisfactory, with Cronbach’s alpha values of .87 and .82 for the harmonious and obsessive subscales, respectively.

Solitary Practice. Participants were asked how long they typically practice each day and how many days a week. In order to get the total amount of practice per week, we multiplied the number of hours of practice per day by the number of days per week. This method gives a more refined measure of practice time than the number of hours per day alone.

Analytical strategy

We followed a traditional multivariate multiple regression approach (Cohen et al., 2003) and structural equation modelling approach with the software Mplus version 8.11 (Muthén & Muthén, 1998-2025). Multivariate non-normality was accounted for using MLR (Muthen & Muthen, 2017). Missing values were accounted for directly in Mplus using Full Information Maximum Likelihood. Following Marsh et al. (2009), model fit

was considered acceptable when the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) exceeded .90, and excellent when above .95. RMSEA and SRMR values below .08 indicated acceptable fit, and below .05 excellent fit (Marsh et al., 2009).

Exploratory Structural Equation Modeling (ESEM).

ESEM analyses were conducted on the 12 items of the Passion Scale for Music (PSM). Drawing on previous research (Marsh et al., 2013; Schellenberg et al., 2014; Tóth-Király et al., 2017), the need to include correlated uniquenesses (CUs) due to the wording of certain items was anticipated. However, the initial model was tested without them. Factor loadings were interpreted using Comrey and Lee's (2013) guidelines: excellent (> .71), very good (.63–.70), good (.55–.62), and fair (.44–.54).

Invariance. To ensure that the PSM is interpreted equivalently across age groups and gender, we tested for configural, metric, and scalar invariance, confirming that the factor structure, loadings, and item intercepts were comparable across groups (Chen, 2007). To compare the adequacy of increasingly restrictive models, delta values between more and less constrained models were examined, in line with the recommendations of Chen (2007). A non-significant chi-square difference test ($\Delta\chi^2$) suggests that the more constrained model fits the data as well as the less constrained model; however, this test is sensitive to sample size. Therefore, additional fit indices were considered. To compare the adequacy of more restrictive models in measurement invariance testing, a change of .010 or less in CFI or TLI, complemented by a change of less than .015 in RMSEA or less than .030 in SRMR, indicates good model fit (Chen, 2007).

Passion through the Ages and Experience. Multivariate multiple regressions were performed, with age, experience, and gender, and their interactions as the independent

variables, and HP and OP latent factors found in the previous analyses as the dependent variables(Cohen, Cohen, West, & Aiken, 2003; Muthén, Muthén, & Asparouhov, 2017). In order to avoid collinearity, the variables age and experience were standardized prior to computing the polynomial terms.

Solitary Practice through the Ages and Experience. The effects of the variables on practice time were also examined using multivariate multiple regressions with age, experience, gender, and their interactions with HP and OP as the independent variables, and solitary practice as the dependent variable(Cohen, Cohen, West, & Aiken, 2003; Muthén, Muthén, & Asparouhov, 2017).

Results

Correlations

Table 1 presents zero-order correlations (upper section) and descriptive statistics (lower section) of the variables of interest. As shown in Table 1, HP was positively correlated with OP. OP was positively correlated with solitary practice and negatively correlated with gender (being higher in men). Age was positively related to experience and solitary practice, and negatively correlated to gender (being higher in men). Experience was positively correlated with solitary practice and negatively correlated with gender (being higher in men). Finally, solitary practice was not associated with gender.

Factor structure of the PSM

The initial ESEM solution yielded a marginally acceptable fit to the data ($\chi 2 = 1911.37$, CFI = .919, TLI = .875, RMSEA = .071[.061-.082], SRMR = .038). Upon evaluating the modification indices in a step by step, iterative manner, and in line with previous research

on the PSM, three correlated uniquenesses emerged as potential improvements to the model fit. Although these correlated uniquenesses were identified a posteriori, their inclusion did not meaningfully alter other parameter estimates. Furthermore, upon inspecting the items, the semantic similarity between these item pairs supports the reasonableness of allowing these correlations on a theoretical basis. With these modifications, the revised ESEM solution yielded an excellent fit (χ^2 = 97.617, CFI = .969, TLI = .948, RMSEA = .046 [.034-.058], SRMR = .027; see Figure 1). According to Comrey and Lee's (2013) guidelines, the factor loadings were classified as good to excellent: target loadings exceeded .52, except for PH2 (.36) and PH3 (.46).

Age and Gender Invariance of the PSM

Invariance results are shown in Table 2. To capture whether participants perceived passion similarly across age and gender, configural, metric, and scalar invariance of the PSM was tested.

Age invariance. The sample was split into three age groups according to meaningful developmental periods: (1)15-22, which corresponds to the end of formal studies and transition to professional levels; (2) 23-39, corresponding to skills mastery and career establishment, and (3) 40+, the apex of the professional career. As shown in the age section of Table 2, all delta values of fit estimation in increasingly constrained models which were within the recommended thresholds (Chen, 2007), supporting scalar invariance between the three age groups.

Gender invariance. The Gender section of Table 2 shows the invariance results of the PSM for men (coded 0) and women (coded 1). Invariance results supported configural, metric, and scalar invariance, between gender, indicating that the factor

structure, factor loadings, and item intercepts were consistent for both men and women. These findings suggest that the PSM measures the same constructs in the same way across gender groups, allowing for meaningful comparisons. Taken together, these results provide strong evidence for configural, metric, and scalar invariance of the PSM across age and gender groups.

Effects of Age and Experience on HP and OP

Given the evidence supporting the invariance of the PSM, factor scores for HP and OP were saved and used to examine the effects of age and experience on HP and OP. Results are presented in Table 3. The model being saturated, model fit information is not presented.

For HP, age was negatively associated to it ($\beta = -.40$, $p < .001$), whereas experience showed a positive association ($\beta = .38$, $p < .001$). Gender was not directly related to HP ($\beta = .01$, $p = .89$). However, significant interaction effects indicated that the associations between both age and experience with HP differed by gender. Specifically, the Age × Gender interaction was positive ($\beta = .38$, $p < .001$). Figure 2 illustrates that with increasing age, HP shows a marked decline among men, while increasing among women. Experience × Gender interaction was also significant, but in the opposite direction as age. ($\beta = -.33$, $p = .001$). Figure 3 shows that as experience increased, HP increased among men, whereas it showed a slight decrease among women.

For OP , neither age ($\beta = .01$, $p = .92$) nor experience ($\beta = -.11$, $p = .41$) was significantly associated with the outcome. Gender showed a significant main effect, with lower levels of obsessive passion among men ($\beta = -.20$, $p < .001$). No interaction reached significance.

Effects of Passion on Solitary Practice

Results are presented in Table 4. Solitary practice was regressed on harmonious passion, obsessive passion, age, experience, gender, and their interactions. Obsessive passion was positively associated with solitary practice ($\beta = .11$, $p = .01$), whereas harmonious passion was not ($\beta = .02$, $p = .61$). Age showed a positive main effect ($\beta = .29$, $p = .03$), while experience and gender were not significant predictors ($\beta s \leq .10$, $ps \geq .12$). The Age × Obsessive Passion interaction reached significance ($\beta = .21$, $p = .05$, see Figure 4), suggesting a stronger positive association between age and practice among individuals high in obsessive passion. In addition, a significant Age × Experience interaction emerged ($\beta = -.19$, $p = .04$). Figure 5 shows that the positive association between age and weekly practice is strongest at low levels of experience. Among highly experienced individuals, weekly practice remains relatively stable across age, showing little age-related change. This indicates a significant Age × Experience interaction, such that age-related increases in practice are attenuated as experience increases. indicating that age-related increases in practice were weaker at higher levels of experience. No other interaction effects were found.

Discussion

This study aimed to provide an in-depth overview of how practice is shaped over the musical lifespan and to examine how passion for music may act as fuel to sustain practice over decades. Before addressing developmental trends, we ensured that the Passion Scale for Music (PSM) provided valid and reliable measurement across subgroups. The ESEM of the two-factor model of HP and OP demonstrated excellent fit, replicating prior research on the scale's structure in music (Bonneville-Roussy &

Vallerand, 2021). Factor loadings met or exceeded accepted standards, with HP and OP items clearly loading on their respective latent factors. Furthermore, invariance testing confirmed that the PSM is interpreted similarly across both gender and age groups. Specifically, configural, metric, and scalar invariance were supported for three age-based subgroups and for gender. This confirms that observed age-related differences in passion are not attributable to measurement bias but instead reflect genuine age changes in passion.

Our findings provide a nuanced account of how passion relates to age and experience among elite musicians. Contrary to Hypothesis 1.1, HP was negatively associated with age, while it was positively associated with years of experience. In contrast with our hypothesis (1.2), OP showed no reliable association with either age or experience. Gender did not show a main effect on HP, but it moderated the associations of both age and experience with HP, indicating that developmental patterns of HP differ for men and women. For OP, gender showed a significant main effect, with higher OP among men, and no evidence of moderation by age or experience.

Interestingly, and contrary to Hypotheses 1.1 and 1.2, age and experience exhibited different effects for HP but not for OP. Specifically, HP decreased with age yet increased with years of experience, and both associations differed by gender. OP remained stable with both age and experience, demonstrating rigidity in both aspects of development. Consistent with Baltes' (1987) Lifespan Perspective on Human Development and Bonneville-Roussy and Vallerand (2018), this pattern points to an adaptive recalibration of motivation in response to changing life roles and developmental demands as musicians evolve in age. In contrast, OP showed no reliable associations with

age or experience, but men reported higher OP than women throughout the lifespan. These results call for a more dynamic view of passion in music, where motivational profiles are not fixed but evolve with experience and shifting life priorities.

Moderating Effects of HP and OP on Practice Time

One of the most informative findings was the significant de moderating effect of age on OP predicting solitary practice. OP was positively associated with practice time, and this association strengthened with age, such that older musicians high in OP reported the greatest practice time. In contrast, HP was not directly associated with practice time, nor did it moderate the association between age and practice. In addition, the interaction between age and experience indicated that age-related increases in practice were most pronounced among musicians with lower levels of experience, whereas practice remained relatively stable across age at higher levels of experience. Based on the DMP (Vallerand, 2015) and past research (e.g., Bonneville-Roussy et al., 2011), we hypothesized that both HP and OP would be positively associated with practice, with OP showing the stronger association. The present findings provided partial support for this hypothesis: OP was positively associated with solitary practice, and this association strengthened with age, whereas HP was not directly related to practice quantity and did not show significant interactions with age, experience or gender. These results suggest that, when practice is operationalized in terms of quantity, OP musicians, consistent with their tendency to display characteristic rigid persistence in their passionate activity, increase their levels of practice with age, while HP may contribute to musical engagement through pathways not captured by hours of solitary practice alone.

This result raises important theoretical considerations. First, while HP promotes adaptive persistence and integration of music into one's identity, OP may support persistence through internal or external pressure, especially when the individual feels a sense of obligation to continue practicing. However, such persistence may not always translate to well-being. This underscores the importance of evaluating not just behavioral outputs (e.g., practice hours), but also the psychological costs and benefits associated with different passion profiles. As such, future research should further explore the qualitative differences in practice experiences associated with HP and OP over the musical lifespan.

Moderating Effects of Age, experience and gender on Practice Time

The interaction between age and experience suggests that age-related increases in practice are not uniform but depend on accumulated expertise. Among less experienced musicians, our results showed that advancing age was associated with greater practice time, whereas among highly experienced musicians, practice remained relatively stable across age. The moderation effects observed in the present study underscore the importance of considering age and experience as distinct developmental dimensions when examining practice behavior across the musical lifespan, consistent with lifespan perspectives emphasizing changing constraints and adaptive allocation of resources across adulthood (Baltes, 1987). Importantly, this moderating role of experience indicates that age-related changes in practice are contingent on musicians' developmental position within their career rather than reflecting a uniform lifespan trend. This pattern is consistent with the idea that practice demands evolve as musicians consolidate expertise, with practice being reorganized rather than uniformly increased or decreased across later

stages of development (Ericsson et al., 1993; Hallam, 1995; Krampe & Ericsson, 1996; Mornell et al., 2020; Vellacott & Ballantyne, 2022).

Theoretical and Practical Implications

The present findings have several implications for the Dualistic Model of Passion (DMP) and its application to long-term engagement in complex activities such as music. First, they underscore the importance of distinguishing between harmonious passion (HP) and obsessive passion (OP) not only in terms of psychological outcomes, but also in terms of their functional roles for sustaining behavior across the lifespan. While prior work within the DMP has primarily emphasized the adaptive versus maladaptive consequences of passion (Vallerand et al., 2003; Vallerand, 2015), the present results suggest that passion may also constitute a pathway for sustained involvement over long periods of time. This extends the DMP by indicating that rigid persistence associated with OP may contribute to long-term engagement in practice under certain developmental conditions, even when external demands or structural incentives are reduced (Bonneville-Roussy & Vallerand, 2018; Chichekian & Vallerand, 2022).

Second, these findings contribute to a lifespan perspective on music practice by highlighting the need to distinguish chronological age from accumulated experience when examining developmental patterns of engagement. Lifespan theories conceptualize development as a process of adaptive reorganization in response to changing biological, psychological, and social constraints (Baltes, 1987; Baltes, Lindenberger, & Staudinger, 2006). The present results align with this view by suggesting that, in adulthood, practice trajectories are shaped by musicians' age as well as their developmental position within their careers. Within this framework, passion can be conceptualized as a motivational

resource that interacts with lifespan constraints to structure long-term engagement in music (Bonneville-Roussy & Vallerand, 2018).

Third, the present study has implications for the conceptualisation of practice in research on musical expertise. Practice is often treated as a unitary behavioral indicator of engagement (Ericsson et al., 1993; Ericsson & Charness, 1994), yet the current findings suggest that equivalent levels of practice may be sustained by qualitatively different motivational processes. Integrating HP and OP into models of musical practice allows for a more differentiated understanding of how practice is maintained over time, distinguishing between flexible, self-endorsed engagement and rigid, obligation-driven persistence (Vallerand, 2015; Bonneville-Roussy et al., 2011). This perspective invites future research to consider the motivational foundations of practice as central components of expertise development and maintenance across the musical lifespan.

Limitations and Future Directions

This study is not without limitations. First, the cross-sectional design limits our ability to draw causal inferences about the developmental trajectories observed. The design of this study does not rule out a cohort effect, that increased passion and practice time in older years may be a byproduct of cultural norms at the time. Longitudinal studies are needed to confirm the temporal dynamics of passion and practice across the lifespan. Second, although our sample included a broad age range and both students and professionals, the sample was drawn from elite classical musicians in Canada and the UK. The

generalizability of the findings to other genres, cultural contexts, or non-elite musicians remains to be tested.

Future research could also examine how passion interacts with other psychological constructs and age such as self-efficacy, identity, and flow in shaping long-term engagement. Additionally, qualitative studies could provide deeper insight into how musicians experience passion differently at various life stages. Finally, differentiating between practice quality and quantity may offer a more nuanced understanding of how passion affects the development and maintenance of expertise in the long run.

Conclusion

In conclusion, this study provides empirical support for a developmental model of passion in music and its role in sustaining solitary practice over the lifespan. HP emerges as a central motivational resource that promotes adaptive persistence and flexibility, while OP, despite its rigid nature, may still contribute to sustained engagement, particularly in interaction with age. These findings enrich our understanding of how musicians maintain their craft over time and highlight the enduring importance of passion as both a psychological and behavioral driver in the development of musical expertise.

References

Bloom, B. S. (1985). *Developing talent in young people*. Ballantine Books.

Bonneville-Roussy, A., & Bouffard, T. (2015). When quantity is not enough: Disentangling the roles of practice time, self-regulation and deliberate practice in musical achievement. *Psychology of Music*, *43*(5). https://doi.org/10.1177/0305735614534910

Bonneville-Roussy, A., Lavigne, G. L. , & Vallerand, R. J. (2011). When passion leads to excellence: The case of musicians. *Psychology of Music*, *39*(1), 123–138. https://doi.org/10.1177/0305735609352441

Bonneville-Roussy, A., & Vallerand, R. J. (2018). The role of passion in the development of expertise: A conceptual model. In D. Z. Hambrick, G. Campitelli, & B. N. Macnamara (Eds.), *The Science of Expertise: Behavioral, Neural, and Genetic Approaches to Complex Skill* (pp. 376–397). New York: Routledge.

Bonneville-Roussy, A., & Vallerand, R. J. (2020). Passion at the heart of musicians' well-being. *Psychology of Music*, *48*(2), 266–282. https://doi.org/10.1177/0305735618797180

Bonneville-Roussy, A., Vallerand, R. J., & Bouffard, T. (2013). The roles of autonomy support and harmonious and obsessive passions in educational persistence. *Learning and Individual Differences*, *24*(3), 22–31. https://doi.org/10.1016/j.lindif.2012.12.015

Brodsky, W. (2011). Rationale behind investigating positive aging among symphony orchestra musicians: A call for a new arena of empirical study. *Musicae Scientiae*, *15*(1), 3–15. https://doi.org/10.1177/1029864910393425

Chen, F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling*, *14*(3), 464–504.

Chichekian, T., & Vallerand, R. J. (2022). Passion for science and the pursuit of scientific studies : The mediating role of rigid and flexible persistence and activity involvement. *Learning and Individual Differences*, *93*(March 2021), 102104. https://doi.org/10.1016/j.lindif.2021.102104

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences*. Lawrence Erlbaum Associates.

Côté, J. (1999). The influence of the family in the development of talent in sport. *The Sport Psychologist*, *13*(4), 395–417. https://doi.org/10.1177/1527002502003003001

dos Santos Silva, C., Araújo, M. V., & Marinho, H. (2024). Attitudes in music practice: a survey exploring the self-regulated learning processes of advanced Brazilian and Portuguese musicians. *Frontiers in Psychology*, *15*(January). https://doi.org/10.3389/fpsyg.2024.1324100

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and Passion for Long-Term Goals. *Journal of Personality and Social Psychology*, *92*(6), 1087–1101. https://doi.org/10.1037/0022-3514.92.6.1087

Ericsson, K. A., & Charness, N. (1994). Expert performance: Its structure and acquisition. *American Psychologist*, *49*(8), 725–747. https://doi.org/10.1037/0003-066X.50.9.803

Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The Role of deliberate practice in the acquisition of expert performance. *Psychological Review*, *100*(3), 363–406.

Ericsson, K. A., & Lehmann, A. C. (1996). Expert and exceptional performance: evidence of maximal adaptation to task constraints. *Annual Review of Psychology*, *47*, 273–305.

Evans, P., & Bonneville-Roussy, A. (2016). Self-determined motivation for practice in university music students. *Psychology of Music*, *44*(5), 1095–1110. https://doi.org/10.1177/0305735615610926

Gembris, H., & Heye, A. (2014). Growing older in a symphony orchestra: The development of the age-related self-concept and the self-estimated performance of professional musicians in a lifespan perspective. *Musicae Scientiae*, *18*(4), 371–391. https://doi.org/10.1177/1029864914548912

Gruber, H., Degner, S., & Lehmann, A. C. (2004). Why do some commit themselves in deliberate practice for many years–and so many do not? Understanding the development of professionalism in music. *Current Issues in Adult Learning and Motivation*, 222–235.

Hallam, S. (2013). What predicts level of expertise attained, quality of performance, and future musical aspirations in young instrumental players? *Psychology of Music*, *41*(3), 267–291. https://doi.org/10.1177/0305735611425902

Hallam, S., & Bautista, A. (2018a). Processes of instrumental learning: The development of musical expertise. *The Oxford Handbook of Music Education*, *3*, 108–125.

Hallam, S., Creech, A., Papageorgi, I., Gomes, T., Rinta, T., Varvarigou, M., & Lanipekun, J. (2016a). Changes in motivation as expertise develops: Relationships with musical aspirations. *Musicae Scientiae*, *20*(4), 528–550. https://doi.org/10.1177/1029864916634420

Hallam, S., Rinta, T., Varvarigou, M., Creech, A., Papageorgi, I., Gomes, T., & Lanipekun, J. (2012). The development of practising strategies in young people. *Psychology of Music*, *40*(5), 652–680. https://doi.org/10.1177/0305735612443868

Hargreaves, D. J., & Bonneville-Roussy, A. (2018). What is 'open-earedness', and how can it be measured? *Musicae Scientiae*, *22*(2). https://doi.org/10.1177/1029864917697783

Hayes, A. (2022). *Introduction to Mediation, Moderation, and Conditional Process Analysis* (3rd ed.). Guilford.

How, E. R., Tan, L., & Miksza, P. (2022). A PRISMA review of research on music practice. *Musicae Scientiae*, *26*(3), 675–697. https://doi.org/10.1177/10298649211005531

Hruska, E., & Bonneville-Roussy, A. (2022). Personality and Individual Differences. In G. E. McPherson (Ed.), *The Oxford Handbook of Music Performance, Volume 1* (pp. 603–629). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190056285.013.25

Jørgensen, H., & Hallam, S. (2016). Practicing. In S. Hallam, I. Cross, & M. Thaut (Eds.), *The Oxford handbook of music psychology., 2nd ed.* (pp. 449–462). Oxford University Press.

Lehmann, A. C., Gruber, H., & Kopiez, R. (2018). Expertise in music. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance., 2nd ed.* (pp. 535–549). Cambridge University Press. https://doi.org/10.1017/9781316480748.028

Manturzewska, M. (1990). A Biographical Study of the Life-Span Development of Professional Musicians. *Psychology of Music*, *18*(2), 112-139. https://doi.org/10.1177/0305735690182002

Marsh, H. W., Muthén, B. O., Asparouhov, T., Lüdtke, O., Robitzsch, A., Morin, A. J. S., & Trautwein, U. (2009). Exploratory structural equation modeling, integrating CFA and EFA: Application to students' evaluations of university teaching. *Structural Equation Modeling: A Multidisciplinary Journal*, *16*(3), 439–476. https://doi.org/10.1080/10705510903008220

Marsh, H. W., Vallerand, R. J., Lafrenière, M.-A. K., Parker, P., Morin, A. J. S., Carbonneau, N., Jowett, S., Bureau, J. S., Fernet, C., Guay, F., Salah Abduljabbar, A., & Paquet, Y. (2013). Passion: Does one scale fit all? Construct validity of two-factor passion scale and psychometric invariance over different activities and languages. *Psychological Assessment*, *25*(3), 796–809. https://doi.org/10.1037/a0032573

McCormick, J., & McPherson, G. E. (2003). The Role of Self-Efficacy in a Musical Performance Examination: An Exploratory Structural Equation Analysis. *Psychology of Music*, *31*(1), 37–51. https://doi.org/10.1177/0305735603031001322

McPherson, G. E., Miksza, P., & Evans, P. (2018). Self-regulated learning in music practice and performance. In D. H. Schunk & J. A. Greene (Eds.), *Handbook of self-regulation of learning and performance., 2nd ed.* (pp. 181–193). Routledge/Taylor & Francis Group.

Mornell, A., Osborne, M. S., & McPherson, G. E. (2020). Evaluating practice strategies, behavior and learning progress in elite performers: An exploratory study. *Musicae Scientiae*, *24*(1), 130–135. https://doi.org/10.1177/1029864918771731

Muthén, B. O., Muthén, L. K., & Asparouhov, T. (2017). *Regression and mediation analysis using Mplus*. Muthén & Muthén.

Muthén, L. K., & Muthén, B. O. (2025). *Mplus Version 8.11*. Muthén & Muthén.

Papageorgi, I. (2016). Developing and maintaining expertise in musical performance. In *Advanced musical performance: Investigations in higher education learning* (pp. 303–318). Routledge.

Papageorgi, I., Creech, A., Haddon, E., Morton, F., De Bezenac, C., Himonides, E., Potter, J., Duffy, C., Whyton, T., & Welch, G. (2010). Perceptions and predictions of expertise in

advanced musical learners. *Psychology of Music*, *38*(1), 31–66. https://doi.org/10.1177/0305735609336044

Passarotto, E., Preckel, F., Schneider, M., & Müllensiefen, D. (2022). Deliberate practice in music: Development and psychometric validation of a standardized measurement instrument. *Psychology of Music*, *50*(5), 1637–1655. https://doi.org/10.1177/03057356211065172

Ryan, R. M., & Deci, E. L. (2017). *Self-Determination Theory: Basic psychological needs in motivation, development, and wellness*. Guilford Press.

Schellenberg, B. J. I., Gunnell, K. E., Mosewich, A. D., & Bailis, D. S. (2014). Measurement Invariance of the Passion Scale Across Three Samples: An ESEM Approach. *Measurement in Physical Education and Exercise Science*, *18*(4), 242–258. https://doi.org/10.1080/1091367X.2014.942453

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

Tóth-Király, I., Bõthe, B., Rigó, A., & Orosz, G. (2017). An Illustration of the Exploratory Structural Equation Modeling (ESEM) Framework on the Passion Scale. *Frontiers in Psychology*, *8*, 1968. https://doi.org/10.3389/fpsyg.2017.01968

Vallerand, R. J. (2015a). *The psychology of passion: A dualistic model.* Oxford University Press.

Vallerand, R. J., Blanchard, C. M., Mageau, G. A., Koestner, R., Ratelle, C., Léonard, M., Gagné, M., & Marsolais, J. (2003). Les passions de l'âme: On obsessive and harmonious

passion. *Journal of Personality and Social Psychology*, *85*(4), 756–767. https://doi.org/10.1037/0022-3514.85.4.756

Vallerand, R. J., Mageau, G. A., Elliot, A. J., Dumais, A., Demers, M.-A. A., & Rousseau, F. L. (2008). Passion and performance attainment in sport. *Psychology of Sport and Exercise*, *9*(3), 373–392. https://doi.org/10.1016/j.psychsport.2007.05.003

Vallerand, R. J., Salvy, S.-J., Mageau, G. A., Elliot, A. J., Denis, P. L., Grouzet, F. M. E., & Blanchard, C. M. (2007). On the role of passion in performance. *Journal of Personality*, *75*(3), 505–534. https://doi.org/10.1111/j.1467-6494.2007.00447.x

Vallerand, R. J., Sverdlik, A., & Bonneville-Roussy, A. (2022). The Role of Passion in the Arts and Humanities: How Quality of Engagement Matters. In L. Tay & J. O. Pawelski (Eds.), *The Oxford Handbook of the Positive Humanities*.Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190064570.013.34

Vellacott, C., & Ballantyne, J. (2022). An exploration of the practice habits and experiences of professional musicians. *Music Education Research*, *24*(3), 312–326. https://doi.org/10.1080/14613808.2022.2053513

Table 1. Descriptive Statistics and Correlation Coefficients

Variable	1	2	3	4	5	6
1. Harmonious Passion	—					
2. Obsessive Passion	.32***	—				
3. Age	.01	-.04	—			
4. Experience	.03	-.06	.89***	—		
5. Solitary Practice	.04	.08*	.40***	.39***	—	
6. Gender	-.01	-.17***	-.12**	-.09*	.00	—
Mean	5.16	3.32	23.82	12.70	15.67	.49
SD	1.10	1.30	10.72	10.52	10.91	.50

Note. N = 657. HP and OP are latent means and variances. By default latent means are centered. Solitary practice is the number of hours per week. Gender is coded 0 = male, 1 = female and can be interpreted as the percentage of females (coded 1) in the sample. Significance levels: $p < .05$ = *, $p < .01$ = **, $p < .001$ = ***.

Table 2. Age And Gender Invariance of the Passion Scale:

Invariance	Model	χ^2 (df)	CFI	TLI	RMSEA [90% CI]	SRMR	ΔCFI	ΔTLI	ΔRMSEA	ΔSRMR
Age	Configural	313.768 (147)	.931	.908	0.071 [.060–.082]	.067	—	—	—	—
	Metric	340.743 (167)	.928	.915	0.068 [.058–.078]	.071	.003	-.007	.003	-.004
	Scalar	369.670 (187)	.925	.920	0.066 [.056–.076]	.074	.003	-.005	.002	-.003
Gender	Configural	290.226 (98)	.920	.892	0.076 [.066–.086]	.062	—	—	—	—
	Metric	300.626 (108)	.920	.902	0.073 [.063–.082]	.064	.000	-.010	.003	-.002
	Scalar	330.326 (118)	.911	.901	0.073 [.064–0.82]	.066	.009	.001	.000	.002

Note. N= 657. Changes values are computed as follows: Metric against Configural, and Scalar against Metric

Table 3. Age and Experience Predicting Harmonious and Obsessive Passion

Outcome	Predictor	B	SE	β	*p*
Harmonious Passion	**Age**	**-0.342**	**0.089**	**-0.399**	**0.000**
	Experience	**0.344**	**0.098**	**0.382**	**0.000**
	Gender	0.010	0.070	0.005	0.891
	Age x Gender	**0.530**	**0.129**	**0.384**	**0.000**
	Experience x Gender	**-0.469**	**0.141**	**-0.326**	**0.001**
Obsessive Passion	Age	0.010	0.100	0.011	0.923
	Experience	-0.096	0.103	-0.105	0.407
	Gender	**-0.177**	**0.069**	**-0.195**	**0.000**
	Age x Gender	0.022	0.135	0.016	0.872
	Experience x Gender	-0.020	0.143	-0.014	0.889
Residual Var.	Harmonious Passion	0.789	0.053	0.979	0.000
	Obsessive Passion	0.763	0.036	0.963	0.000

Note. N= 668. Var = Variance. Significant values are presented in bold typeface.

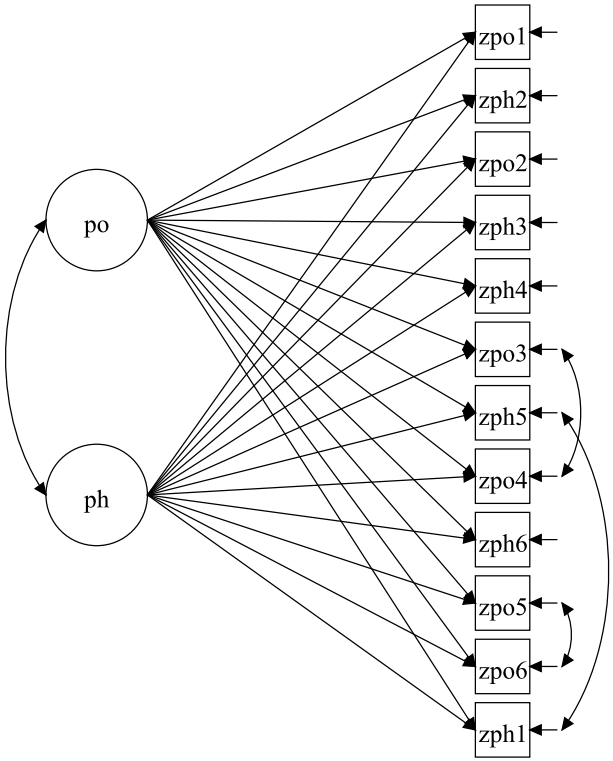
Table 4. Harmonious Passion, Obsessive Passion, Age and Experience Predicting Solitary Practice

Outcome	Predictor	B	SE	β	*p*
Solitary Practice	HP	0.36	0.71	0.02	0.61
	OP	**1.83**	**0.68**	**0.11**	**0.01**
	Age	**4.21**	**1.98**	**0.29**	**0.03**
	Experience	1.32	2.02	0.09	0.51
	Gender	1.66	1.07	0.06	0.12
	Age X Experience	**-1.38**	**0.68**	**-0.19**	**0.04**
	Age x HP	1.18	1.88	0.07	0.53
	Age x OP	**3.56**	**1.86**	**0.21**	**0.05**
	Experience x HP	-1.89	1.74	-0.10	0.28
	Experience x OP	-1.54	1.69	-0.09	0.36
	Age x Gender	-0.12	2.94	-0.01	0.97
	Experience x Gender	2.34	2.87	0.10	0.42
Residual Var.	**Solitary Practice**	**175.94**	**11.87**	**0.79**	**0.00**

Note. N= 654. Var = Variance. Significant values are presented in bold typeface.

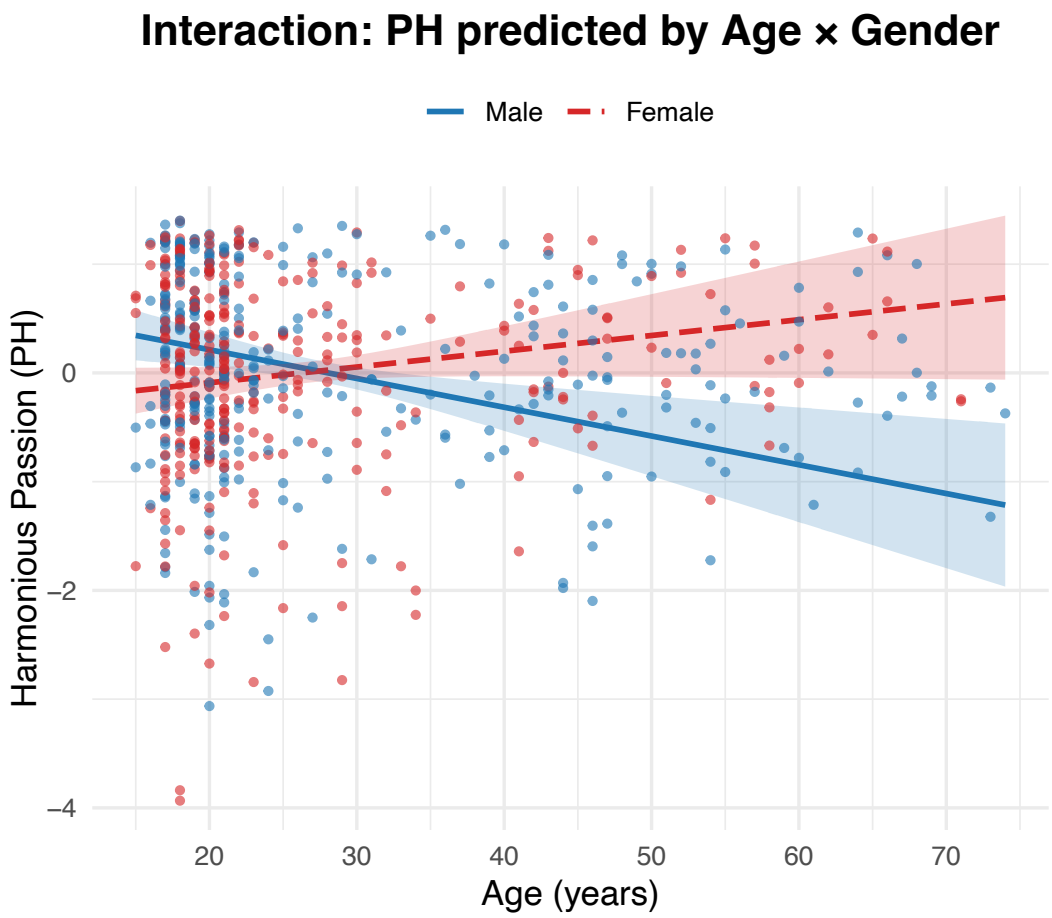
Figure Captions

Figure 1. ESEM Results of the HP and OP Latent Factors



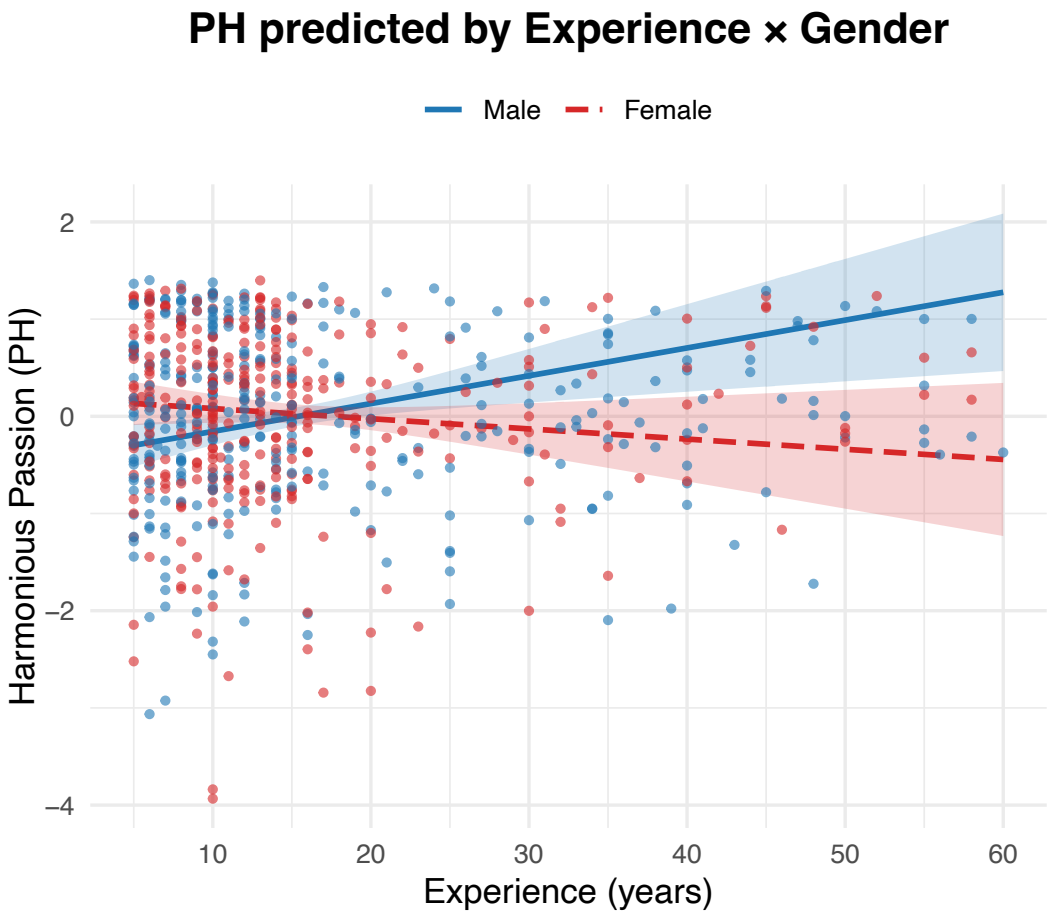
Note. N= 682. HP = Harmonious Passion; OP = Obsessive passion.

Figure 2. Interaction Effect of Age and Gender on Harmonious Passion



Note. N= 654. The figures show the relationship between age (x-axis, ranging from 15 to 74 years) and passion. The solid line represents the predicted trend of passion across age, and the shaded area around the line indicates the 95% confidence interval, reflecting uncertainty in the model's prediction.

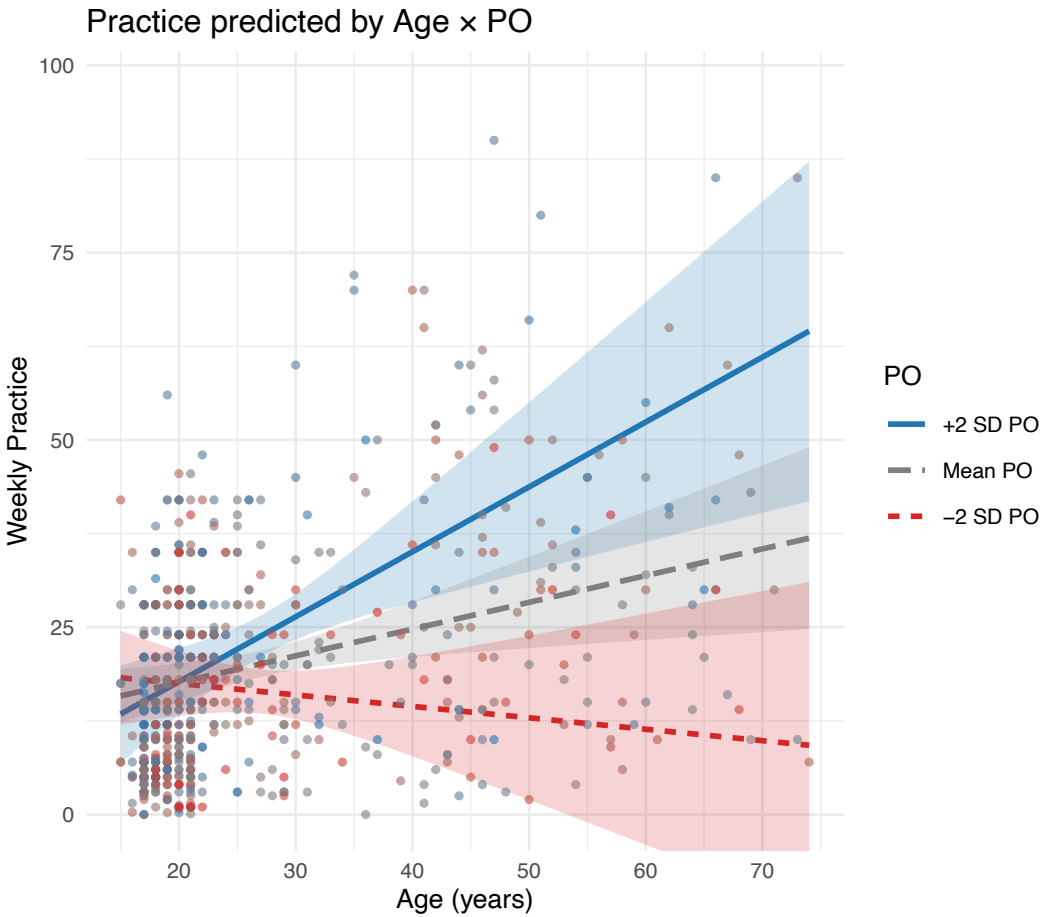
Figure 3. Influence of Age on Solitary Practice



Note. N= 654. The figure shows the relationship between experience (x-axis, ranging from 5 to 60 years) and solitary practice (y-axis, ranging from 0 to 60 hours per week). Each dot represents an individual participant's self-reported weekly solitary practice hours. The

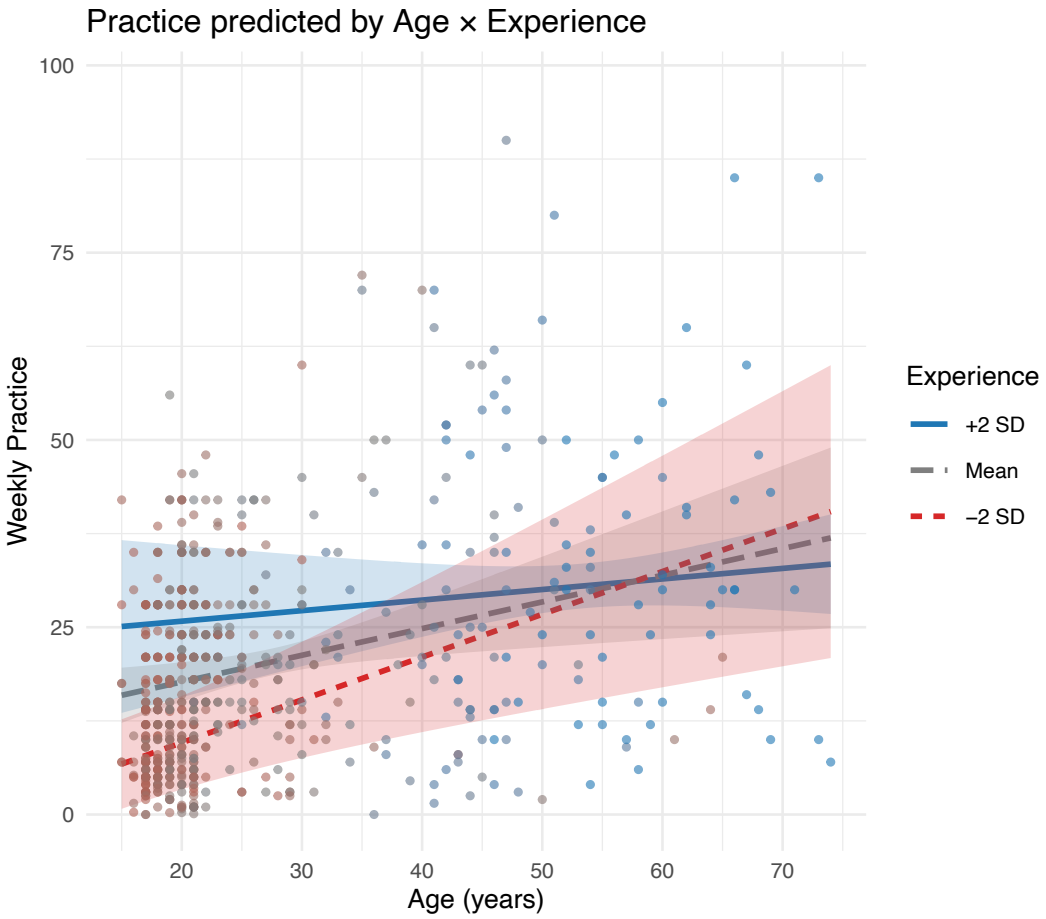
solid line represents the predicted trend of solitary practice across age, and the shaded area around the line indicates the 95% confidence interval, reflecting uncertainty in the model's prediction.

Figure 4. Interaction between Obsessive Passion and Age predicting Solitary Practice.



Note. N= 654. The figure shows the interaction between age (15 to 74 years) and obsessive passion (PO) on solitary practice. Each dot represents an individual's weekly practice. The three lines represent predicted levels of practice for low (–2 SD), average (Mean), and high (+2 SD) levels OP. The shaded areas around the lines indicate 95% confidence intervals.

Figure 5 Interaction between Age and Experience predicting Solitary Practice.



Note. N= 654. The figure shows the interaction between age (15 to 74 years) and experience (5 to 60 years) on solitary practice. Each dot represents an individual's weekly practice. The three lines represent predicted levels of practice for low (–2 SD), average (Mean), and high (+2 SD) levels of years of experience. The shaded areas around the lines indicate 95% confidence intervals.