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How Do General Musical Sophistication and Musical Training Affect the Use of Music in Mood Regulation?

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ABSTRACT

Music is often used to regulate mood (Locke & Keltner, 1993; Schäfer et al., 2013). Studies have indicated a positive correlation between active engagement in music and the use of music for mood regulation (Saarikallio, 2006; Saarikallio, 2012), but this has not been explored in relation to musical ability. The present study aimed to investigate the link between the level of musical sophistication and musical training, and the use of music to regulate mood. The study explored the extent to which participants used music for mood regulation, and the way in which they used it. The hypothesis was that participants with higher levels of musical sophistication and musical training would use music more for mood regulation. Participants completed questionnaires assessing musical sophistication, amount of musical training and use of music in mood regulation. The scores generated were compared, and correlations were analysed. The results demonstrated that as hypothesised, participants with more musical sophistication and musical training used music more to regulate their mood. Additionally, there were positive correlations between musical sophistication and musical training and each mood regulation subcategory, except for "discharge", defined as the "venting of negative emotion". The subcategory with the strongest positive correlation was "strong sensation", or "intense emotion induction".

1. INTRODUCTION

The topic of music and emotion is very important in music psychology. Despite its significance, however, this topic did not receive much attention between the 1960s-1980s, and has only become more prominent in music psychology over the last 30 years (Juslin & Sloboda, 2010). The first full volume on the subject, Juslin & Sloboda's *Music and Emotion: Theory and Research*, was published in 2001. This 'arguably contributed to rapid development in the field' (Juslin & Sloboda, 2010), and many books and studies on this topic have been published since.

Researchers have explored the emotions which are evoked by music. Zentner, Grandjean & Scherer's study (2008), created a nine-factor model of emotions produced by music. This consisted of wonder, transcendence, tenderness, nostalgia, peacefulness, power, joyful activation, tension and sadness. Furthermore, studies have shown that music is usually listened to in daily life (North et al., 2004; Sloboda, et al., 2001) and that emotions evoked by music are fundamental to the majority of rituals and events (Dissanayake, 2009). Moreover, researchers have claimed that the emotional impacts are the principal reason for people taking part in musical recreation, based on results from questionnaires (Juslin & Laukka, 2004), and the Experience Sampling Method (ESM) (Sloboda & O'Neill, 2001). Evidence has shown that people use music not only to induce emotions, but also to regulate emotions (Batt-Rawden & DeNora, 2005; Behne, 1997; DeNora, 1999; Gabrielsson & Lindström, 1995; Sloboda, 1992). Further to this, researchers have used questionnaires to assess the reasons why people use music on an everyday basis (Juslin & Laukka, 2004; North et al., 2004). The responses have included enjoyment, passing time, building a certain atmosphere and evoking memories.

The use of music not only affects emotions, but can also impact mood. Moods are distinguished from emotions as they are less intense and last for a longer period of time. The most common goal of mood regulation is changing a negative mood to a positive one, but it can also include changing positive or negative moods to neutral, changing a positive mood to be negative, or maintaining a current mood (Parkinson et al., 1996). A number of frameworks for understanding mood regulation methods have been developed. Morris & Reilly (1987) identified four categories of mood regulation. The first of these used strategies to directly handle the mood, such as self-reward and distraction. The second category included strategies which changed the meanings and associations of the mood, such as attributional bias and downward comparison. The third category was based on directly targeting the cause of the mood. Finally, the fourth category involved using social support, and combined elements from the other three categories. The use of mood regulation fits within the first category, as it can be a distraction or a reward. Thayer (1989) devised a two-dimensional model for analysing mood regulation, based on energy and tension: the aim of mood regulation was either to increase energy or to decrease tension. Studies have shown music to be an effective way of raising energy (Reimnitz & Silverman, 2020), in

addition to reducing stress and improving overall mood (Bishop et al., 2007; Fritz et al., 2013; Pelletier, 2004; Stewart et al., 2019). Therefore, according to Thayer's framework, music can be seen as a valuable strategy for mood regulation.

There are several strategies which have been revealed to regulate mood, such as recalling mood-incongruent memories (Erber & Erber, 1994; Parrott & Sabini, 1990) and thinking about the future (Parkinson et al., 1995; Persson & Sjöberg, 1985; Staats & Skowronski, 1992). Other effective mental approaches include attributional biases (McFarland & Ross, 1982), downward comparison (Aspinwall & Taylor, 1993; Morris & Schnurr, 1989) and positive thinking (Goodhart, 1985; Lazarus, 1991; Lazarus & Alfert, 1964). Additionally, the consumption of alcohol is often used to enhance mood (Hull & Bond, 1986; Marlatt, Kosturn, & Lang, 1975), along with food (Kräuchi et al., 1990; Kräuchi et al., 1993), in addition to caffeine and nicotine (Adan, 1994). Moderate forms of exercise have been found to be a useful way to increase energy (Thayer et al., 1992) and relieve tension (Berger & Owen, 1992), and diversion methods such as watching television (Zillmann, 1988) and listening to music (Locke & Keltner, 1993) are regularly used for mood regulation. Parkinson et al. (1996) found pleasurable activities and distraction to be the second most effective method of mood regulation, after active mood management. This indicates that the use of music can be very useful for regulating mood.

There is evidence to show that the most important purposes of music listening are arousal and mood regulation (Schäfer et al., 2013). Saarikallio (2006, 2008, 2012) has been particularly important in the research of the use of music in mood regulation. In 2007, Saarikallio & Erkkilä published a study on the use of music for mood regulation in adolescents. This study identified 7 key purposes for the use of music in mood regulation:

1. Entertainment: "creating a nice atmosphere and a happy feeling in order to maintain or enhance current positive mood"
2. Revival: "personal renewal: relaxing and getting new energy when feeling stressed or tired"
3. Strong Sensation: "searching for intense emotional experiences"
4. Diversion: "forgetting unwanted thoughts and feelings with the help of pleasant music"
5. Discharge: "emotional disclosure, releasing anger or sadness through music that expresses these emotions"
6. Mental Work: "using music as a framework for mental contemplation and reappraisal of emotional preoccupations"
7. Solace: "searching for feelings of being accepted and understood when feeling sad or troubled"

Notably, discharge differs from the other purposes as it is the only one not to associate the use of music with improving mood.

These findings formed the framework for the Music in Mood Regulation Scale (MMR), which was developed soon after (Saarikallio, 2008). The MMR scale consists of 40 questions, and assesses the use of music in mood regulation, using the seven subscales. Additionally, Saarikallio later developed the brief Music in Mood Regulation Scale, or b-MMR (Saarikallio, 2012). This is a shorter, 21-item version of the MMR scale, with three questions for each of the seven subscales. The initial results from this scale showed a correlation with the results from the longer MMR scale, indicating that this is a reliable and more concise way to assess the use of music in mood regulation. Although these scales were designed based on adolescents, they can be applied to other age groups (Saarikallio, 2012).

Previous studies have revealed a number of differences between musicians and non-musicians. It has been found that brain structures differ between musicians and non-musicians (Gaser & Schlaug, 2003), and imaging has shown that listening to music activates different parts of the brain for musicians compared to non-musicians (Angulo-Perkins et al., 2014). Furthermore, differences between musicians and non-musicians are present in the area of music and emotion. Park et al. (2014) used functional magnetic resonance imaging to assess the responses of musicians and non-musicians to musical emotions, showing that musicians and non-musicians processed these emotions in music differently. Additionally, musicians have been found to be better at the auditory, tactile and audiotactile identification of emotions in music (Sharp et al., 2019). Studies have indicated that a higher level of musical expertise leads to higher emotional responses to music (Gerstgrasser et al., 2022; Kantor-Martynuska & Horabik, 2015). Levels of musical sophistication may also affect the use of music for mood regulation, as research has shown a positive correlation between active engagement in music and the use of music for mood regulation (Saarikallio, 2006 & 2012). This aspect, however, has not been explored.

The research aim of this study was therefore to explore the link between the level of musical sophistication and the amount of musical training, and the use of music for mood regulation. The hypothesis was that participants

with a higher level of musical sophistication and more musical training would use music more for mood regulation. This hypothesis was based on the previous evidence which has indicated that higher levels of musical expertise lead to higher emotional responses to music (Gerstgrasser et al., 2022; Kantor-Martynuska & Horabik, 2015), and that there is a positive correlation between engagement in music and the use of music for mood regulation (Saarikallio, 2006 & 2012).

2. METHOD

Design. For this study, a quantitative design was used. The study was an anonymous online survey, carried out using Qualtrics. This meant that a higher number of participants could take the survey, and enabled data to be gathered from participants who did not live or study in Durham. The central independent variables of interest in this study were the level of musicianship and the level of musical training. The dependent variable being assessed was the use of music in mood regulation. This included not only how much participants used music for mood regulation, but also the ways in which they used music for mood regulation, according to Saarikallio's seven subscales (Saarikallio, 2008 & 2012).

Participants. Participants were recruited through social media: a link to the survey was posted on Instagram and Facebook. This was effective for attracting young adults, which was the age group being targeted. The online survey received 54 responses, but after removing the incomplete responses, there was a total of 46 participants who had completed all the questions of the survey (32 females, 11 males, 2 non-binary, 1 preferred not to say; mean age = 25.1, *SD* = 1.14). Research has suggested that the use of music in mood regulation increases as age increases (Saarikallio, 2008). Therefore, in order to keep the ages consistent and minimise the effect of background variables, participants were asked only to complete the survey if they were a student. All participants were aged between 18-23 years. The majority of participants were British, although there were a range of different nationalities (29 British, 8 Scottish, 1 Chinese, 1 Dutch, 1 Irish, 1 Polish, 1 Singaporean, 1 Spanish, 1 Turkish, 1 Canadian-British, 1 French-Scottish). When asked their level of musicianship, 7 participants (15.22%) described themselves as non-musicians (mean age = 20, *SD* = .58), 16 participants (34.78%) described themselves as amateur musicians (mean age = 20.75, *SD* = 1.24), 19 participants (41.3%) as serious amateur musicians (mean age = 19.84, *SD* = .9) and 4 participants (8.7%) as semi-professional musicians (mean age = 20.75, *SD* = .5). Professional musician was also presented as an option, but no participants chose this term to describe themselves. When asked which instrument they played best, including voice, there was a range of answers given (11 reported piano, 7 voice, 6 cello, 4 flute, 3 guitar, 3 trumpet, 2 drum kit, 2 violin, 1 bassoon, 1 clarinet, 1 euphonium, 1 French horn, 1 recorder, 1 trombone, 1 xylophone, 1 N/A).

Materials/stimuli. Two pre-existing questionnaires were used for this study. Firstly, the Goldsmiths Musical Sophistication Index (Gold-MSI) was used (Müllensiefen et al., 2014). This was chosen as it is a standardised and regularly used questionnaire, and is thorough. This questionnaire consists of 39 questions and gives a comprehensive assessment of musical sophistication. Within this, there are five factors: active engagement, perceptual abilities, musical training, singing abilities and emotion. Additionally, there is a set of questions assessing general musical sophistication. For this study, the questions for general musical sophistication and musical training were used. Secondly, Saarikallio's Brief Music in Mood Regulation Scale (b-MMR) was used (Saarikallio, 2012). This was a shortened, 21-item version of the original 40-item scale, as discussed earlier. This scale was chosen as it was devised in 2012, and therefore is not considered outdated. The shorter version of the survey was used as it meant that participants would be more likely to complete the survey, and previous evidence indicates that results from the shorter scale correspond with results from the longer scale.

Procedure. In the survey, participants were firstly asked to provide demographic information, consisting of age, gender and nationality, in order to account for background variables. Furthermore, participants were asked to describe themselves as one of the following options: non-musician, amateur musician, serious amateur musician, semi-professional musician or professional musician. Participants then answered the selected questions (on general musical sophistication and musical training) from the Gold-MSI. Some of the questions were on a 7-point Likert scale ranging from "completely disagree" to "completely agree". The remaining questions were presented as multiple-choice questions, with 7 options for each answer, with the exception of "which instrument participants played best", which was a text answer. Finally, the 21 b-MMR questions were presented in a table, with a 5-point Likert scale from "strongly disagree" to "strongly agree".

3. ANALYSIS

The data analysis was performed using Excel. The Gold-MSI scoring template was used in order to generate scores for participants. Each answer was assigned a value between 1 and 7, with higher scores indicating a higher level of musical sophistication. This generated a minimum score of 18 and a maximum score of 126 for general musical sophistication, and a minimum score of 7 and a maximum score of 49 for musical training. For the b-MMR questions, scores were generated by giving each answer a value from 1 to 5, with 1 being "completely disagree" and 5 being "completely agree". This produced an overall minimum score of 21 and an overall maximum score of 105. Within this, there was a minimum score of 3 and a maximum score of 15 for each of the subscales. The scores generated were used to calculate the correlation between general musical sophistication and overall b-MMR scores, and between general musical sophistication and each of the b-MMR subscales. This was repeated for musical training and overall b-MMR scores, and musical training and each b-MMR subscale. Graphs were created in order to show visual representations of this data.

Additionally, in order to further check the effect of musical ability, average scores for overall b-MMR and each of the subscales were calculated for the following groups: non-musicians, amateur musicians, serious amateur musicians and semi-professional musicians. The results of these groups were compared to each other and shown on graphs. An analysis of variance (ANOVA) test was carried out between the different groups for the overall b-MMR scores and each of the subscale scores to check whether these results were significant.

In order to account for the effects of background variables, the correlation between age and scores was calculated. Studies have also suggested that mood regulation strategies differ between males and females (Thayer et al., 1994), and that females use music for mood regulation more than males (Behne, 1997; Tarrant et al., 2000; Sloboda & O'Neill, 2001; Wells & Hakanen, 1991). To account for this, average scores for males and females were calculated and these scores were compared. T-tests were run between male and female scores in order to determine the effect of this factor on the results.

4. RESULTS

Figures 1 and 2 support the central hypothesis of the current study. Figure 1 shows the relationship between general musical sophistication scores and overall b-MMR scores, and Figure 2 shows the relationship between musical training scores and overall b-MMR scores. Overall, it is evident that there is an increase in the use of music for mood regulation as musical sophistication and musical training increase. Additionally, a stronger positive correlation is seen for general musical sophistication and mood regulation than for musical training and mood regulation, which was not hypothesised.

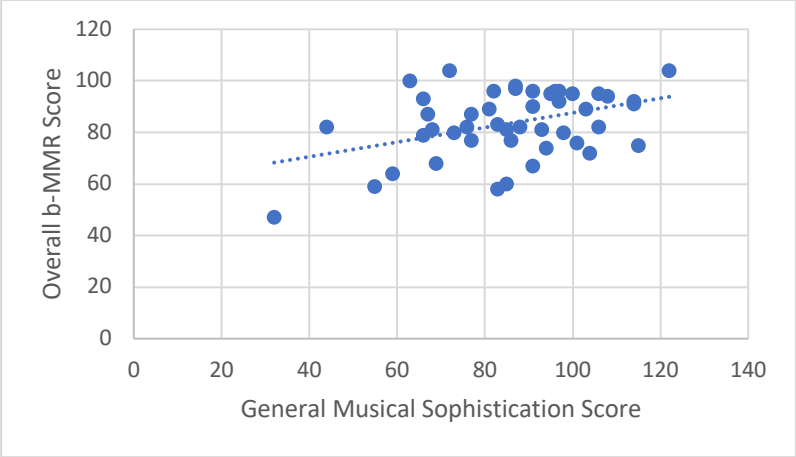

Figure 1. Relationship between general musical sophistication scores and overall b-MMR scores

Table 1 shows the correlations between general musical sophistication scores and overall b-MMR scores, and between musical training scores and overall b-MMR scores. This table also displays the correlations between general musical sophistication and each of the seven b-MMR subscales, and between musical training and each subscale. In general, the hypothesis is supported. Here, both general musical sophistication and musical training

exhibit a positive correlation with overall b-MMR scores and with each of the subscales apart from discharge, which shows negative correlations, although these are statistically insignificant (correlation > -.1). This difference, however, is potentially to be expected as discharge differs from the other subscales as it does not associate music with increasing the positivity of a mood. In this table, general musical sophistication scores show a medium effect ($.3 \leq r \geq .5$) on overall b-MMR scores, whilst musical training scores show a small effect ($.1 \leq r \geq .3$) on overall b-MMR scores. Furthermore, stronger positive correlations are observed between general musical sophistication and the subscales than between musical training and the subscales. General musical sophistication demonstrates a large effect ($r \geq .5$) on strong sensation scores, a medium effect on entertainment, revival, mental work and solace scores, and a small effect on diversion scores. Musical training demonstrates a medium effect on strong sensation scores and a small effect on entertainment, revival, diversion, mental work and solace scores. For both general musical sophistication and musical training scores, strong sensation showed the strongest positive correlation and diversion showed the weakest correlation.

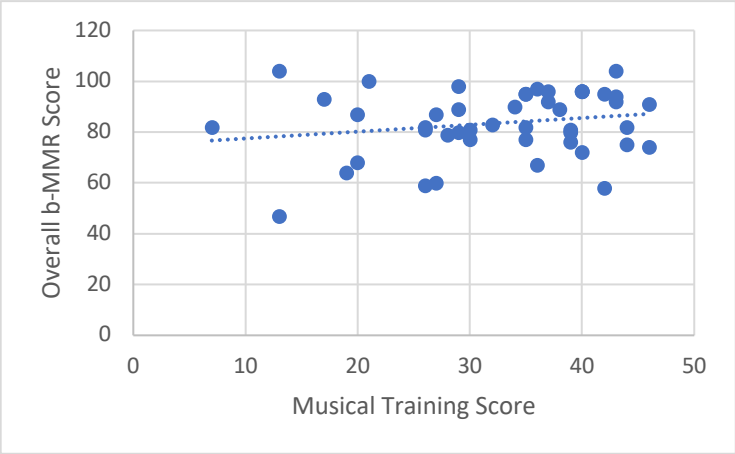

Figure 2. Relationship between musical training scores and overall b-MMR scores

Table 1. Correlations of b-MMR scores with general musical sophistication scores and musical training scores

	General musical Sophistication	*Musical Training*
Overall b-MMR score	.41	.2
Entertainment score	.39	.21
Revival score	.35	.24
Strong sensation score	.58	.41
Diversion score	.29	.1
Discharge score	-.05	-.07
Mental work score	.42	.18
Solace score	.39	.12

When the averages were calculated for non-musicians, amateur musicians, serious amateur musicians and semi-professional musicians, the results were similar. Figure 3 illustrates that overall b-MMR scores increase as musicianship level increases, with non-musicians having the lowest average scores and semi-professional musicians having the highest average scores, supporting the hypothesis. Once again, this is true for all the subscales apart from discharge (Figure 4). Table 2 shows the p-values from the ANOVA tests which were run. Here, it can be observed that the results of comparing musicianship to overall b-MMR are statistically significant ($p < .05$), supporting the hypothesis. Additionally, the p-values are less than .05 for entertainment, strong sensation, mental work and solace, meaning that a null hypothesis can be rejected for these subscales.

Conversely, the results for revival, diversion and discharge are not statistically significant ($p > .05$), indicating that a null hypothesis cannot necessarily be rejected for these subcategories.

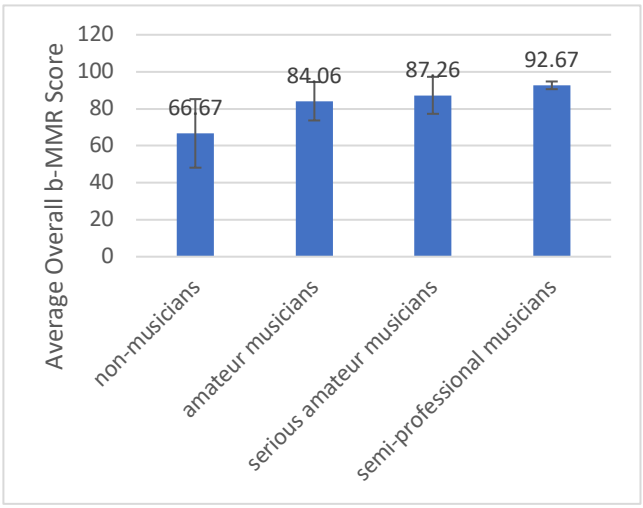

Figure 3. Average overall b-MMR scores by musicianship level group

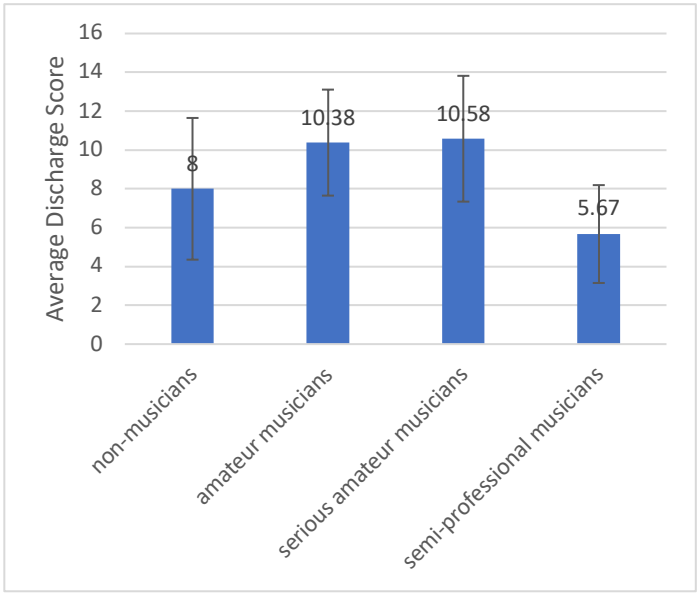

Figure 4. Average discharge scores by musicianship level group

Table 2. P-values from ANOVA

Factor	*p-value*
Overall b-MMR	.02
Entertainment	.01
Revival	.1
Strong Sensation	.01
Diversion	.1
Discharge	.07
Mental Work	.02
Solace	.04

Table 3 presents the correlation between age and overall b-MMR scores, and between age and each of the b-MMR subscales. These results indicate that there is no effect of age on the overall b-MMR scores or on any of the subscales, other than discharge, which may have a small negative effect. The p-value for discharge, however, is not statistically significant (p = .51), meaning that a null hypothesis cannot be rejected, and that age does not necessarily have an effect on this factor. The effect of age as a background variable can therefore be discounted in this study, suggesting that it was effective to keep the ages of participants consistent.

Table 3. Correlations between age and b-MMR scores

Factor	*Correlation with Age*
Overall b-MMR	.05
Entertainment	.07
Revival	-.09
Strong Sensation	-.03
Diversion	-.05
Discharge	-.1
Mental Work	.02
Solace	0

Figure 5 shows average scores for males and females, demonstrating that female scores were slightly higher for every category. Table 4 illustrates the results of the t-tests run between male and female scores. These results suggest that gender may have influenced the overall b-MMR, revival, strong sensation and diversion scores, but not the entertainment, discharge, mental work and solace scores. It is unlikely, however, that this would have manipulated the results of this study as the majority of participants were female (69.57 %), and the male participants were divided between the different levels of musicianship (4 non-musicians, 1 amateur musician, 6 serious amateur musicians). Therefore, this suggests that the results have not been impacted heavily by background variables, and that the hypothesis is supported.

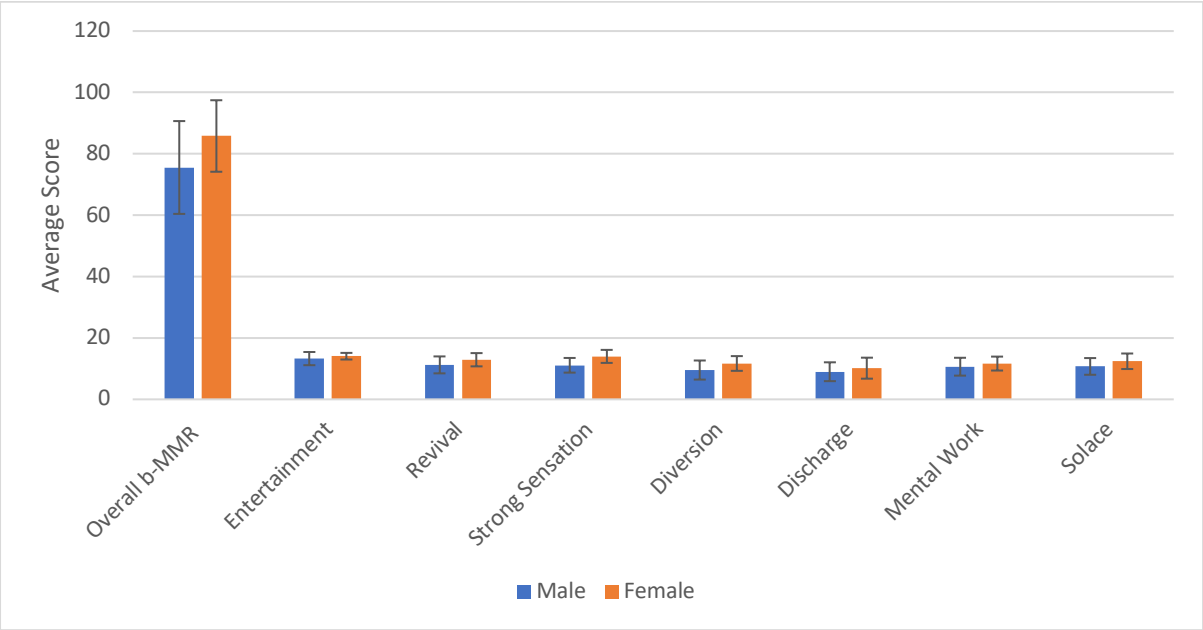

Figure 5. Average b-MMR and subcategory scores for male and female participants

Table 3. P-values from t-tests

Factor	*P-value*
Overall b-MMR	.02
Entertainment	.12
Revival	.05
Strong Sensation	.02
Diversion	.02
Discharge	.33
Mental Work	.24
Solace	.07

5. DISCUSSION

The results from this study indicate that there is a link between the level of musicianship and the use of music in mood regulation. As general musical sophistication increases, the use of music for mood regulation increases. This also applies for musical training and the use of music for mood regulation. These results support the hypothesis of the study, which was that participants who had a higher level of musical sophistication and more musical training would use music more to regulate their mood. The results also align with previous studies which have demonstrated that the use of music for mood regulation increases as active engagement in music increases (Saarikallio, 2006; Saarikallio, 2012).

Results show a stronger link between general musical sophistication and the use of music in mood regulation than between musical training and the use of music in mood regulation. Whilst this aspect was not hypothesised, it is possible that this is to be expected as the general musical sophistication scores provided a more comprehensive view of musicianship, including musical abilities and musical engagement, rather than focusing

on one factor only. Moreover, the results showed that as general musical sophistication and musical training increased, scores for each of the b-MMR subscales increased as well, with the exception of discharge. Similarly, this aspect was not included in the hypothesis. Discharge is the only subscale which does not use music to improve mood, suggesting that creating a positive mood is an important goal of music, particularly for musicians. Due to the correlational nature of this study, it cannot be confirmed whether musical sophistication directly influences the use of music in mood regulation. It is also possible that increased use of music for mood regulation can increase musical sophistication, and there are several other aspects which affect both factors, such as environment and musical ability.

The results demonstrated that the aspect which was most affected by the level of musical sophistication and musical training was "strong sensation", which is associated with "intense emotional experiences". This aligns with previous studies which have found that higher musical sophistication correlates with stronger emotional reactions to music. (Gerstgrasser et al., 2022; Kantor-Martynuska & Horabik, 2015) Conversely, a weak link was observed for diversion. Using music as a distraction has been shown to be an effective and common way of mood regulation (Locke & Keltner, 1993; Parkinson et al., 1996). The results indicate that this method is used similarly between different levels of musicians, and that this experience is potentially more universal than other methods of mood regulation through music.

There were a number of limitations to this study. Firstly, there was a limited number of participants, and the study could be improved by recruiting more participants. Furthermore, only 15.22% of the participants were non-musicians, with the remaining participants each describing their musical ability as "amateur musician" or higher. Additionally, no participants described themselves as "professional musicians" and only 8.7% referred to themselves as "semi-professional musicians", meaning that most participants (76.1%) fell within the categories of "amateur" and "serious amateur musician". Despite this, 50% of the participants were either "non-musicians" or "amateur", and the other 50% were either "serious amateur" or "semi-professional" musicians. Future studies could explore an equal split between every level of musicianship in order to provide a balanced level of musical ability of the participants.

Another limitation of this study is that the scoring of musical sophistication can be subjective. As the participants had to fill out the Gold-MSI for themselves, and a number of the questions were on a scale from "completely disagree" to "completely agree" rather than using objective or factual values, it is possible that this may have affected the results. If the study were to be repeated, it may be better to focus on objective elements such as number of hours or years spent practising music, for example. A further limitation of the study was that the b-MMR questions were presented in order, meaning that the questions for each subscale appeared one after the other. It may have been better to randomise the order of the questions, so that participants' answers were not subconsciously affected.

In addition to this, the process of mood regulation can be conscious or non-conscious (Parkinson et al., 1996). This means that some people may use music with the intention of changing or maintaining their mood, while others engage with music out of habit and therefore may be less likely to notice the impact which music has on their mood. It is possible that this factor affected participants' responses about their use of music for mood regulation. Furthermore, musicians may be more aware of the impact which music has on them. For example, they may be more likely to actively engage with music, rather than listening to background music out of habit.

It is also possible that there are other factors which impacted participants' use of music for mood regulation. An example of this is that differences in personality traits may affect how people use music to regulate their mood. For instance, studies have shown that individuals with low self-esteem use different mood regulation strategies compared to individuals with high self-esteem (Brown & Mankowski, 1993; Morris & Schnurr, 1989; Smith and Petty, 1995). In future, it may be advantageous to take more background variables such as this into account. Another future direction for this study could include adding qualitative methods. For example, it would be beneficial to interview participants in order to better understand the ways in which they use music for mood regulation.

The results of this study have several implications. The study has revealed a link between musicianship and the use of music in mood regulation, and indicated that the use of music to regulate mood may be more complicated than previously thought. Therefore, this is an area which is worth researching further. Additionally, the most evident link was between musical sophistication and strong sensation, indicating that music can be an intensely emotional, and even therapeutic, experience for musicians. It is important for individuals to be able to recognise and regulate emotions and moods (Gross & Thompson, 2007; Parkinson et al., 1996), and it would be beneficial to better understand how music is used as a method for this. This could also have impacts in areas such as mental health, and could potentially be used to regulate feelings of music performance anxiety, perfectionism

and impostor syndrome, which are especially present in musicians (Mor et al., 1995; Osborne & Franklin, 2002; Sims & Cassidy, 2020; Stoeber & Eismann, 2007).

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APPENDICES

Appendix A. Gold-MSI Questions

The highlighted questions were used for this survey.
Questions highlighted in yellow assess "General Factor: Musical Sophistication".
Questions highlighted in blue assess "Factor 3: Musical Training".
Questions highlighted in green assess both of the above factors.

Please circle the most appropriate category:	**1 Completely Disagree**	**2 Strongly Disagree**	**3 Disagree**	**4 Neither Agree nor Disagree**	**5 Agree**	**6 Strongly Agree**	**7 Completely Agree**
1. I spend a lot of my free time doing music-related activities.	1	2	3	4	5	6	7
2. I sometimes choose music that can trigger shivers down my spine.	1	2	3	4	5	6	7
3. I enjoy writing about music, for example on blogs and forums.	1	2	3	4	5	6	7
4. If somebody starts singing a song I don't know, I can usually join in.	1	2	3	4	5	6	7
5. I am able to judge whether someone is a good singer or not.	1	2	3	4	5	6	7
6. I usually know when I'm hearing a song for the first time.	1	2	3	4	5	6	7
7. I can sing or play music from memory.	1	2	3	4	5	6	7
8. I'm intrigued by musical styles I'm not familiar with and want to find out more.	1	2	3	4	5	6	7
9. Pieces of music rarely evoke emotions for me.	1	2	3	4	5	6	7
10. I am able to hit the right notes when I sing along with a recording.	1	2	3	4	5	6	7

Please circle the most appropriate category:	**1 Completely Disagree**	**2 Strongly Disagree**	**3 Disagree**	**4 Neither Agree nor Disagree**	**5 Agree**	**6 Strongly Agree**	**7 Completely Agree**
11. I find it difficult to spot mistakes in a performance of a song even if I know the tune.	1	2	3	4	5	6	7
12. I can compare and discuss differences between two performances or versions of the same piece of music.	1	2	3	4	5	6	7
13. I have trouble recognizing a familiar song when played in a different way or by a different performer.	1	2	3	4	5	6	7
14. I have never been complimented for my talents as a musical performer.	1	2	3	4	5	6	7
15. I often read or search the internet for things related to music.	1	2	3	4	5	6	7
16. I often pick certain music to motivate or excite me.	1	2	3	4	5	6	7
17. I am not able to sing in harmony when somebody is singing a familiar tune.	1	2	3	4	5	6	7
18. I can tell when people sing or play out of time with the beat.	1	2	3	4	5	6	7
19. I am able to identify what is special about a given musical piece.	1	2	3	4	5	6	7
20. I am able to talk about the emotions that a piece of music evokes for me.	1	2	3	4	5	6	7

Please circle the most appropriate category:	**1 Completely Disagree**	**2 Strongly Disagree**	**3 Disagree**	**4 Neither Agree nor Disagree**	**5 Agree**	**6 Strongly Agree**	**7 Completely Agree**
21. I don't spend much of my disposable income on music.	1	2	3	4	5	6	7
22. I can tell when people sing or play out of tune.	1	2	3	4	5	6	7
23. When I sing, I have no idea whether I'm in tune or not.	1	2	3	4	5	6	7
24. Music is kind of an addiction for me - I couldn't live without it.	1	2	3	4	5	6	7
25. I don't like singing in public because I'm afraid that I would sing wrong notes.	1	2	3	4	5	6	7
26. When I hear a piece of music I can usually identify its genre.	1	2	3	4	5	6	7
27. I would not consider myself a musician.	1	2	3	4	5	6	7
28. I keep track of new music that I come across (e.g. new artists or recordings).	1	2	3	4	5	6	7
29. After hearing a new song two or three times, I can usually sing it by myself.	1	2	3	4	5	6	7
30. I only need to hear a new tune once and I can sing it back hours later.	1	2	3	4	5	6	7
31. Music can evoke my memories of past people and places.	1	2	3	4	5	6	7

Please circle the most appropriate category:

32. I engaged in regular, daily practice of a musical instrument (including voice) for **0 / 1 / 2 / 3 / 4-5 / 6-9 / 10 or more** years.

33. At the peak of my interest, I practiced **0 / 0.5 / 1 / 1.5 / 2 / 3-4 / 5 or more** hours per day on my primary instrument.

34. I have attended **0 / 1 / 2 / 3 / 4-6 / 7-10 / 11 or more** live music events as an audience member in the past twelve months.

35. I have had formal training in music theory for **0 / 0.5 / 1 / 2 / 3 / 4-6 / 7 or more** years.

36. I have had **0 / 0.5 / 1 / 2 / 3-5 / 6-9 / 10 or more** years of formal training on a musical instrument (including voice) during my lifetime.

37. I can play **0 / 1 / 2 / 3 / 4 / 5 / 6 or more** musical instruments.

38. I listen attentively to music for 0-15 min / 15-30 min / 30-60 min / 60-90 min / 2 hrs / 2-3 hrs / 4 hrs or more per day.

39. The instrument I play best (including voice) is ____

Appendix B. B-MMR Questions

ENTERTAINMENT: HAPPY MOOD MAINTENANCE

1. I usually put background music on to make the atmosphere more pleasant
2. When I'm busy around the house and no one else is around, I like to have some music on in the background
3. I listen to music to make cleaning and doing other housework more pleasant

REVIVAL: RELAXATION AND NEW ENERGY

1. I listen to music to perk up after a rough day
2. When I'm exhausted, I listen to music to perk up
3. When I'm tired out, I rest by listening to music

STRONG SENSATION: INTENSE EMOTION INDUCTION

1. Music has offered me magnificent experiences
2. I want to feel the music in my whole body
3. I feel fantastic putting my soul fully into the music

DIVERSION: DISTRACTION FROM WORRIES AND STRESS

1. For me, music is a way to forget about my worries
2. When stressful thoughts keep going round and round in my head, I start to listen to music to get them off my mind
3. When I feel bad, I try to get myself in a better mood by engaging in some nice, music-related activity

DISCHARGE: RELEASE AND VENTING OF NEGATIVE EMOTION

1. When I'm really angry, I feel like listening to some angry music
2. When everything feels bad, it helps me to listen to music that expresses my bad feelings

3. When I'm angry with someone, I listen to music that expresses my anger

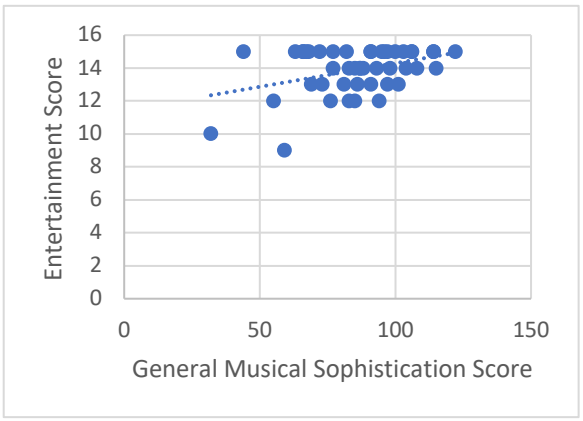
MENTAL WORK: CONTEMPLATION AND REAPPRAISAL OF EMOTIONAL EXPERIENCE

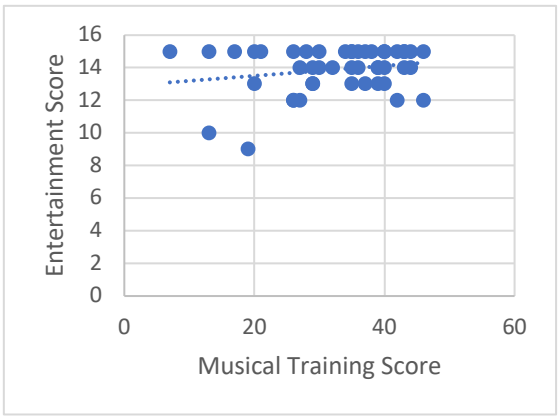
1. Music helps me to understand different feelings in myself
2. Music has helped me to work through hard experiences
3. When I'm distressed by something, music helps me to clarify my feelings

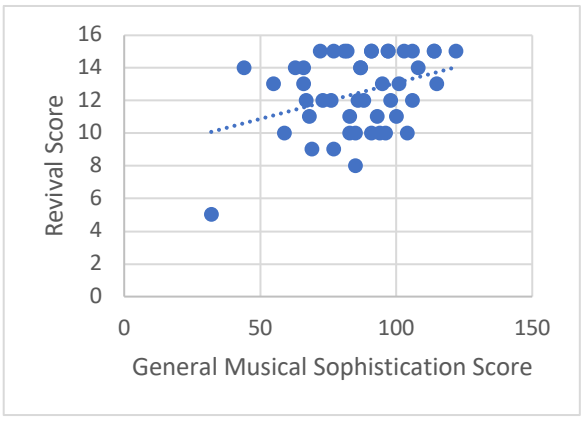
SOLACE: EMOTIONAL VALIDATION AND SUPPORT WHEN FEELING DOWN

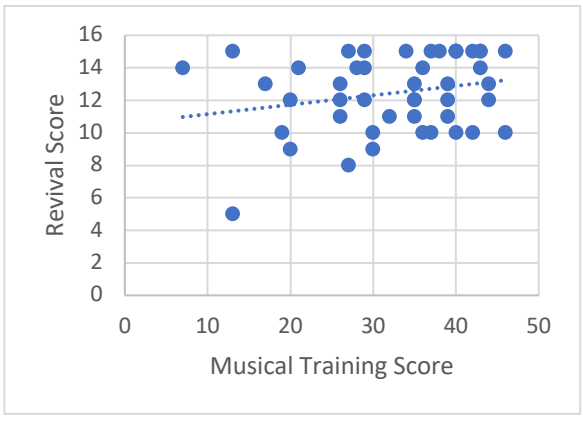
1. When everything feels bad, music understands and comforts me
2. When I'm feeling sad, listening to music comforts me
3. I listen to music to find solace when worries overwhelm me

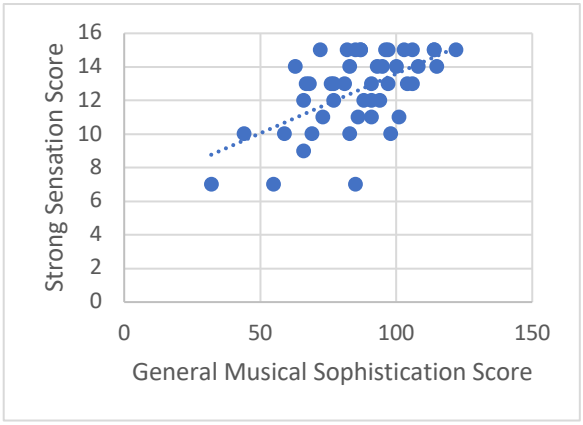
Appendix C. Graphs showing relationship between general musical sophistication/musical training and b-MMR subscale scores







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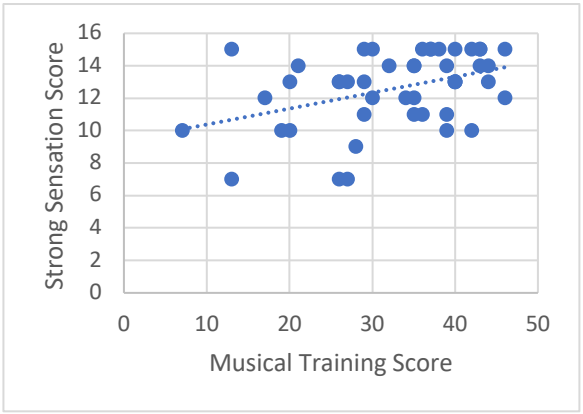
General Musical Sophistication Score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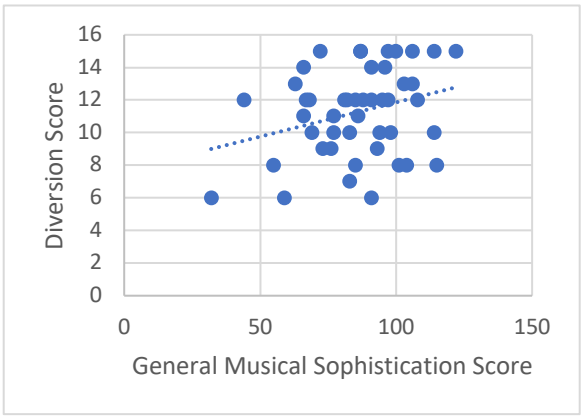
Musical Training Score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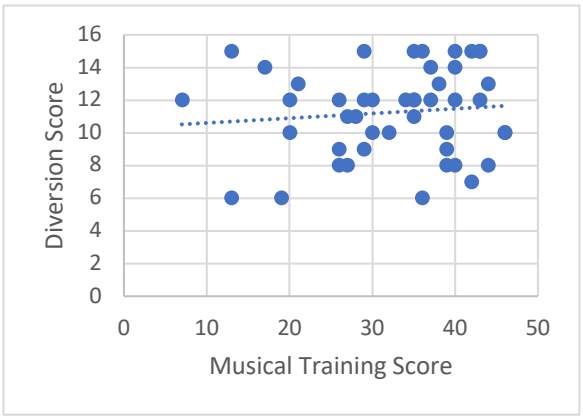
General Musical Sophistication Score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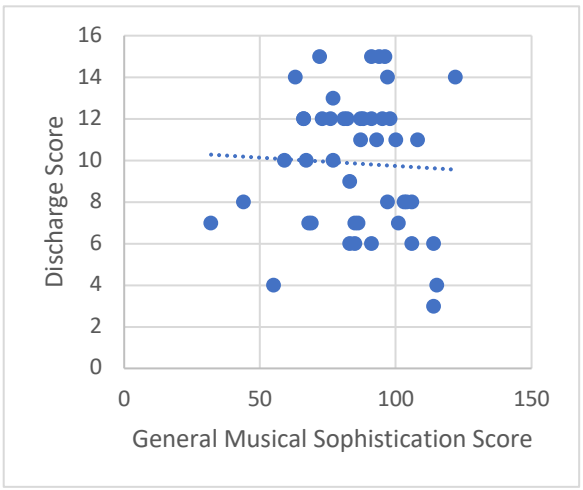
Musical Training Score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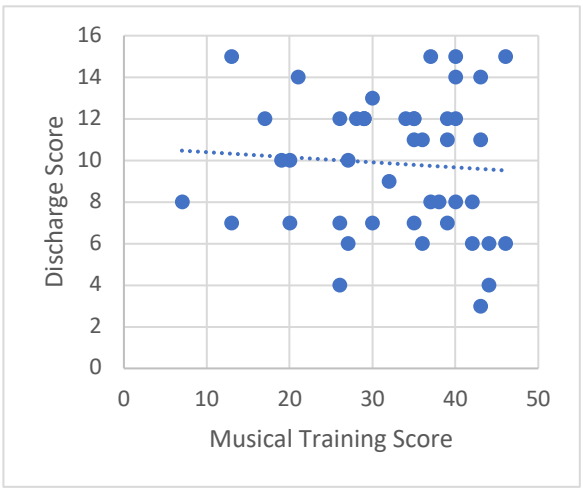
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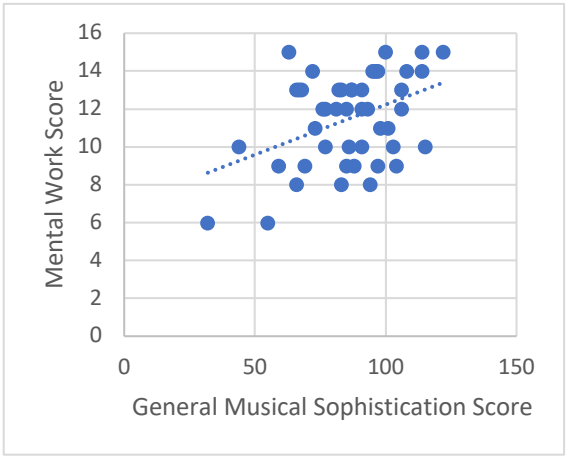
Musical Training Score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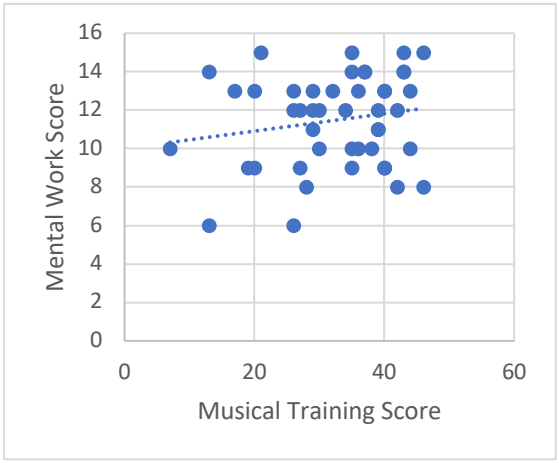
General Musical Sophistication Score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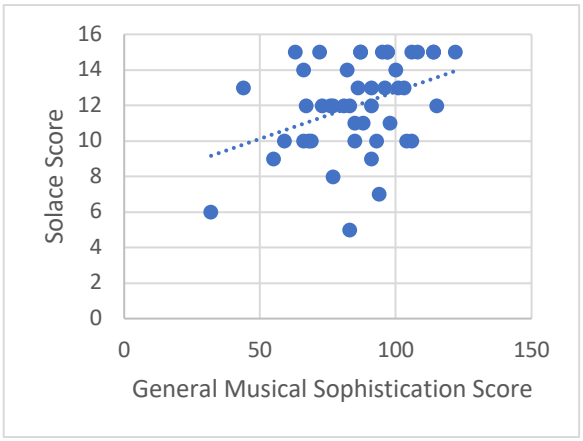
Musical Training Score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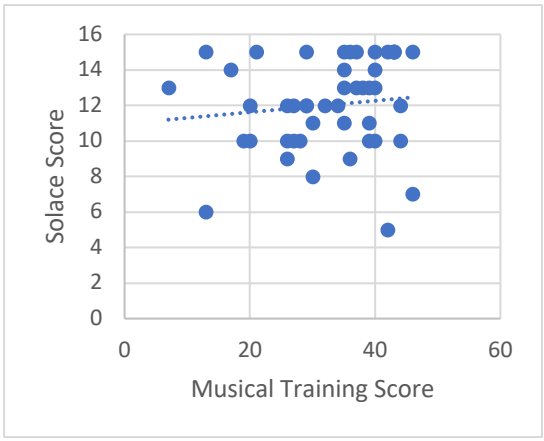
General Musical Sophistication Score


Solace Score
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20
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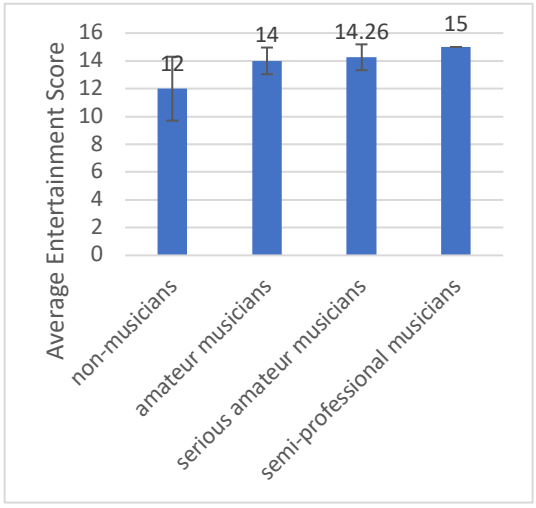
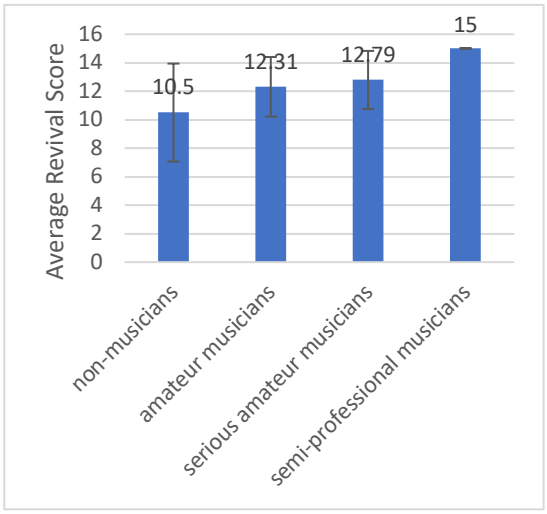
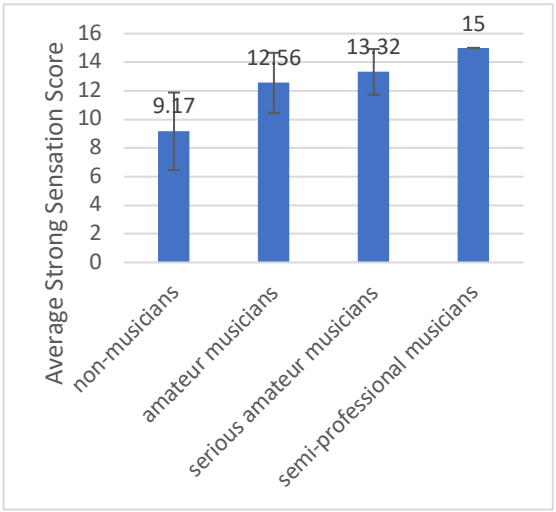
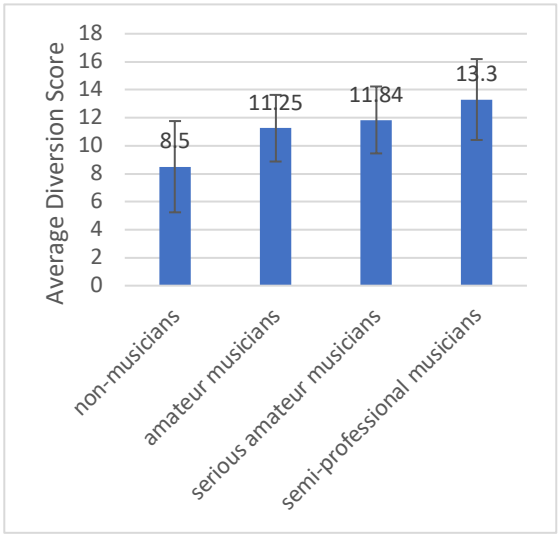
60
Musical Training Score

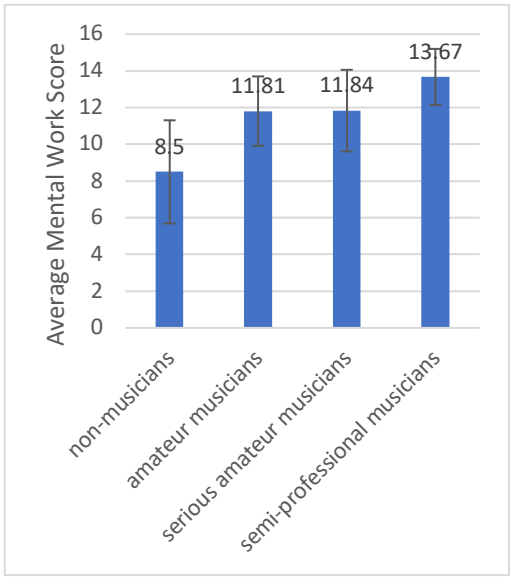
Appendix D. Bar graphs showing average subscale scores for each musicianship group







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12
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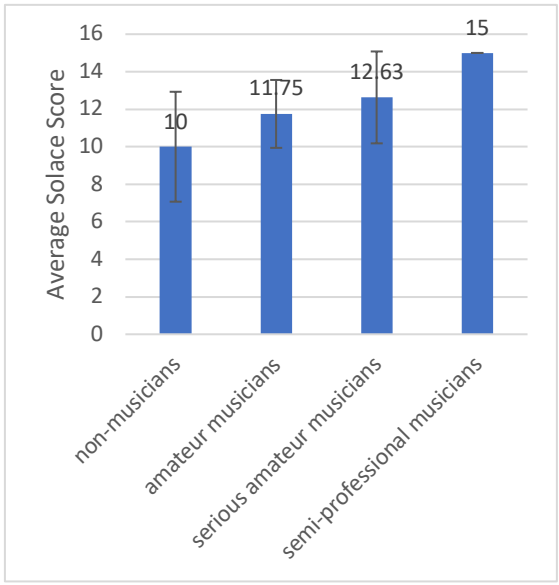
11.81
11.84
13.67
non-musicians
amateur musicians
serious amateur musicians
semi-professional musicians


Average Solace Score
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11.75
12.63
15
non-musicians
amateur musicians
serious amateur musicians
semi-professional musicians