

Music-Listening Level Preference in Musicians and Non-Musicians, and Relation to Vestibular Function

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Background

- Musical experience may cause improved attention to musical aspects when listening to music because of familiarity, and thus musicians preferred music to be played at higher levels (Hoover & Cullari, 1992).
- However, the reason why musicians prefer to listen to music at high levels is still unclear. One possible underlying mechanism could be the acoustic sensitivity of the vestibular system and the vestibular system contribution to hearing (Todd&Cody, 2000).
- Therefore, researchers have been interested in the vestibular contribution to hearing over the years and whether it is affected by musical experience (Truslit, 1938; Trainor et al., 2009). Previous findings assumed that the vestibular system is vital for musical rhythm perception, and the auditory and vestibular pathways are significantly more intertwined than previously thought (Trainor et al., 2009).

Aim

- The aim of this study was to examine differences in music-listening level preference between musicians and non-musicians, and whether vestibular function could account for these differences.

Methods

Participants

Inclusion Criteria:

Musicians: Having at least six years of musical experience (Zhang et al., 2018).

Non-musicians: No experience of formal musical training and not actively play an instrument

Exclusion criteria:

For both groups: Ear malformations and disorders, history of neurological or systemic disease, Any vestibular disorders , ototoxic / vestibulotoxic drug use, hearing loss

- For the first part of the study, 92 musicians (46F/45M/1 non-specified) and 96 non-musicians with self-reported normal hearing completed online questionnaires (74F). Subsequently, 69 participants (44F) consisting of 28 musicians and 41 non-musicians completed the second part of the study. All participants in both groups were aged between 18 and 45 (mean+ sd=26.2±6.45).

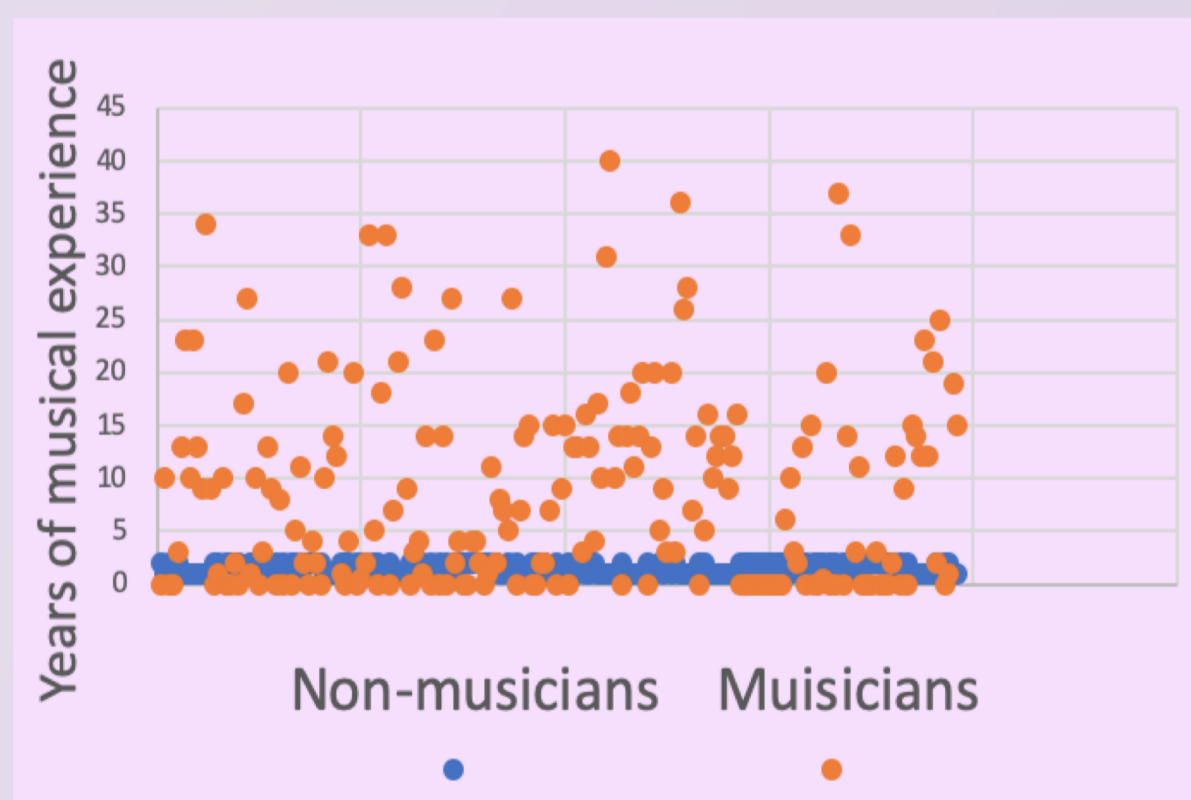


Fig. 1.Scatterplot for the years of musical experience in both groups

- Figure 1 shows that the distribution of the years of musical experience in both groups. Musicians had an average of 16.2 ± 7.7 years of musical experience (ranging from 6 to 40 years).
- On average, musicians started to play a musical instrument at the age of 8.9 years (ranging from 2 to 33 years old).

Study Design and Data Collection Procedure

- This study included two online sections:

1) Online Questionnaires:

- General health questionnaire
- Clinical and Demographic Questionnaire
- Music Use (MUSE) Questionnaire
- Noise Exposure Questionnaire (online NESI)
- The Activities Specific Balance Confidence (ABC) Scale
- Hyperacusis Questionnaire (HQ)
- Tinnitus Functional Index (TFI)

2) Online Tests:

- Online Music Listening Preference Test (onlineMLP)
- Online Hearing Screening Test (DIN test)

- Participants who completed the first section of the study (i.e. online questionnaires) and who gave consent to being contacted were invited to participate in the second section of the project (i.e. onlineMLP and DIN).
- All online sections were accessible for all participants across the UK. Participants were recruited via advertisement websites, social media, and the University of Manchester's online research advertising platforms.

Statistics

- All data analyses were conducted using RStudio (Version 1.3.1093, 2009-2020). Linear regression analyses used musicGroup as a predictor variable on the outcome variables (onlineMLP and ABCs) for both online sections.
- A pre-registration for the study is published on the Open Science Framework website (<https://osf.io/4vuxs>).

Results

1) Online music-listening test (onlineMLP)

Coefficients				
	β value	Std. Error	t-value	p value
(Intercept)	4.027	3.974	0.013	0.315
musicGroup	0.152	1.420	0.107	0.915
HQ score	-0.028	0.075	-0.370	0.713
OnlineNESI	-0.129	0.733	-0.176	0.861
sex	2.508	1.360	1.844	0.070
AGE	-0.196	0.110	-1.777	0.080
DIN	0.311	1.640	0.190	0.851

Table 1. Beta, t and p values and standard error are presented for each of the variables

- The regression equation was non-significant [F (5, 63) = 1.448, $R^2 = 0.103$, $p = 0.915$].

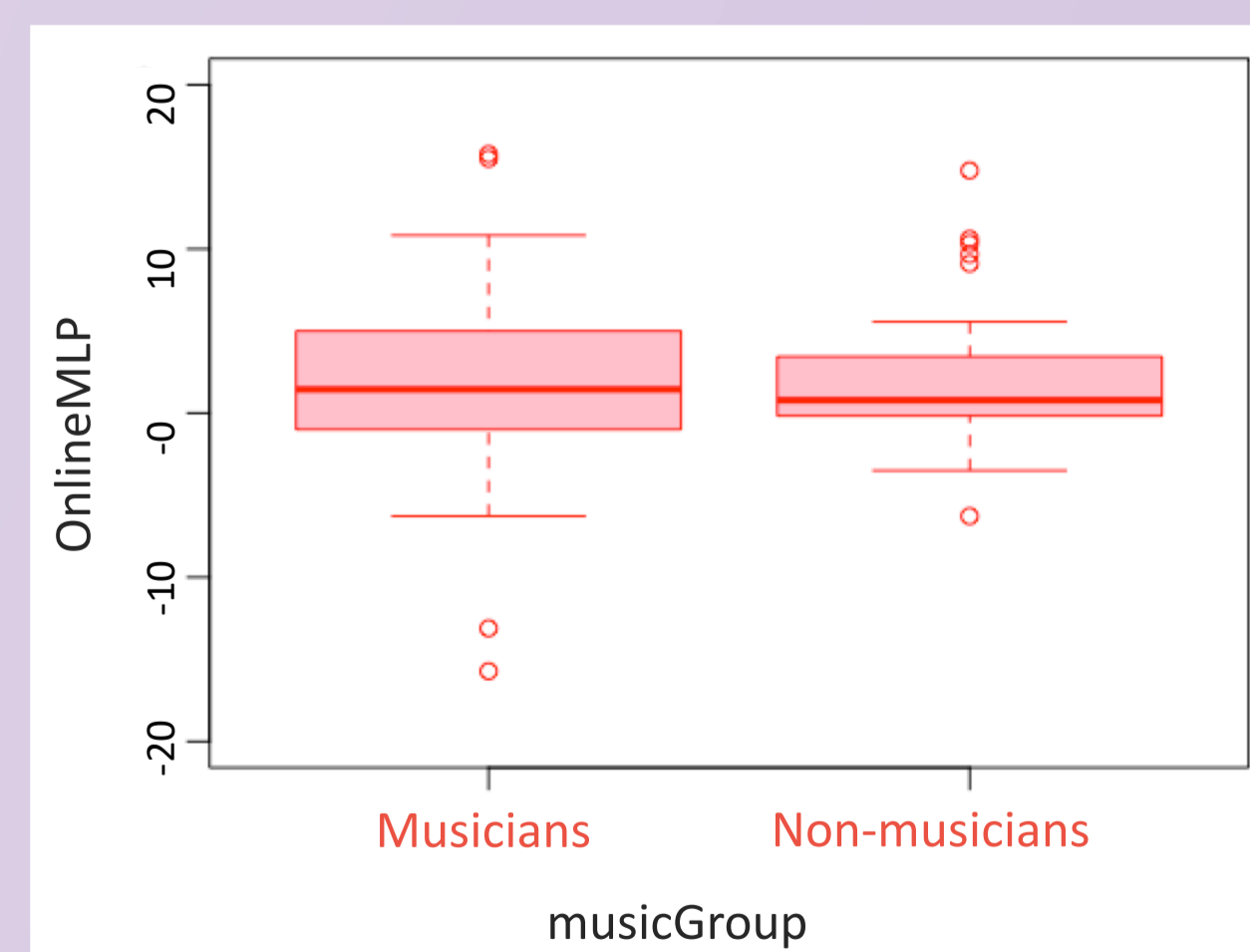


Fig. 2.Boxplots of the mean values for online music-listening levels in dB in both groups

- Figure 2 shows that musicians (mean±sd= 1.98±7.16) had slightly higher music-listening levels in dB than non-musicians (mean±sd=1.52±7.07).

2) Online ABC Scale Scores (ABCs)

Coefficients				
	β value	Std. Error	t-value	p value
(Intercept)	86.150	2.946	21.239	<2e-16
musicGroup	0.322	1.149	0.280	0.780
HQ score	-0.138	0.065	-2.119	0.035
OnlineNESI	-0.471	0.600	-0.787	0.432
sex	2.545	1.184	2.150	0.033
AGE	0.147	0.088	1.657	0.099

Table 2. Beta, t and p values and standard error are presented for each of the variables

- Inspection of table 2 confirms that a non-significant regression equation was found (F (5, 193) = 2.595, $p = 0.780$), with an R^2 of 0.063.

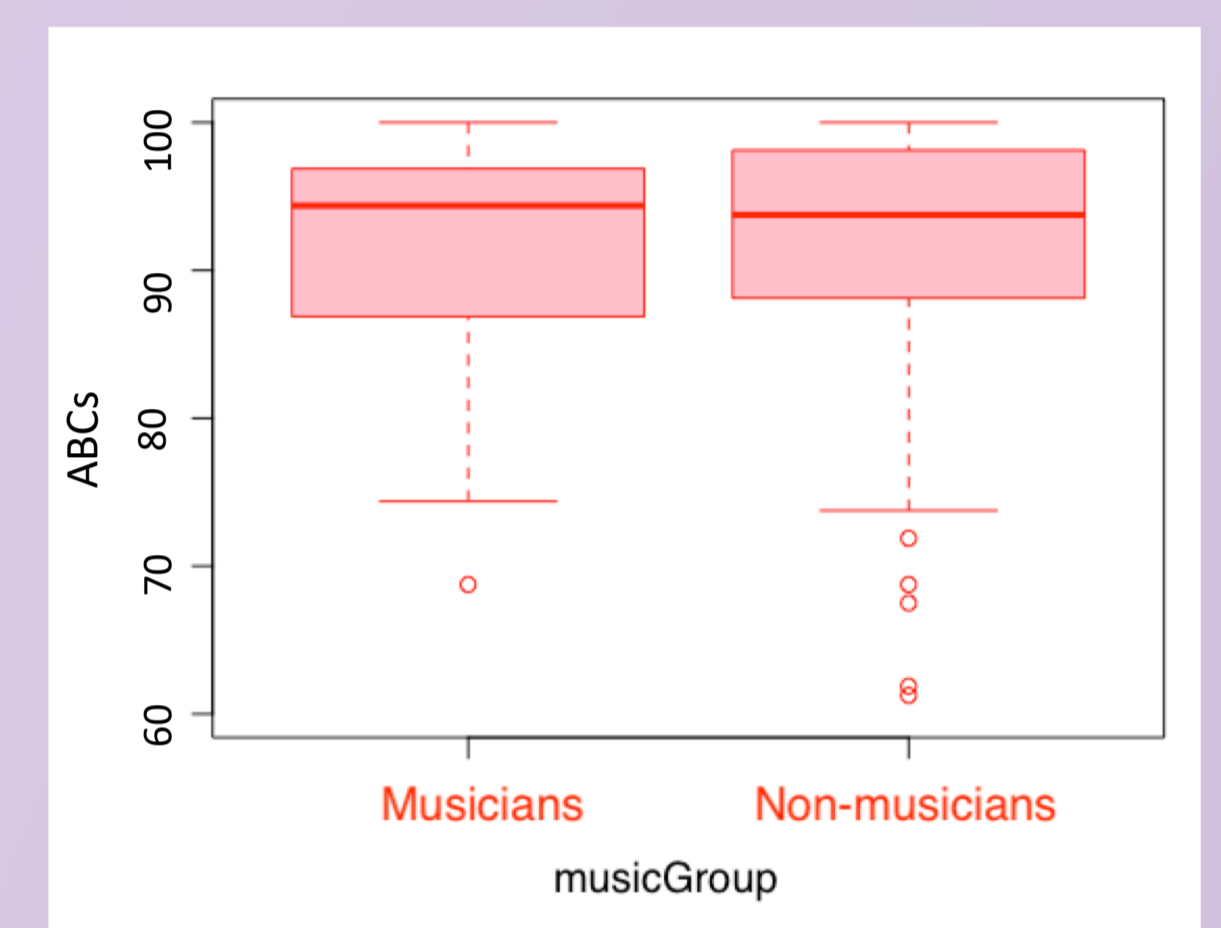


Fig. 3.Boxplots of the online music-listening levels in dB in both groups

- Figure 3 shows that musicians (n= 94.4%) had slightly higher ABC scores than non-musicians (n=93.8 %).

Conclusions

- This study contributes a new online test assessing music-listening level preference. Our findings suggest there is little impact of musicianship on preferred music-listening level.
- The online ABC scale showed ceiling effects, and may not be suitable for measuring differences in vestibular function as a proxy measure between young, healthy, normal hearing musicians and non-musicians.
- In a follow-up face-to-face study, we aim to assess vestibular function objectively using vestibular evoked myogenic potentials. We also intend to complete an in-person version of the music listening test to help validate our online measure.

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Acknowledgments

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