

Introduction

- The popularity of social music venues have significantly risen over recent years with 52% of Americans reporting attend at least one live music event in 2018¹
- Prolonged and even short-term exposure to loud music has been shown to cause negative hearing threshold shifts, hearing loss, and other hearing-loss related symptoms^{2,3}
- Despite music venues such as concerts and music festivals commonly producing sustained sound levels above the recommended exposure levels set by OSHA, there is a lack of promotion of HP use and guidelines at such events^{3,4}
- Prior studies mostly focused on HP availability at these large recreational events with limited emphasis on understanding participants' decision-making regarding and perceptions regarding HP use to help shape HP interventions⁵
- We sought to characterize the knowledge, behaviors, and perceptions related to HP use amongst music venue attendees among a large cohort of recreational music venue to better promote HP compliance, especially among at-risk populations.

Methods and Materials

Study population included participants of 18 Reddit groups (10.5 million people) and 3 Facebook groups (175,000 people)

Anonymous Cross-sectional 39-question survey through REDCap was posted on these forums with a short description of the study for 3 months with monthly re-posts. Online forum moderators were asked to promote the survey along with the chance to enter a raffle for one of two \$50 Visa gift cards.

HP use and music attendance questions were included along with a variety of demographic and medical history questions as described in the results

Preliminary descriptive statistics were calculated using paired t-tests and Pearson's chi-squared tests

Multivariable logistic regression controlling for demographic factors and other music venue attendance characteristics to analyze for factors associated music enjoyment.

Results

Table 1. Cohort characteristics and significant differences between HP users and non-users. N= 2,352

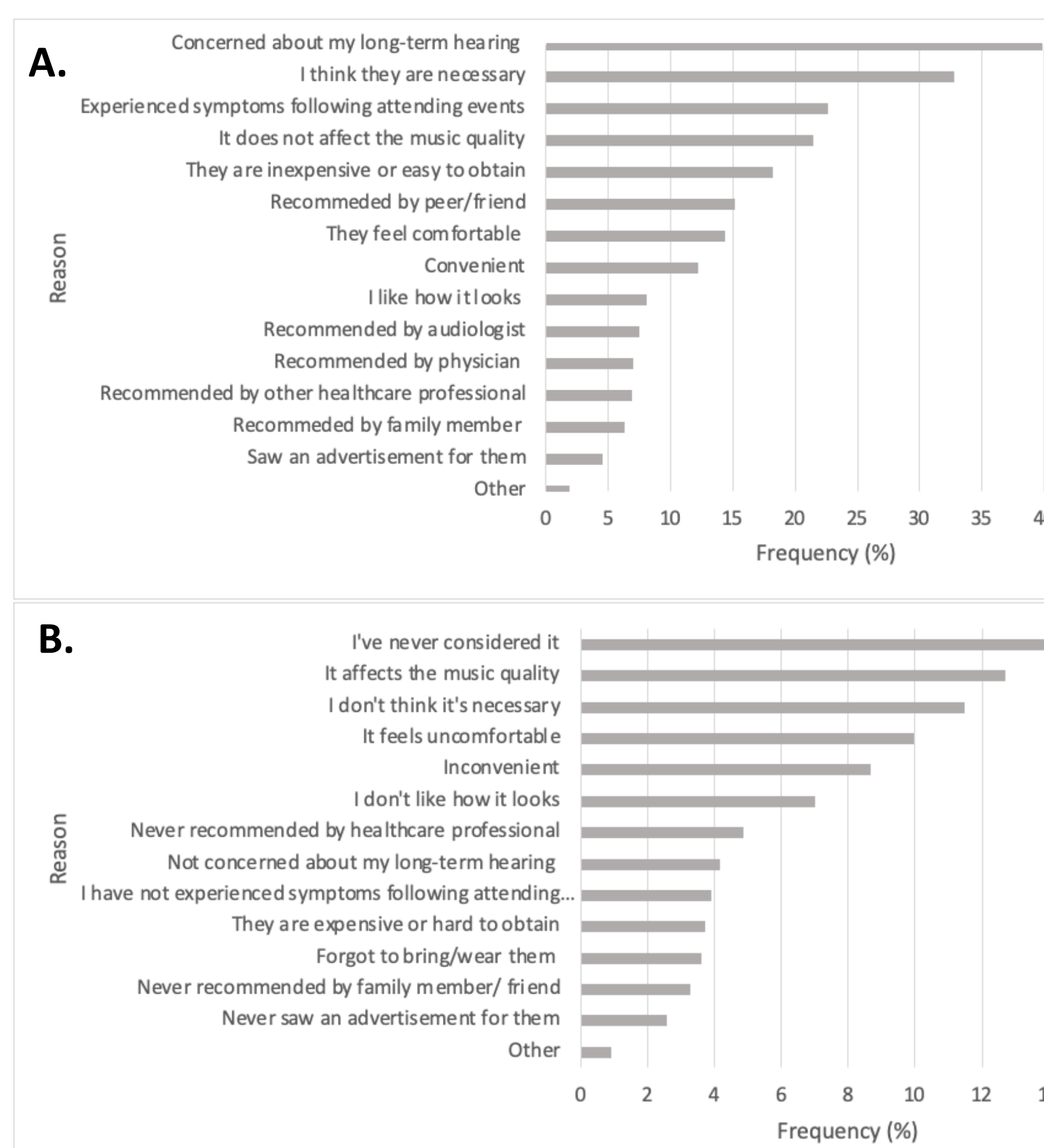
Characteristic	Overall (n,%)	Hearing Protection (n,%)	No Hearing Protection (n,%)	p-value
Demographics				
Age, mean (SD)	28.68 (6.95)			0.164
Sex				0.003
Male	1436 (61.26)	894 (63.54)	530 (57.92)	
Female	862 (36.77)	482 (34.26)	373 (40.77)	
Other	46 (1.96)	31 (2.20)	12 (1.31)	
Race and Ethnicity				
Asian/Pacific Islander	310 (13.32)	206 (14.70)	109 (11.90)	0.032
Black	93 (3.99)	53 (3.78)	39 (4.26)	
Hispanic	204 (8.76)	113 (8.07)	89 (9.72)	
White	1665 (71.52)	987 (70.45)	665 (72.60)	
Other	56 (2.41)	42 (3.00)	14 (1.53)	
Education				
Less than high school	85 (3.64)	61 (4.35)	24 (2.63)	0.010
High school	241 (10.32)	132 (9.42)	107 (11.72)	
Some college	548 (23.46)	306 (21.83)	235 (25.74)	
College degree	1005 (43.02)	617 (44.01)	384 (42.06)	
Graduate degree	457 (19.56)	286 (20.40)	163 (17.85)	
Otologic Past Medical Hx				
Prior Hx Ear Trauma/Infection				<0.0001
Yes	655 (27.98)	504 (35.90)	141 (15.41)	
No	1686 (72.02)	900 (64.10)	774 (84.59)	
Diagnosed Hearing Problems				
Yes	654 (28.26)	510 (36.72)	141 (15.60)	<0.0001
No	1660 (71.74)	879 (63.28)	763 (84.40)	
Symptom Duration				
<1 day	761 (33.02)	426 (30.65)	326 (36.42)	<0.0001
1 to <3 days	602 (26.23)	433 (31.15)	161 (18.00)	
3 days to < 1 week	290 (12.59)	209 (15.04)	80 (8.94)	
1+ week	290 (12.59)	184 (13.24)	106 (11.84)	
Have not had symptoms	361 (15.67)	138 (9.93)	222 (24.80)	
Symptom Resolution				
Yes	450 (19.48)	261 (18.79)	186 (20.64)	<0.0001
No	1476 (63.90)	975 (70.19)	488 (54.16)	
Have not had symptoms	384 (16.62)	153 (11.02)	227 (25.19)	
Sought Treatment				
Yes	1075 (46.70)	597 (43.32)	466 (51.55)	<0.0001
No	733 (31.84)	575 (41.73)	155 (17.15)	
Have not had symptoms	494 (21.46)	206 (14.95)	283 (31.31)	
Protection Use				
Yes	1412 (60.60)	1412 (100.00)	0 (0.00)	<0.0001
No	918 (39.40)	0 (0.00)	918 (100.00)	

Results

Table 2. Multivariable linear regression of factors associated with music enjoyment while wearing HP (significant characteristics only).

Characteristic	β	95% CI	p-value
Age	-0.01	[-0.03 – 0.01]	0.312
Sex			
Male	REF	-	-
Other	1.57	[0.76 – 2.38]	<0.001
Race			
White	REF	-	-
African American/Black	-0.93	[-1.47 – -0.39]	<0.001
I am concerned about the effects of music on my hearing.	0.05	[-0.09 – 0.18]	0.483
I feel like my hearing ability has decreased because of attending music venues.	-0.04	[-0.16 – 0.08]	0.487
Wearing ear protection at music venues can protect me from hearing loss.	0.64	[0.49 – 0.78]	<0.001
Symptom resolution			
No	REF	-	-
Yes	-0.07	[-0.38 – 0.24]	0.65
I have not had any symptoms	0.86	[0.08 – 1.64]	0.031
Bar attendance	-0.30	[-0.59 – -0.01]	0.043
Job attendance	0.50	[0.23 – 0.76]	<0.001
Reported Symptoms			
Often asking people to repeat what they say	-0.28	[-0.52 – -0.03]	0.027
Substance Use			
No substance use	0.44	[0.03 – 0.85]	0.033
Hallucinogens/Psychedelics	0.39	[0.08 – 0.70]	0.015
Hearing Protection Use	1.73	[1.47 – 1.98]	<0.001

57.5% of HP users used High Fidelity Ear Plugs followed by moldable (17.5%) and foam ear plugs (16.6%)



Hip-Hop /Pop

Listeners were the least likely to wear HP

HP use = music enjoyment

HP users were more likely to report higher level of music enjoyment with HP use

Figure 1. Respondent treatment decision-making regarding wearing hearing protection. (A) Reasons why respondents chose to wear hearing protection. (B) Reasons why respondents chose not to wear hearing protection. Multiple answer choices were allowed.

Discussion

- Despite the increasing popularity in loud social music venues/events and its associated risk of noise-induced hearing loss, the topic and interventions to address it remains understudied
- A large proportion of non-HP users have never considered using HP and have less awareness and urgency regarding safe listening practices, highlighting the need for further public education efforts
- HP usage and the belief in its efficacy is associated with greater subjective music enjoyment controlling for other variables
- More experienced concert goers (i.e 3h+ attendance) were more likely to use HP
- Future directions should include analysis of at-risk or sound-sensitive groups (e.g migraines, autism spectrum) for HP use at recreational music events

Conclusions

Our findings suggest **protecting attendees' hearing health requires further educating patients about HP and hearing loss, providing increased HP access, and better understanding attendees' current hearing health beliefs.** The findings from this study can help **guide strategies to promote the safest recreational music listening practices**

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