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Attitudes and beliefs of potential hearing damage at nightlife music events in young adults

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ABSTRACT

This study investigated the subjective attitudes and beliefs of young adults regarding sound exposure and its potential risks in nightlife settings, given the heightened risk of hearing loss from recreational sound exposure. Participants completed questionnaires before, immediately after, and two weeks following a nightlife music event. Findings revealed that while a majority of regular attendees are aware of the potential for hearing damage (60%), and perceive the sound levels as loud or very loud (80%), with a significant number experience symptoms like ringing, buzzing, muffled or reduced hearing after the events (88%), and belief that hearing loss can affect daily life (88%), very few (5%) actually use hearing protection devices at nightlife music events.

1 Introduction

According to the World Health Organization, over one billion young people (12-35 years old) are at risk for hearing loss due to recreational exposure to loud sound [1], [2]. It is estimated that among teenagers and young adults, nearly 40% are exposed to potentially damaging high sound levels in venues that feature amplified music, such as nightclubs, discotheques, and bars. This gives rise to a growing concern for irreversible noise-induced hearing loss or accelerated age-related hearing loss [3]. Furthermore, the prevalence of noise-induced hearing loss among adolescents and young adults has drastically increased over the past 40 years [1], [4].

The purpose of this study was to investigate the subjective attitudes and beliefs of young people, who frequently attend nightlife music events, regarding noise exposure and the potential risks at nightlife music events. The objective was to gain insights into

their personal experiences with noise exposure, behaviours that might contribute to hearing damage, and their attitudes towards recreational noise. To achieve this, questionnaires were distributed to the participants before, within 24 hours after, and two weeks following their attendance at a nightlife music event.

2 Methods

2.1. Participants

In total, 25 young adults (14 male, 11 female) were selected for participation in the study. These participants had a mean age of 24.4 ± 2.3 years [range 21-31 years]. All participants had independently planned prior to the study to attend a nightlife music event and reported frequent attendance at such events, at least twice a month over the previous year.

The participants were healthy young adults recruited through social networks and channels associated with Denmark's Technical University. They were all either current students or were recently graduated. Hearing thresholds were assessed using an Affinity Compact audiometer during the initial meeting, confirming all participants had thresholds of 20 dB HL or better across all standard audiometric frequencies.

The study was approved by the Science-Ethics Committee for the Capital Region of Denmark (addendum 103164 to reference H-16036391), and the participants were compensated for their time.

2.2. Questionnaires at three stages

The participants attended the lab at three distinct times: 1) before the nightlife music event, ensuring a 48-hour gap from any previous loud noise exposure, 2) within 24 hours after attending the nightlife music event and on average 9.5 ± 3.3 hours after the event, and 3) two weeks following the event, again with at least a 48-hour buffer from other loud noise exposures.

During these visits, the participants completed self-administered questionnaires, referred to as Q1-3. Q1 aimed to profile the participants and understand their general attitudes and beliefs about noise exposure at nightlife music events, covering their hearing history, experiences with sound levels at such events, and their perceptions of noise exposure risks. Q2, administered after the event, echoed Q1's themes but focused on the specific event attended. Q3, conducted two weeks later, sought to capture any changes in attitudes or beliefs resulting from their study participation, alongside experiences between Q2 and Q3. These questionnaires were inspired by the Noise Exposure Questionnaire [5] and previous studies [4], [6]–[13].

2.3. Noise level measurement

In addition, a noise level measurement was performed at a student bar on campus, which was a representative nightlife music event that the participants attended. The noise dose was measured from a customer and a staff member of the bar for the duration of one hour using a Casella dBadge2 dosimeter.

3 Results

3.1. Profile of participants

The initial questionnaire distributed to the participants, who identified themselves as frequent attendees of nightlife music events, sought information on their profiles and hearing histories.

The responses revealed regular attendance at nightlife music events: 60% of the participants reported attending such events once a week, 16% 2-3 times a week, and 24% 1-2 times a month (see Figure 1). The majority (76%) of these participants attended those venues solely as customers, while the remaining 24% were both customers and staff, sometimes taking on roles such as crew members or DJs. Concerning the type of venues that the participants typically attend, bars were most common (mentioned by 72% of the participants), followed by nightclubs (mentioned by 56% of the participants). Some participants also mentioned house parties (12%) and university events (8%). Regarding alcohol consumption, 44% of the participants typically consume 5 or more drinks, 48% 3-4 drinks, and the remaining 8% indicated to consume 1 or 2 drinks.

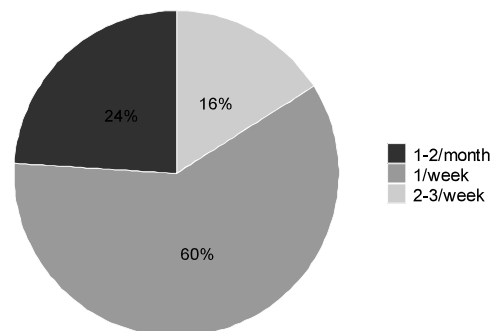


Figure 1: The participants' typical attendance of nightlife music events.

On average, participants reported spending 4 hours and 25 minutes at these venues, with a standard deviation of 1 hour and 5 minutes. Nearly half (48%) typically remain at an event for over five hours, while the rest (52%) stays between three and four hours at an event. Only 60% of the participants take breaks, and if they do, this is on average 36 ± 28 minutes. This pattern persisted immediately after the event (Q2) and two weeks later (Q3). Furthermore, 79% of the participants reported listening to personal

wearable players for more than eight hours per week, 12% indicated to listen between four and eight hours per week, 8% between two and four hours per week, 4% less than two hours per week, with none reporting they “never” use such devices.

3.2. Perceived loudness at nightlife music events

Figure 2 shows the perceived loudness levels as indicated in the three questionnaires. During a usual night out, as assessed in Q1, most participants perceived the sound exposure levels at the venues typically as loud (68%) or very loud (12%). The event itself, as assessed in Q2, was also considered as loud (72%) or very loud (4%), while the events attended in the two weeks after the event, as assessed in Q3, were considered mostly as loud (32%) or as medium loudness levels (36%). Three participants were not included in the responses of Q3, since these participants indicated not having attended an event between Q2 and Q3.

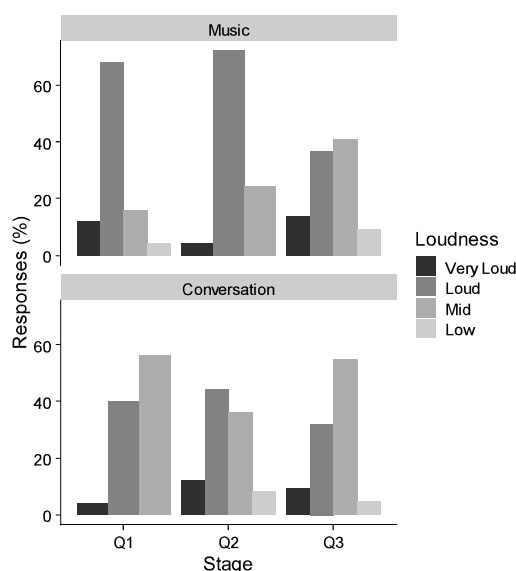


Figure 2: The perceived loudness as reported in the three questionnaires, with Q1 the questionnaire given before the event, Q2 the questionnaire given right after attendance, and Q3 the questionnaire given two weeks after the event.

3.3. Perceived effect on hearing and tinnitus

When asked about their perceptions of nightlife music events affecting their hearing, 60% acknowledged a

potential effect. However, only over half (52%) worried about the impact of a single event (Q2), and only 32% expressed concern about the impact from the attended events over the two weeks after the event (Q3), which were also perceived as less loud compared to the event assessed at Q2, as illustrated in Figure 2.

In total, 88% of the participants reported experiencing symptoms such as ringing or buzzing in the ears or muffled hearing after attending nightlife events. Among these, 55% believed these symptoms could have long-term effects on their hearing. After the event, 76% noted experiencing such auditory symptoms, but this figure dropped to 32% between Q2 and Q3, during which the events attended were also rated as less loud compared to Q2, as can be seen in Figure 2.

Interestingly, the majority of the participants were not particularly bothered by these auditory disturbances, as shown in Figure 3. Initially, 44% and 36% of the participants reported being “not at all” annoyed by muffling or ringing, respectively. These percentages increased to 64% and 60% immediately after the event (Q2) and further to 80% and 72% in the third questionnaire (Q3). All participants responded to this question, indicating that even those who did not experience muffling or ringing chose “not at all”. While not all participants provided the duration of their symptoms, reported durations varied from 20 minutes to 48 hours.

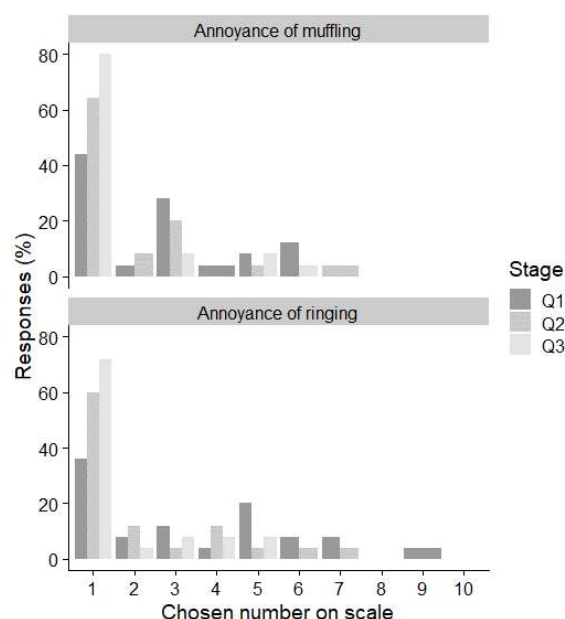


Figure 3: Participants rated the annoyance of muffling and ringing on a scale from 1 to 10 with 1 meaning “not at all” and 10 meaning “causing serious troubles in daily life” at the three stages (Q1-3).

3.4. Beliefs regarding impact of hearing loss

Concerning their views on hearing loss, most participants believed that hearing loss could seriously (56%) or mildly (32%) affect an individual’s daily life. This perception remained consistent immediately after the event and two weeks later, as illustrated in Figure 4. It is noteworthy that all participants (32%) who reported experiencing symptoms like ringing, buzzing, muffled, or reduced hearing between Q2 and Q3 acknowledged that such effects could potentially influence their hearing over the long term.

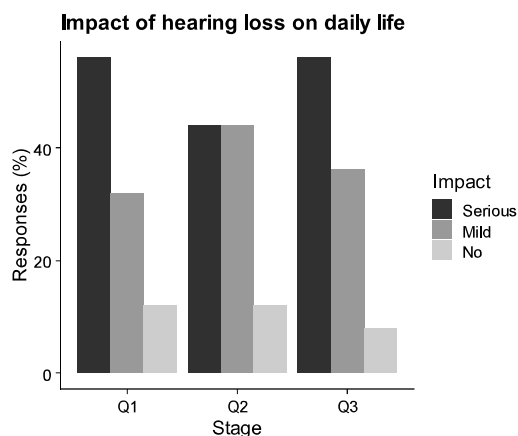


Figure 4: The participants' beliefs regarding the impact that hearing loss can have on someone's daily life as indicated at the three stages (Q1-3).

3.3. Use of hearing protection devices

Figure 5 presents the data on whether participants utilized hearing protection during the events. Initially, at Q1, the participants' general attitude towards hearing protection devices (HPD) was that they were either occasionally used (32%) or not used at all (68%). During the event (Q2), merely two participants (i.e. 8% of the sample) used some form of hearing protection: one of them used the devices for only half of the duration of attendance, and the other used the device in just the left ear. Two weeks following the event (Q3), the majority of the participants (95%) still reported not using any hearing protection at nightlife events. The response option

differed across the questionnaires, with Q2 and Q3 allowing a simple 'yes' or 'no', while Q1 offered the options “Yes, always”, “Yes, sometimes”, and “No”.

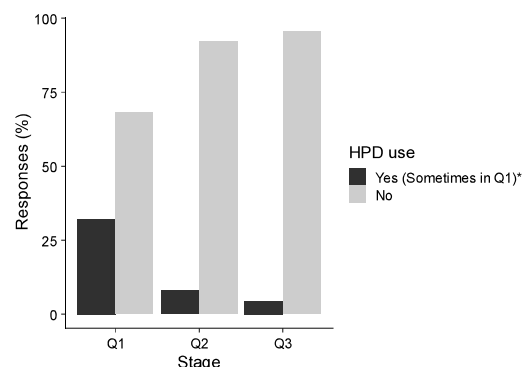


Figure 5: The indicated usage of hearing protection devices (HPDs) at the three stages (Q1-3).

3.4. Noise level measurement

At a representative event, the A-weighted equivalent continuous sound levels (LAeq), as recorded by two dosimeters, were 96.6 and 97.4 dB, with measured unweighted peak levels of 127.4 and 131.0 dB SPL.

4 Discussion

The questionnaires revealed that the majority (95%) of the healthy young participants who identify themselves as regularly attending nightlife music events do not protect their hearing with HPDs. However, they are aware of the potential for hearing damage (60%) and recognize the potential impact of hearing loss on daily life (88%). Most of them experience the sound exposure levels at such events as loud or very loud (80%), and the vast majority (88%) has already experienced symptoms like ringing, buzzing, muffled, or reduced hearing after such events.

Noise level measurements at a representative event demonstrated that sound levels were approaching the recommended limit of 100 dB LAeq (97 dB A measured), as suggested by the World Health Organization in the global standard for safe listening venues and events in 2022 [1]. However, this standard also recommends the use of HPDs, which were barely used by our participants (5%), as well as an implementation of quiet zones. Furthermore, WHO addresses that 100 dB LAeq cannot eliminate the risk

of an individual suffering from sound-induced hearing injury, especially when frequently attending these music venues.

Moreover, the questionnaires revealed that these participants, who identify themselves as regularly attending nightlife music events, lead a lifestyle that may worsen the negative impact on their hearing or health in general [14], [15]. For example, alcohol was profoundly consumed, with 92% of the participants consuming at least 3 drinks per event. Furthermore, 79% of the participants spend over eight hours per week listening to music through personal devices, with the actual percentage potentially being higher as it was the maximum option available in the survey.

Previous studies also found high proportions of students who had experienced tinnitus or muffled hearing after attending a nightlife music event. For example, Johnson et al. [4] found that 88% of British university students experienced tinnitus after nightclub visits, mirroring the results of this study, and 66% of the British students reporting impaired hearing the next day. Keppler et al. [10] observed temporary tinnitus in 86% of young adults, while Rawool and Colligon-Wayne [11] noted a 66% occurrence rate. A study focused on DJs [7], who were primarily young males, found that 76% had experienced tinnitus. This underscores the widespread nature of these issues among young nightlife attendees.

The majority of young adults in this study (60%) was aware of the potential damage to their hearing from nightlife music events. This awareness is comparable to a study among US college students, where 75% of them reported that loud sound exposure could lead to hearing loss [11]. It is worth noting that almost half of the participants (48%) in this study did not believe that the attendance of a single event could affect their hearing.

Despite recognizing the risk and understanding the impact of hearing damage on daily life, many young adults seem reluctant to modify their behaviour. In this study, only 8% used HPDs to an extent, and none wore HPDs consistently throughout the events. Similarly, in Johnson et al. [4], 73.2% of the students stated that the risk of hearing damage would not affect their nightclub attendance, although over 70% believed nightclub noise levels should be limited to safe volumes. In the US college study [11], 46% did

not use HPDs during loud musical activities because they felt that the music was difficult to hear with HPDs.

It appears that potential hearing damage is not a pressing concern for many young adults. In the US college study [11], 58% of the students who experienced tinnitus were not worried about it, and 76% did not expect to suffer hearing loss until much later in life, suggesting a disconnect between awareness of the risks and the urgency to take preventive action.

Several factors can influence young adults' behaviour and beliefs regarding potential hearing damage from nightlife music events. A study with upper secondary school students [9] showed a slightly higher use of HPDs, with 53% of the adolescents using them at concerts to some extent, averaging 17% of concert visits. This study [9] also linked norms, barriers, permanent tinnitus, and noise sensitivity to HPD usage, even though intent did not significantly correlate with actual use. Additionally, Degeest et al. [12] found that experiencing permanent tinnitus increased risk awareness and the perceived importance of HPDs, with 6% of the tested young adults showing permanent tinnitus compared to 69% showing temporary tinnitus.

The low usage of HPDs in this study aligns with the 2% reported by Armitage et al. [13] in another cohort of adults, highlighting a concerning trend. Keppler et al. [16] found that negative attitudes towards HPDs and indifference to noise and hearing loss correlated with more significant hearing deterioration. Armitage et al. [13] noted that men, younger people, and those with stronger beliefs in behavioural causes for hearing loss were more likely to experience more recreational noise exposure and to use HPDs. A longitudinal study with university students [6] revealed an increase in noise exposure from nightclubs and music venues during university enrolment, leading to hearing deterioration at certain frequencies and a rise in temporary tinnitus cases.

Participation in a study conducted at various time intervals might raise awareness about the recreational noise's impact on hearing, potentially changing beliefs or behaviours. However, we could not observe such a change in HPD usage in this study, with only 5% of the participants using HPDs between Q2 and Q3. Conversely, the longitudinal study [6] with

university students showed a change in attitudes and behaviour over three years after being enrolled in higher education, with HPD usage at music venues or nightclubs increasing from 18 to 50%. The participants' specific educational background in Speech, Language, and Hearing Sciences, and most of them being females, could have influenced these changes. Regardless, longitudinal studies, whether conducted over shorter or longer time intervals, can facilitate the examination of individual changes per participant.

Overall, despite awareness among young adults who frequently attend nightlife music events about the long-term impacts of their lifestyle, there remains a significant risk of hearing damage.

5 Conclusions

The findings of this study resonate with the concerns highlighted in existing literature and by the World Health Organization about the risk of noise-induced hearing loss among young adults due to recreational exposure to loud music at nightlife events [1]. Additionally, our findings underscore this issue by showing that although a substantial number of participants (60%) recognize the potential risks to their hearing, only a small percentage (5%) take proactive steps by using hearing protection devices. This gap between awareness and actual protective behaviour underscores the inadequacy of current policies or societal initiatives in Denmark to effectively address the risks associated with recreational noise exposure.

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