



## The Relationship between the Habit of Listening to Music using Earphones with the Incidence of Hearing Loss in Students of SMA Negeri 8 Luwu Timur 2023

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### ABSTRACT

The influence of music on modern life is evident through the widespread use of earphones, which is particularly popular among teenagers. While offering convenience for listening to music in various situations, the use of earphones is also linked to the risk of Noise-Induced Hearing Loss (NIHL). Earphones generate high noise intensity, reaching levels that can damage hearing, especially when used for extended periods. Global data from the World Health Organization (WHO) indicates a high prevalence of hearing loss, and Indonesia is among the countries with a significant prevalence. The type of research used is observational analytic using a cross-sectional study approach. Determination of the number of samples in this study was by total sampling technique. Univariate data analysis is presented in the form of frequency distribution and percentage and bivariate analysis using the Chi Square test and data processing using the computerized SPSS version 16.0 program. There is a significant relationship between the use of earphones and hearing loss in students of SMA Negeri 8 Luwu Timur.

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## **INTRODUCTION**

Headset or earphone is a pair of small loudspeakers used near the ear and for listening and talking when communicating using other devices.(Christian V. G. Rumampuk et al., 2018; Rosita, 2019) Now the use of earphones is increasingly found among the public, especially among teenagers. Young teenagers in their daily activities are often interspersed with listening to music using earphones which can be done in their spare time, in crowded places or while driving.(Lily Setiani et al., 2018)

Hearing loss caused by prolonged exposure to loud noise is called Noise Induced Hearing Loss (NIHL). NIHL causes the ear to lose the ability to hear sound either totally or partially, resulting in hearing loss and difficulty in communication. Factors such as intensity, frequency, duration of exposure, as well as individual factors such as susceptibility, age, and gender can influence noise-induced hearing threshold reduction. People with NIHL are often distracted by background noise, causing difficulty in hearing and understanding conversations, especially in crowded environments. People tend to be more comfortable communicating in quiet environments. NIHL generally occurs due to damage to the cochlea, which is part of the inner ear.(Rosita, 2019; Susiyanti & Imanto, 2020)

Hearing loss due to noise is not only in the work environment, but can also occur due to the use of earphones. Music heard using earphones has a greater noise intensity than noise intensity without using earphones even with the same volume of sound. It happens because the distance of the sound source is closer to the listener who uses earphones.(Rosita, 2019)

Noise is a high-density sound that is highly disruptive to hearing. Exposure to noise with an intensity of 85 decibels (dB) or more can cause damage to the corti receptors in the inner ear. The threshold of noise intensity acceptable to the ear is usually less than 85 dB. However, the noise intensity generated by the use of earphones reaches 110 dB under normal conditions, 121 dB at high volume, and can increase up to 139 dB. Exposure to sound with an intensity of 110 dB for 1-4 hours per day can cause damage to hair cells, buffer cells, blood vessels, and afferent nerves in the ear. This damage can cause hearing loss.(Susiyanti & Imanto, 2020)

The purpose of this study was to determine the relationship between the habit of listening to music using earphones with the incidence of hearing loss in SMA Negeri (SMAN) 8 Luwu Timur students.

## **THEORETICAL FRAMEWORK**

Hearing loss caused by prolonged exposure to loud noise is called Noise Induced Hearing Loss (NIHL). NIHL causes the ear to lose the ability to hear sound either totally or partially, resulting in hearing loss and difficulty in communication. Factors such as intensity, frequency, duration of exposure, as well as individual factors such as susceptibility, age, and gender can influence noise-induced hearing threshold reduction. People with NIHL are often distracted by background noise, causing difficulty in hearing and understanding conversations, especially in crowded environments. People tend to be more comfortable communicating in quiet environments. NIHL generally

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## METHODOLOGY

The research method used was observational analytic research using a cross sectional study to assess the relationship between the habit of listening to music using earphones on the incidence of hearing loss in students of SMAN 8 Luwu Timur. The sample technique was carried out using total sampling. The population of this study were all 12th grade students of SMAN 8 Luwu Timur in the 2023-2024 school year.

The population was given a questionnaire to determine the sample to be studied, after which, each individual who was part of the sample was asked to fill out an informed consent. After obtaining consent from each participant, the Tuning Fork test was conducted. The Tuning Fork test is a hearing examination method that tests a person's ability to hear and respond to sound using a tool called a tuning fork. The data was then analyzed through SPSS and then presented in the form of tables and diagrams.

## RESULTS

Based on research conducted at SMAN 8 Luwu Timur, a sample of 94 people was obtained with the following characteristics of respondents:

### *Characteristic of Student of SMAN 8 Luwu Timur*

**Table 1. Characteristics of Students of SMAN 8 Luwu Timur based on Age**

Age	n	Percentage
16	13	13,80
17	64	68,10
18	17	18,10
<b>Total</b>	<b>94</b>	<b>100</b>

Table 1. shows the frequency of the sample of students of SMAN 8 Luwu Timur based on age, 13 students (13.80%) were 16 years old, 64 students (68.10%) were 17 years old, and 17 students (18.10%) were 18 years old.

**Table 2. Characteristics of Students of SMAN 8 Luwu Timur based on Gender**

Gender	n	Percentage
Male	39	41,50
Female	55	58,50
<b>Total</b>	<b>94</b>	<b>100</b>

Table 2. shows the frequency of the sample of students of SMAN 8 Luwu Timur based on gender, 55 students (58.50%) were female and 39 students (41.50%) were male.

**Table 3. Characteristics of SMAN 8 Luwu Timur Based on the Duration (Years) of Earphone Usage.**

Year	n	Percentage
< 1 year	94	100,0
> 1 year	0	0,00
<b>Total</b>	<b>94</b>	<b>100</b>

Table 3. shows the frequency of samples of students from SMAN 8 Luwu Timur based on the duration of earphone usage per year. All of the total sample of 94 students (100.00%) used earphones for less than 1 year.

**Table 4. Characteristics of Students of SMAN 8 Luwu Timur Based on Weekly Frequency of Earphone Usage**

Daily	n	Percentage
1- 2 days	18	19,10
3 - 4 days	41	43,60
5 - 6 days	13	13,90
Everyday	22	23,40
<b>Total</b>	<b>94</b>	<b>100</b>

Table 4. displays the frequency of samples of students from SMAN 8 Luwu Timur based on the duration of earphone usage per week. A total of 41 students (43.60%) used earphones for 3 - 4 days, 22 students (23.40%) used earphones every day, 18 students (19.10%) used earphones for less than 3 days, and 13 students (13.90%) used earphones for 5 - 6 days.

**Table 5. Characteristics of SMAN 8 Luwu Timur Based on Daily Frequency of Earphone Usage**

Frequency	n	Percentage
< 1 jam	67	71,30
> 1 jam	27	28,70
<b>Total</b>	<b>94</b>	<b>100</b>

Table 5. illustrates the frequency of samples of students from SMAN 8 Luwu Timur based on the duration of earphone usage per day. A total of 67

students (71.30%) used earphones for less than 1 hour, while 27 students (28.70%) used earphones more than 1 hour.

**Table 6. Characteristics of Students of SMAN 8 Luwu Timur Based on Volume of Earphone Usage**

Volume of Earphone	n	Percentage
25%	29	30,80
50%	46	48,90
75%	10	10,60
100%	9	9,70
<b>Total</b>	<b>94</b>	<b>100</b>

Table 6. displays the frequency of samples of students from SMAN 8 Luwu Timur based on the volume of earphone usage per day. A total of 46 students (48.90%) used earphones at 50% volume, 29 students (30.80%) used earphones at 25% volume, 10 students (10.60%) used earphones at 75% volume, and 9 students (9.70%) used earphones at 100% volume.

**Table 7. Characteristics of Students of SMAN 8 Luwu Timur Based on Hearing Impairment**

Hearing Impairment	n	Percentage
Normal	86	86,20
Sensorineural Hearing Loss	13	13,80
<b>Total</b>	<b>94</b>	<b>100</b>

Table 7. illustrates the frequency of samples of students from SMAN 8 Luwu Timur based on hearing impairment. A total of 13 students (13.80%) experienced hearing impairment, while 86 students (86.20%) did not experience hearing impairment.

*Relationship Between Earphone Usage and Hearing Impairment*

**Table 8. The Relationship Between Earphone Usage and Hearing Impairment**

Earphone Usage	Hearing Impairment	Sensorineural Hearing Loss		Normal		p-value
		n	%	n	%	
Usage	< hour	0	0,00	67	71,30	0.01
	>1 hour	13	13,80	14	14,90	
<b>Total</b>		<b>13</b>	<b>13,80</b>	<b>81</b>	<b>86,20</b>	<b>100</b>

Table 8. reveals that there is a relationship between earphone usage and hearing impairment with a p-value of 0.01 (<0.05).

## DISCUSSION

Using Personal Listening Devices is a popular and common practice, but the most hazardous equipment appears to be headphones and earphones. The intensity and duration of exposure to these devices can result in permanent bilateral sensorineural hearing loss, especially if listening for more than eight hours per day and at levels exceeding eighty-five decibels, which can lead to hearing damage. (Diyah Ayu Purnaningtyas & Rahmania Ambarika NAA, 2021)

Listening to music using earphones results in greater noise intensity compared to listening without earphones, even at the same volume level. This occurs because the sound source is closer to the ear of the listener using earphones. Additionally, earphones do not fully distribute sound and do not completely block out external noise. Consequently, earphones can have an impact, namely hearing impairment. (Indri Wellsi Rizal et al., 2017)

The sound intensity produced by earphones can reach up to 110 dB, making hearing impairment likely due to their usage. Moreover, if the sound intensity exceeds the permissible sound threshold, it can lead to disturbances in the cochlea. This disturbance involves a conversion of mechanical energy into electrical energy, causing damage to the hair cells responsible for transmitting mechanical sound. (Iswari M & Nurhastuti, 2018)

The use of earphones itself typically does not cause mixed hearing loss, but it can contribute to the occurrence of sensorineural hearing loss depending on how often and for how long earphones are used. Sensorineural hearing loss can occur due to continuous exposure to high levels of noise, resulting in permanent hearing damage. This happens because the use of earphones can amplify direct exposure to noise, increasing the risk of significant hearing impairment. (Hude Umar et al., 2023)

Hearing impairment due to noise exposure can result from continuous exposure to loud sounds. It is classified as sensorineural hearing loss, which typically appears bilaterally, is irreversible, and progresses with continuous exposure to higher decibels. This is a common medical condition that can limit daily routine activities. The threat of hearing impairment due to prolonged noise exposure affects approximately 12% of the global population, making it one of the most preventable causes. NIHL was initially identified as an occupation-based disease, and the World Health Organization assesses that 33% of all cases of hearing impairment can be attributed to noise exposure. (Dehankar & Gaurkar, 2022; Sharma et al., 2022)

## CONCLUSION AND SUGGESTIONS

There is a significant relationship between the use of earphones and hearing impairment among students at SMAN 8 Luwu Timur, with a p-value of 0.01 (<0.05). Enhanced health education regarding the overlooked risks of earphone usage is imperative. A targeted educational initiative should emphasize safe earphone practices and raise awareness about the potential risks of hearing impairment due to improper usage. Furthermore, conducting comprehensive examinations, including audiometry paired with Otoacoustic

Emission (OAE) testing, is crucial. However, it's essential to secure adequate research funding to support these endeavors effectively.

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