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# Investigating the effect of personality traits on sensitivity, annoyance and loudness perception due to exposure to high frequency noise

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## Abstract

**Introduction:** Although noise characteristics such as intensity and frequency are the main cause of detrimental effects, it is important to pay attention to the personality traits of individuals as the host of adverse health effects. The aim of this study was to investigate the effect of personality traits on sensitivity, annoyance and loudness perception due to exposure to high frequency sound.

**Material and method:** This interventional and experimental study was carried out among 80 undergraduate and postgraduate students in 2017. First, examinee were exposed to a high frequency noise at 65 dBA for one hour in an acoustic room. Then, to determine amount of annoyance, sensitivity, loudness perception and to investigate personality traits, questionnaire of noise annoyance, noise sensitivity, loudness perception and Eysenck personality inventory was used, respectively. Finally, Chi-square, independent t-test and multivariate analysis of variance (MANOVA) were used to data analyze.

**Results:** The mean±SD of sensitivity, annoyance and loudness perception were 54.08±7.71, 7.0±1.53, and 2.79±1.13, respectively in this study. The mean scores of sensitivity, annoyance and loudness perception were significantly different in terms of personality traits, so that their average was higher in the neurotic and introverted. Based on MANOVA test results, personality traits had a significant effect on sensitivity, annoyance and loudness perception of individuals. In a way, the neuroticism and introversion had the greatest effect on the sensitivity and annoyance, respectively.

**Conclusion:** The results of this study showed that personality traits such as introversion and neuroticism can affect the sensitivity, annoyance and loudness perception of individuals.

**Keywords:** Noise Sensitivity, Loudness Perception, Noise Annoyance, Personality Traits.

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## 1. Introduction

In general, adverse health effects of noise are divided into three categories: mental effects (including annoyance, discomfort, and dissatisfaction), interference with activities (such as speech, sleep, and learning), and physiological effects (such as anxiety, tinnitus, or hearing loss) [1]. High-frequency noise is mainly associated with hearing loss, high blood pressure, discomfort, annoyance and fatigue. In addition to the physical characteristics of noise, intrinsic characteristics of individual also play an important role in determining the noise effects. People with different personality traits seem to have different levels of noise sensitivity [2]. Due to the importance of sound sensitivity, as one of the determinants of adverse health effects of noise, as well as noise annoyance and loudness perception as mental and psychological responses to the noise, the present study was conducted to investigate the effect of personality traits on sensitivity, annoyance and loudness perception due to exposure to high frequency noise.

## 2. Material and Methods

This laboratory study was performed in 2019 among undergraduate and graduate students of Mazandaran University of Medical Sciences. Based on Cochran's formula, 80 students (40 female and 40 male) who had no history of hearing problems and hearing loss were invited to participate in this study. The participants were asked to visit the sound laboratory of department of occupational health in the morning of an appointed day. They were asked to have an enough sleep (8 hours sleep) the night before the intervention. The sound used in this study was produced using Cool Edit Pro 2.1 software. The participants were exposed to 65 dB of a noise that was amplified in the Octavoband's central frequencies higher than 2,000 Hz for one hour (Fig. 1). After the test, to determine amount of annoyance, sensitivity, loudness perception and personality traits, questionnaire of noise annoyance, noise sensitivity, loudness perception and Eysenck personality inventory were completed by understudy subjects. Finally, data were analyzed in SPSS software using Chi-square, independent t-test and multivariate analysis of variance.

## 3. Results

A 78, 30 percent of the subjects were considered as neurotic and 48 subjects were classified as stable. Two subjects were eliminated due to incomplete completion of the questionnaire. Also, regarding the E scale of the participants, about 78, 46 of them were considered as extroverted and 38 subjects were classified as introverted. The results of the Chi-square test showed that there was no significant relationship between marital status, gender, and level of education with personality trait groups. The results of independent t-test showed that the means of annoyance, sensitivity and loudness perception in introverted and extroverted groups was significantly different. Similarly, these relationships were seen between neurotic and stable groups (Table 1). The results of the MANOVA in Table 2 and Fig. 2, showed that introverts and neurotic students experienced more sensitivity, annoyance and loudness perception.

The Partial eta square showed that neuroticism had the greatest effect on sensitivity (0.25). Loudness perception (0.21) and annoyance (0.20) were also affected by neuroticism, respectively. Introversion exerted its greatest effect on annoyance with values of 0.29 compared to sensitivity (0.21) and loudness perception (0.12). Although personality traits had an effect on each of the dependent variables, but no interactive effect was found for them.

## 4. Discussion

The results of the present study are consistent with the results of the study by Shepherd et al. As, Shepherd et al. found that introversion/extroversion was the main variable predicting noise sensitivity [3]. They also stated that neuroticism is another personality trait that predicts noise sensitivity, except that its predictive power is lower than introversion/extroversion. The literature also showed that introverts and neurotics were more sensitive to noise [4]. Other researchers have stated that noise sensitivity in introverts is higher than in extroverts

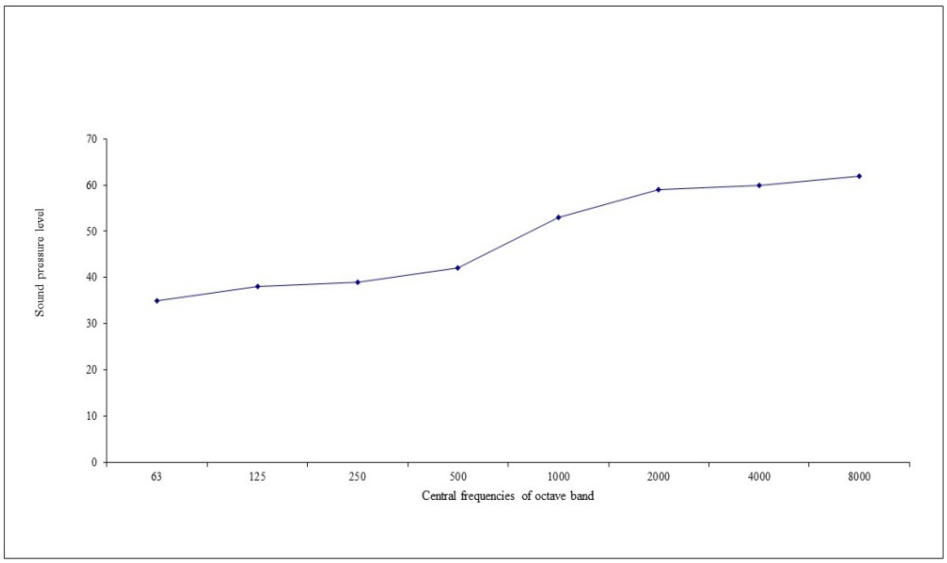


**Fig.1. The** participants were exposed to 65 dB of a noise

**Table 1.** Mean and standard deviation of the studied variables in term of individual personality traits

| | Extrovert | Introvert | P-Value | Neurotic | Stable | P-Value |
|---|---|---|---|---|---|---|
| Sensitivity | 5.7950.41± | 7.0959.37± | 0.001 ** | 6.4457.58± | 6.1948.50± | 0.001 ** |
| Annoyance | 1.406.24± | 0.918.05± | 0.001 ** | 1.207.72± | 1.285.58± | 0.001 ** |
| Loudness perception | 0.772.28± | 1.183.52± | 0.001 ** | 1.063.26± | 0.822±..4 | 0.001 ** |
| Age | 1.4525.78± | 1.4025.62± | 0.63 | 1.58±25.70 | 1.14±25.73 | 0.94 |

**significant at the 0.05 level

[5]. Beheshti et al. showed that annoyance was more common in neurotic and introverted individuals than in non-neurotic and extroverted individuals [6]. Weinstein stated that neurotics are more sensitive to sound and easily react negatively to it even at low levels [7]. Belojevic et al. stated that extroverts compared to introverts are less annoyed during exposure to noise [5]. Öhrström et al. observed a strong correlation between introversion and annoyance, so that introverted people experienced more noise annoyance [8].

## 5. Conclusions

The results of this study showed that in addition to noise characteristics, personality traits can also be an important factor in creating noise effects such as annoyance. Meanwhile, traits such as introversion and neuroticism had a greater effect on people's sensitivity during exposure to noise, so the harmful effects of noise in these people are expected to be more.

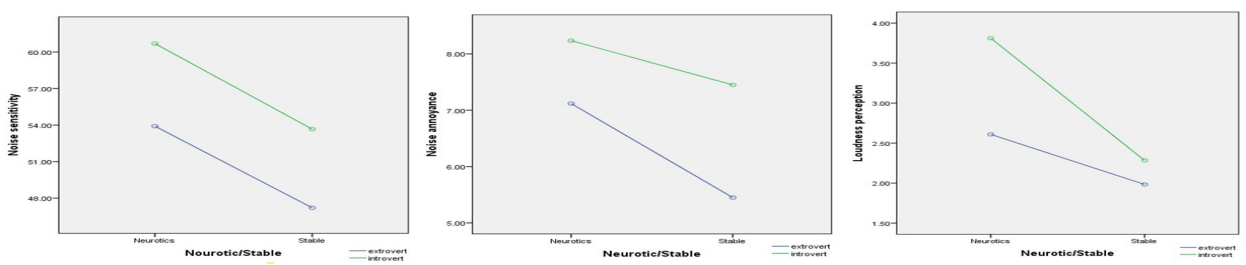


**Fig. 2.** Relationship between noise sensitivity, annoyance, and loudness perception with neuroticism/stability in introvert/extrovert groups.

**Table 2.** The evaluation of sound of between subjects by MANOVA test

| | Dependant variables | Type III sum of squares | df | Mean square | F | P-Value | Partial eta square |
|---|---|---|---|---|---|---|---|
| Corrected model | Sensitivity | 2271.72 [a] | 3 | 757.24 | 24.18 | 0.001 | 0.50 |
| | Annoyance | 98.81 [b] | 3 | 32.93 | 29.91 | 0.001 | 0.55 |
| | Loudness perception | 45.00 [c] | 3 | 15.00 | 20.18 | 0.001 | 0.45 |
| Intercept | Sensitivity | 15887.41 | 1 | 158871.14 | 5074.78 | 0.001 | 0.99 |
| | Annoyance | 2731.29 | 1 | 2731.29 | 2480.97 | 0.001 | 0.97 |
| | Loudness perception | 390.82 | 1 | 390.82 | 525.77 | 0.001 | 0.88 |
| Neurotic/Stable | Sensitivity | 644.70 | 1 | 644.70 | 20.59 | 0.001 ** | 0.25 |
| | Annoyance | 20.58 | 1 | 20.58 | 18.69 | 0.001 ** | 0.20 |
| | Loudness perception | 15.87 | 1 | 15.87 | 21.35 | 0.001 ** | 0.21 |
| Introvert/Extrovert | Sensitivity | 599.96 | 1 | 599.96 | 19.16 | 0.001 ** | 0.21 |
| | Annoyance | 33.23 | 1 | 33.23 | 30.18 | 0.001 ** | 0.29 |
| | Loudness perception | 7.72 | 1 | 7.72 | 1.39 | 0.002 ** | 0.12 |
| Neurotic/Stable* Introvert/Extrovert | Sensitivity | 0.36 | 1 | 0.36 | 0.02 | 0.91 | 0.001 |
| | Annoyance | 2.67 | 1 | 2.67 | 2.42 | 0/12 | 0.03 |
| | Loudness perception | 2.78 | 1 | 2.78 | 3.74 | 0.057 | 0.05 |
| Error | Sensitivity | 2316.64 | 74 | 31.30 | | | |
| | Annoyance | 81.46 | 74 | 1.10 | | | |
| | Loudness perception | 55.00 | 74 | 0.74 | | | |
| Total | Sensitivity | 232793.00 | 78 | | | | |
| | Annoyance | 4005.08 | 78 | | | | |
| | Loudness perception | 708.18 | 78 | | | | |
| Corrected total | Sensitivity | 4588.37 | 77 | | | | |
| | Annoyance | 180.27 | 77 | \ | | | |
| | Loudness perception | 100.01 | 77 | | | | |

a. R=0.47 b. R=0.53 c. R=0.26 **significant at the 0.05 level

## 6. References


[1] Basner M, Babisch W, Davis A, Brink M, Clark C, Janssen S, et al. Auditory and non-auditory effects of noise on health. The lancet. 2014;383(9925):1325-32.

[2] Stansfeld S, Clark C, Smuk M, Gallacher J, Babisch W. Noise sensitivity, health and mortality—A review and new analyses. ICBEN 2017. 2017.

[3] Shepherd D, Heinonen-Guzejev M, Hautus MJ, Heikkilä K. Elucidating the relationship between noise sensitivity and personality. Noise & health. 2015;17(76):165.

[4] Dornic S, Ekehammar B. Extraversion, neuroticism, and noise sensitivity. Personality and Individual Differences. 1990;11(9):989-92.

[5] Belojevic G, Jakovljevic B, Slepcevic V. Noise and mental performance: Personality attributes and noise sensitivity. Noise and Health. 2003;6(21):77.

[6] Beheshti MH, Hajizadeh R, Jebeli MB, Tajpoor A, Zia G, Damyar N. The role of individual and personality traits in noise annoyance. Annals of Medical and Health Sciences Research. 2018.

[7] Weinstein ND. Individual differences in reactions to noise: a longitudinal study in a college dormitory. Journal of Applied Psychology. 1978;63(4):458.

[8] Öhrström E, Björkman M, Rylander R. Noise annoyance with regard to neurophysiological sensitivity, subjective noise sensitivity and personality variables. Psychological Medicine. 1988;18(3):605-13.