Original Article

The Role of Individual and Personality Traits in Noise Annoyance

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Abstract

Background: Mental annoyance caused by noise pollution is a common phenomenon in modern societies, especially in industry. Noise annoyance is dependent on Psychological and physiological characteristics of the individual. **Aim:** This study aimed to determine the role of personality characteristics and demographic factors on the noise annoyance caused by noise pollution in the industrial workers of the industrial city of Qom. **Subjects and methods:** In this descriptive correlational study 158 workers in various industries of Qom industrial city on classification quota methods were selected and evaluated in this study. All workers with mental and physical disorders, uninsured workers and Seasonal and children workers were excluded from the study. A general questionnaire was used for collecting demographic and contextual information including age, work experience and education. Also, the Weinstein noise annoyance scale was used to obtain information on annoyance. The NEO-FFI personality questionnaire (short form 60) was used to measure the personality traits of the research community. Finally, the collected data were analyzed using SPSS software. **Results:** In general, in 39% people noise annoyance score is between 50% and 75%, and in 33% people was between 75% and 100%. The results showed that, the average of noise annoyance in male and female workers is respectively 61 and 73/99. Also the results showed that there was a significant relationship between neuroticism and Noise annoyance and there is no significant correlation between other personality characteristics of individuals with the Noise annoyance. According to the results of this study, there is no significant relationship between noise annoyance with any individual characteristics (age, sex, marital status and education). **Conclusion:** According to the results of this study, neuropsychiatric personality has an effective role in increasing the noise annoyance and Negative people are more likely to suffer from noise annoyance than others. Due to the fact that more people in the industry are suffering from noise annoyance, further research is recommended to manage people's noise annoyance based on their personality traits.

Keywords: Noise annoyance; Personality traits; Demographics

Introduction

The noise of the workplace causes noise annoyance. In recent years, noise annoyance has been studied as one of the most important issues related to individual's mental health. [1] In general, noise annoyance is defined as "feeling of frustration caused by noise". [2] Furthermore, there is a dose-response relationship between the level of exposure to noise and the amount of noise annoyance. [3] Noise annoyance is one of the indicators of mental health that is affected by noise of machinery. A number of empirical and clinical studies have shown that exposure to the ambient noise activates the central nervous system and accelerates the response to some stressors. [4] Noise may be associated with endocrine changes and cardiovascular disease. Also increased cortisol levels and chronic sleep problems affected by noise may increase the risk of obesity. [5] In general, various studies have been conducted to the effects of noise balance and people's noise sensitivity on noise annoyance. [6] Since, noise annoyance is a mental indicator, therefore other mediators such as different personal, environmental and social factors may affect noise perception and level of noise annoyance. In various researches, the role of noise sensitivity on increasing noise annoyance has been studied. [6]

The study by Bente Oftedal et al. showed that exposure to high level of traffic's noise increases obesity in women with high noise sensitivity. [5] However, in addition to increase or decrease the noise annoyance, other factors may also be effective if they

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are neglected. In the meantime, we can mention the role of individual characteristics to the noise influence. Different people who are exposed to a type of noise are not equally affected. The sensitivity of people to noise is different. Also people don't show the same sensitivity to the noise pollution when they are exposed to noise at home or outdoors. [7]

Eysenck believes that extroversions and introversions differ in terms of the level of brain excitability; also extroversion has a lower level of brain arousal than introverts. Therefore, they need excitation and stimulation, so they seek it actively. In contrast, introversion has a high level of brain arousal and avoids arousal. So, introversion people responses to sensory stimulation more than extraversion. Also they have a lower pain threshold than extraversion. [8] Studies have emphasized the role of human factors to make annoyance. For example, the role of individual characteristics on exposure to noise can be mentioned. [9]

There is some evidence that the social - cultural differences significantly affect the response to the noise 4. Due to the fact that exposure to the noise in people has had different effects, it seems that these differences are related to personality features of individuals. Eysenck found in his studies that introverted people were more stimulated than extroverted. [10-12]

According to studies that show the effect of noise on concentration, attention, alertness, accuracy, and stress depending on the people's personality, also due to the few studies have been done with regard to the amount of noise annoyance based on individual differences, the purpose of this study is to determine the role of personality features and demographic factors on the noise annoyance caused by noise pollution in workers employed in industrial centers.

Subjects and Methods

This is a descriptive correlational study that was conducted to determine the role of personality traits and demographic factors on noise annoyance caused by noise pollution in workers employed in industrial city of Qom. Inclusion and exclusion criteria for this study were that all people are willing to participate in this study and are physically and mentally healthy. Accordingly, before the study, the medical records of all participants were examined and all subjects with mental and physical disorders including depression and mental disorders were excluded. Also, in this study, all uninsured workers, Seasonal and children workers were excluded from the study.

Demographic and contextual information including age, work experience, degree of education were collected by a general questionnaire. Also the Weinstein noise annoyance Scale was used to obtain information on annoyance. Following the necessary coordination with the managers of the industries, the questionnaires were delivered to people and monitored how they were completed correctly. Noise annoyance is determined by "the acoustic - noise annoyance evaluation using social and socio-acoustic audit "questionnaire, which is available in ISO/TS 15666. [13,14] This scale contains numbers from 0 to 10, which zero indicates non annoyance, and number 10 indicates excessive annoyance. If the responses of workers are in the range of 0-2, 2-4, 4-6, 6-8 or 8-10, they indicate non annoyance, mild annoyance, moderate annoyance, high annoyance and excessive annoyance respectively.

The NEO-FFI five-factor personality questionnaire (60 questions short form) was used to measure the personality characteristics of the research community. The five-factor personality test is one of the most authoritative psychological tests in the world. Researchers who have designed this test have chosen different personality traits for many years and have conducted detailed questionnaires on people, and then with using sophisticated statistical methods have reach to five major factors of personality include neurosis, extraversion, flexibility, and pleasure, responsibility and conscientious.

The NEOPI-R questionnaire is a personality test that is based on factors analysis. This questionnaire is the latest personality tool that introduced as the NEO Personality Questionnaire by McCurry and Costa in 1985. The revised version of this questionnaire is provided by the same authors as the revised version of the NEO Personality Questionnaire.

The long form of the questionnaire is designed in 240 phrases to measure five main factors includes neurosis, extraversion, flexibility, pleasure and responsibility. This questionnaire also has another form with 60-question questionnaire called NEO-FFI that used to assess the five main factors of the character. In the 240-item form, each factor has 6 scales or sub-scales, while in the short form each factor is measured with 12 questions.

The question marking method have five options which includes 0 (I totally disagree), 1 (I disagree), 2 (I have no idea), 3 (I agree), and 4 (I totally agree). Some questions are scored in reverse order.

Esfandiari et al. used a short form of the questionnaire in their research on nurses in 2012. The amount of Cronbach's alpha of the personality dimensions of this questionnaire for psychosis, openness in experience, orbital task, agreement and extroversion was 0.82, 0.69, 0.76, 0.73 and 0.70 respectively. [15]

Results

In general, 158 employees working in Qom industrial city which 151 (95.56%) men and 7 (44.4%) women were studied. The mean age of participants was 34.48 years with standard deviation 6.09. 67 (42.40%) had a diploma and 42 (26.58%) had a university degree. The demographic characteristics of the research community are presented in Table 1.

Based on the results of this study, the mean of noise annoyance in the research community is 16/73. The results of the measurement of noise annoyance in the research community are shown in Table 2.

Based on the results of Table 2, 72% of the participants expressed their noise annoyance scores in their workplace by more than 50. 39% of the participants expressed their noise annoyance scores in their workplace between 50% and 75% and 33% of the participants expressed their noise annoyance scores in their workplace between 75 and 100. The results of the study on relationship between noise annoyance and personality traits in the research community are shown in Table 3.

According to the results of Table 3, there is a significant relationship between neurosis and noise annoyance and there is no significant relationship between other personality characteristics and their noise annoyance. In addition, the results of statistical analysis showed that there was no significant relationship between age and noise annoyance (p-value>0.05).

Table 1: Demographic characteristics of the research community in Qom industrial city workers.

Variable		Number
Sex	Male	151
	Female	7
Degree of education	Elementary	20
	Middle School	29
	Diploma	67
	College	42
Marital status	Single	15
	Married	143
Total	158	

Table 2: The results of noise annoyance in workers in Qom industrial city.

Noise annoyance score	Number	Percent
Less than 25	17	11
Between 25 and 50	27	17
Between 50 and 75	61	39
Between 75 and 100	53	33

The results of t-test test for the investigation the relationship between demographic characteristics and noise annoyance caused by noise pollution have shown in the Table 4.

Based on the results of Table 4, the mean of noise annoyance in male and female workers is 61 and 99.73 respectively. The results of t-test test showed that there is no significant difference of noise annoyance between male and female. The results of t-test test to determine the relationship between marital status and noise annoyance due to noise pollution are shown in the Table 5.

Based on the results of Table 5, the mean of noise annoyance in single and married workers is 59.58 and 74.92, respectively. The results of t-test test showed that there is no significant difference of noise annoyance between single and married people. The results of the determine of noise annoyance by the degree of education as well as the results of the statistical test to determine the relationship between academic status and noise annoyance caused by noise pollution are presented in the Table 6.

The results of Table 6 and Figure 1 show that people with a diploma have the highest level of noise annoyance. The results of ANOVA test for determine the relationship between degree of education and noise annoyance caused by noise pollution has been shown in the Table 7. The results of ANOVA test showed that there is no significant relationship between the noise annoyance and education.

Discussion

Based on the results of this study, the mean of noise annoyance in the study population is 16/73. 39% of people have noise annoyance score between 50% and 75%, and 33% of them have between 75 and 100. Since the maximum score is 100, the level of noise annoyance in research community is high. In according

Table 3: The results of the correlation test between personality trait and noise annoyance.

Personality trait	P-Value
Neurosis*	0.039
Extroversion	-0.16
Flexibility	-0.14
Agreeability	-0.07
Being conscientious	-0.11

***Neurosis:** A type of mental or behavioral illness that does not have an anatomical basis. In this disease, mental anxiety is created by maintaining mental health. Psychologists believe that anxiety is one of the most important neurosis symptoms.
**.is a personality trait and a major dimension in the theory of human personality and it pays to getting human energy from the outside world issue. Introverted receive their energy from within themselves (ideas and concepts from the mind) and extraverted receive their energy from their outside world and in relation to others.

Table 4: The results of t-test test to determine the significance of noise annoyance between male and female.

Sex	Noise annoyance			t	Df	P-value
	Number	Mean	Standard deviation			
Male	151	73.99	66.34	0.43	126	0.66
Female	7	61	34.16			

Table 5: Results of t-test test to determine the significance of noise annoyance based on marital status.

Marital status	Noise annoyance			t	Df	P-value
	Number	Mean	Standard deviation			
Single	15	59.58	23.88	0.77	126	0.44
Married	143	74.92	68.11			

Table 6: The results of measuring the noise annoyance among workers employed in Qom industrial city by degree of education.

Variables	Noise annoyance mean	Noise annoyance standard deviation
Elementary	58	20.41
Middle School	67.71	24.8
Diploma	85.2	95.56
College	66.24	27.09
Total	73.48	63.35

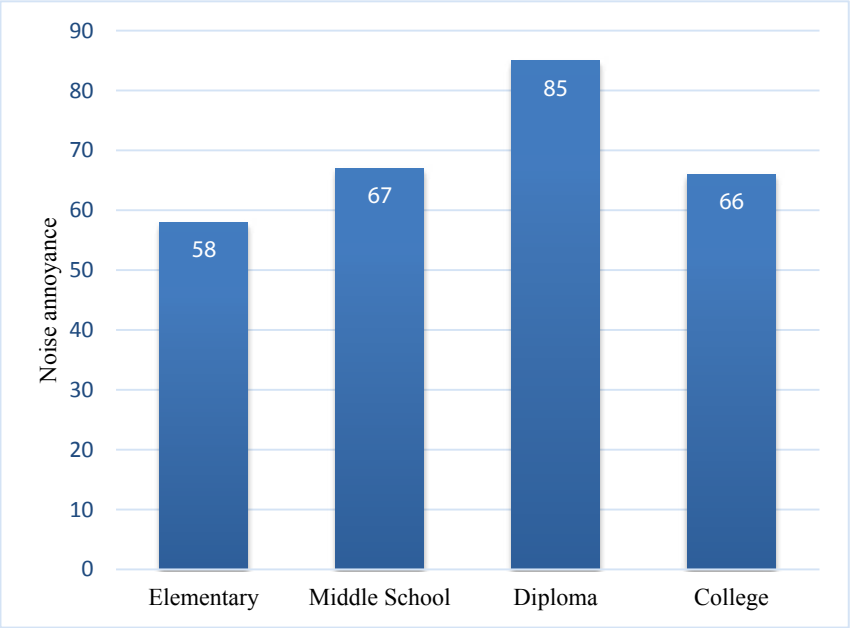

Figure 1: Comparison of noise annoyance among workers employed in Qom industrial city by degree of education.

Table 7: The results of ANOVA test to determine the significance of noise annoyance based on educational status.

Noise annoyance	Df	F	P-value
Between job groups	3	1.08	0.35

to Negative effects of noise annoyance on general health and quality of life 3, so it's necessary to having control measures. Generally, in according to the direct correlation between the level of noise intensity and noise annoyance in most studies, [16] it is suggested that management and engineering actions reduce the intensity of noise and other parameters such as the frequency of noise, [17] personality traits and personal-environmental factors are neglected. As a result, it is suggested that in addition to providing control strategies for reducing the sound level, other parameters affecting noise annoyance should also be studied.

The results of statistical analysis showed that there is a significant relationship between neurosis and noise annoyance and there is no significant relationship between other personality traits of people with their noise annoyance. The results of Belojevic et al. showed that traffic noise is positively affected by mental noise sensitivity and neuroticism 18, which have conformity with the results of the present study. In addition, their study results showed that being introverted and extroverted don't have any significant effect on mental responses to noise, which is in agreement with the results of the present study. [18] In addition, the results of the laboratory study conducted by Evy Öhrström et al. showed that there is a direct relationship between neurosis and noise annoyance. [19] According to the results of this study, noise sensitivity and individual's attitude to noise is also effective on noise annoyance. [19] Also, the results of vastfjall showed that the level of noise sensitivity and mood of the person is effective on noise annoyance. [20]

The results of all these studies indicate that there is a direct relationship between neurosis and noise annoyance, so they confirm the results of this study.

The results of statistical analysis showed that there is no significant relationship between age, gender, marital status, education variables and noise annoyance. The results of study by Miedema et al. in order to determine the role of attitude and demographic factors to the noise annoyance caused by traffic noise showed that attitudinal variables such as noise sensitivity and fear caused by a source of noise have a great effect on noise annoyance, while demographic factors play a very minor role. [21] According to the results of their study, there is no correlation between gender and noise annoyance, however age and other demographic characteristics have a small effect on noised annoyance. [21] The results of study by Son et al. to determine the role of demographic and attitudinal factors to noise annoyance caused by airborne noise showed that noise annoyance was not significantly affected by demographic variables including gender, age, education and occupation and it is affected by attitude variables such as complaints [22] so it's confirm the results of this study.

The study by Eulalie Peris et al. to determine the effects of

situational, attitude and demographic factors on noise annoyance caused by railway vibrations in residential areas showed that the annoyance score was strongly influenced by attitudinal factors such as worry about equipment damage and expectations about future vibration levels. [23] In the case of noise annoyance factors such as fear of damage to the auditory system and etc. may increase noise annoyance. Therefore, it is recommended to be investigated in future studies.

The results of Fredrik Sjödin's study on the noise annoyance in preschool teachers showed that there is no significant difference between the amount of noise annoyance and different personal characteristics (hearing impairment, tinnitus, age and sex). [24] The study by Kang Sun et al. Showed that seeing the source of the noise generator by people is effective in noise annoyance. [1] Also noise frequency is one of the effective parameters in noise annoyance. The study by Lekaviciute et al. showed that in equal levels of sound, the noise caused by the aircraft and train had the greatest effect on noise annoyance. [25] As a result, it is suggested that these cases be investigated in future studies. In general, few studies have been done on the effects of noise on humans. The results of studies conducted in this regard are incompatible. [26,27] Therefore, in this regard further studies are recommended.

The current study has some limitations. Firstly, because of the cross-sectional of current study, so the effect of personality traits on noise annoyance cannot be analyzed as a causal relationship. Secondly, in this study, noise annoyance was measured based on a mental index. Thirdly, the noise properties didn't break down in current study.

However, this study compared with other studies has important advantages that are mentioned below: Firstly, this study evaluated the level of noise annoyance in a wide range for the first time, although in a number of studies, the level of noise annoyance is evaluated in a particular industrial unit. Secondly, this study examines the role of individual and personality traits to noise annoyance among workers employed in Qom industrial centers. Due to the cultural and social differences between Iranian workers and workers in other countries, this study is closer to reality compared to other studies abroad. Thirdly, this is a field study and can be used as a basis for future laboratory studies.

Conclusion

Based on the results of the present study, the people working in industrial units are in an unsatisfactory condition in term of noise annoyance. Depending on the different individual and personality characteristics, noise annoyance may exist at any level of noise intensity, so that engineering control strategies cannot control the noise annoyance to the optimum level. As a result, other non-noise factors that are effective in noise annoyance should be considered. Based on the results of this study, there is a direct correlation between psychosomatic personality characteristics and noise annoyance and there is no relationship between other personality and demographic characteristics with noise annoyance.

The results of this study can be effective in future planning management as well as conducting extensive studies to manage the negative effects of noise annoyance on general health and quality of life.

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Conflict of Interest

All authors disclose that there was no conflict of interest.

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