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Investigating the Effect of Perception of Air Pollution, the Level of Noise Perception with Quality of Life and the Possibility of Mental Disorders with the Moderating Role of Psychological Hardiness in Residents of Areas Close to Industrial City (Tehran)

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A B S T R A C T

Purpose: The purpose of this study is to explore how people's perceptions of air and noise pollution impact their quality of life. It also aims to examine the potential for mental disorders, with a focus on the moderating influence of psychological hardiness, among individuals living near industrial sites in Tehran.

Methods and Materials: The current study was a part of descriptive-correlational research and utilized a cross-sectional research method. The researchers employed a structural model and path analysis to examine the impact of the moderating variable. The statistical population for this study consisted of all individuals residing in proximity to industrial areas (industrial towns) in Tehran from July to October 2023. A sample of 152 participants was randomly chosen using a multi-stage cluster sampling technique. The research instruments utilized in the study were Kobasa's Hardiness Scale (KHS), World Health Organization Quality-of-Life Scale (WHOQOL-BREF), Symptom Checklist-90 (SCL90), Air Pollution Perception Survey, and Noise Exposure Questionnaire (NEQ). Descriptive statistics and the moderating variable's effects were analyzed using JAMOVI version 2.4 software, while Smart PLS version 4 software was used to assess the relationships between variables. A p-value of 0.05 was deemed appropriate in this study.

Findings: The current study's findings indicate that the variable of Hardiness played a moderating role in the connection between the level of Noise perception and Phobic anxiety, with a notable impact observed (β=0.139, P=0.031). Furthermore, Hardiness was also found to moderate the relationship between the level of Noise perception and Obsessive-compulsive disorder, with a significant

effect noted (β=0.155, P=0.026). In addition, the study revealed that Hardiness moderated the association between air pollution perception and Obsessive-compulsive disorder, with a significant effect evident (β=0.485, p<0.001). Moreover, the results showed that Hardiness moderated the relationship between air pollution perception and quality of life, with a significant effect observed (β=0.267, p<0.001).

Conclusion: The findings of this study demonstrated that both air and noise pollution have the potential to increase mental disorders and decrease the quality of life. However, developing psychological hardiness can help mitigate these adverse consequences. These findings have valuable implications for people living in industrial zones, employees exposed to high levels of pollution, and authorities in charge of public health.

Keywords: *Air Pollution, Noise Pollution, Quality of Life, Mental Disorders, Psychological Hardiness, Industry*

1. Introduction

Industrial towns are essential for the economic development of any city, but they come with various environmental risks. The dangers consist of air pollution, displacement of communities, discharge of dangerous industrial effluents, noise pollution, harmful radiation, soil contamination, climate change induced by the release of hazardous substances, and industrial mishaps (Abdi et al., 2022). The correlation between the environment and health plays a crucial role in public health. The World Health Organization (WHO) states that environmental factors contribute to 23% of global deaths, and residing in clean environments can prevent various diseases (Dettori et al., 2020). Many research studies have demonstrated that residing close to industrial zones can negatively impact physical health and overall quality of life (Johnston & Cushing, 2020).

Sulfur dioxide, suspended particles, polycyclic aromatic hydrocarbons, certain metals, volatile organic compounds, and substances like butadiene and dichloroethane are commonly present in the air around petrochemical facilities. These pollutants can have detrimental effects on health (Marquès et al., 2020). Globally, poor air quality is responsible for 6.5 million premature deaths, with both noise and air pollution negatively impacting public health (Dettori et al., 2020). Noise pollution, in particular, can lead to mental health issues, causing disruptions in daily activities, emotions, thoughts, sleep, and rest, resulting in feelings of irritability, distress, fatigue, and cognitive impairment (Beutel et al., 2020). Studies indicate that noise pollution can also trigger health problems such as headaches, insomnia, high blood pressure, physiological stress, and dizziness (Farooqi et al., 2020). Moreover, being exposed to air pollution has been associated with a higher chance of developing mental disorders due to worsening symptoms and behaviors related to feelings of sadness, worry, and alterations in specific areas of the brain (Zundel et al., 2022).

Residents living near industrial areas often experience a decline in their quality of life due to exposure to noise and air pollution generated by industrial activities, leading to physical and psychological challenges (Muhammed & Abubakar, 2022). The idea of quality of life includes the level of advantages gained from basic life needs, such as improving living standards and overall happiness, along with the feeling of security and contentment with one's life (Turkington et al., 2023). Research has highlighted the correlation between air pollution and a notable rise in hospital admissions for acute respiratory illnesses when air pollutant levels are elevated, ultimately impacting productivity and overall welfare (Raimi et al., 2021). Studies have also shown the negative impact of low air quality on both social and environmental health, specifically on the respiratory and cardiovascular systems, leading to higher death rates (Velayatzadeh, 2020). Noise pollution has also been connected to various cardiovascular diseases, including arterial hypertension, coronary artery disease, heart failure, and arrhythmia, leading to elevated stress hormone levels, blood pressure, endothelial dysfunction, and oxidative stress (Münzel et al., 2021).

Additionally, air pollution plays a significant role in the development of mental disorders, with higher levels of PM2.5 in the air associated with increased feelings of nervousness, depression, helplessness, and restlessness (Gu et al., 2020). Essentially, air pollution serves as a source of oxidative stress in the environment, leading to inflammation in the central nervous system and potentially impacting

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mental health, particularly depression (Dores et al., 2021). Various health problems, such as cardiovascular, metabolic, and respiratory diseases, have been correlated to noise pollution. New research indicates that both air and noise pollution could be factors in psychiatric disorders (Tortorella et al., 2022). Research has indicated that short-term exposure to air pollution, particularly NO2, could be a key factor in the onset of mental disorders (Li et al., 2020). Furthermore, a study demonstrated that pollution, such as ambient air pollution, is a significant risk factor in the development of mental health complications and can exacerbate conditions like stress and anxiety disorders (Trushna et al., 2021).

Individuals in industrial areas have certain skills and abilities to help them cope with stress caused by pollution and life pressures. These skills can help them manage their response to stress and navigate difficult situations. These abilities and talents can serve as a protective barrier and enable individuals to cope effectively (Tahmasbi, 2020). For instance, one such ability is psychological hardiness, which encompasses control, commitment, and a willingness to take on challenges, thus serving as a buffer against stress and mitigating its negative impact on mental health (Haj Hashemi et al., 2021). Research has shown that individuals with higher levels of hardiness tend to have better mental health outcomes (Sadeghi & Einaky, 2020). Additionally, studies have found a connection between psychological hardiness and improved overall quality of life (Javer et al., 2022).

The impact of industrial pollution on the physical health of nearby residents can vary in type and severity, having direct and indirect effects. It is crucial to assess these effects accurately, especially with the growth of industries and settlements. These evaluations can lead to better design and placement of industrial areas, improved urban planning to minimize environmental harm, disease prevention, and better environmental health conditions. This proactive approach can also help prevent the need for government financial resources to compensate for potential damages (Abdi et al., 2022). Therefore, research in this area is essential to address the gap in previous studies that did not directly investigate the influence of air and noise pollution perception on quality of life and mental health, as well as the potential moderating role of psychological hardiness in residents living near industrial areas in Tehran. This current study aims to fill this research gap and is one of the initial studies in this specific field.

2. Methods and Materials

2.1. Study Design and Participants

The current study is descriptive-correlational research employing a cross-sectional research design, using the structural model and path analysis method to examine the impact of the moderating variable. This study focused on the independent variables of perception of air pollution and level of Noise perception, the dependent variables of quality of life and likelihood of mental disorders, and the moderating variable of psychological Hardiness. The statistical population for this research comprised all residents living near industrial areas and factories in Tehran between July and October 2023. A sample of 152 residents from these areas was randomly selected using multi-stage cluster sampling. The sample size for the study in 2013 was determined using Cohen's formula. Considerations included the quantity of visible and unseen factors in the model, the anticipated impact size, and the preferred degrees of probability and statistical power. In the calculation, an effect size of 0.3, a statistical power level of 0.8, five latent variables, 218 observed variables, and a probability level of 0.01 were all considered.

The researcher established a sample size of 150 individuals according to the information given. To accommodate for possible dropouts, the researcher opted for a sample size of 200 people. Individuals had to meet specific requirements to be part of the study, such as living close to industrial areas for at least two years, having a diploma, and giving informed consent. Participants would be excluded from the study if they did not respond to more than eight questions on the questionnaire. The researcher first received the necessary approvals from their university and chose 13 industrial towns near Tehran to conduct the study. The towns were grouped according to their location, and four towns were randomly chosen from each group. The researcher then identified nearby residential areas in these towns, such as Shamsabad, Abbas Abad, Nasirabad, and Khavaran Industrial Estate. Subsequently, the researcher visited these areas to commence the research. The next step involved providing detailed information about the research, including research objectives, research permits, and compliance with ethical principles, to each participant in the sample. Participants were assured that their responses would be kept confidential and that they could withdraw from the study at any time. Due to challenges in recruiting participants, it took three months to collect data through in-person interviews. A total of 152 out of 200 completed questionnaires were used for analysis, as 48 questionnaires were excluded due to

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incomplete or inaccurate responses. All responses were self-reported.

2.2. Measures

Kobasa's Hardiness Scale (KHS): The Hardiness questionnaire of Kobasa (1982) was created to evaluate people's Hardiness levels, and its validity and reliability have been confirmed by the researcher (Kobasa et al., 1982). This scale includes 20 items, each scored on a four-point Likert scale from zero (never) to three (often). At the end, the person's scores on the scale are added together and the total score is calculated for the person. The range of scores of people on the test is between 0 and 60. Higher scores indicate severe Hardiness of the subject. Cronbach's alpha obtained by Kobasa et al. is 0.81. The reliability of this scale in Iran is 0.73 using Cronbach's alpha test (Mansouri et al., 2018). In the present study, Cronbach's alpha for this questionnaire was 0.695 and its Composite Reliability value was 0.760. Likewise, the AVE value for convergent validity was 0.77.

World Health Organization Quality-of-Life Scale (WHOQOL-BREF): The World Health Organization developed a 26-question survey in 1996 to assess quality of life (Whoqol Group, 1998). It comprises four dimensions: physical health (7 questions), psychological health (6 questions), social relationship (3 questions), and environmental health (8 questions). Two questions focus on the individual's general health status. Responses range from 0 to 3, with 0 representing non-existence, 1 for low, 2 for medium, and 3 for high. Researchers found the internal consistency of the scale to be above 0.7 (Khooshemehri et al., 2013; Nejat et al., 2006). The Cronbach's alpha coefficient for this scale in the current study was 0.893. Similarly, the Composite Reliability value was 0.913 and the validity value, as indicated by the AVE index, was 0.60.

Symptom Checklist-90 (SCL90): In 1994, Drogatis created the SCL-90-R symptom checklist, also known as the SCL-90 test, for assessing different psychological issues. The primary goal of this tool is to evaluate the mental health of individuals, recognize psychological problems in patients, track the progress of treatments, conduct research, and explore the connection between symptoms and other psychosocial factors (Derogatis, 1994). This survey includes 90 questions in a Likert scale format with 5 points each, assessing the degree of unease someone feels in different aspects. Responses are interpreted as follows: "Not at All" indicates the issue has never been a problem and has never caused distress. "A Little" indicates that the issue is present to a limited degree and has resulted in slight discomfort. "Moderately" suggests the issue has been somewhat significant and has caused some distress, occurring three or four times in recent weeks. "Quite A Bit" indicates the problem has occurred frequently and intensely, causing significant distress (e.g., once every two or three days). "Extremely" suggests the problem has occurred almost daily with intense distress. Responses on the SCL-90 test should reflect the individual's state in the past week. This survey examines nine different aspects, which are: Physical complaints or somatization (12 questions), Obsessive-Compulsive behavior (9 questions), Interpersonal sensitivity (9 questions), Depression (13 questions), Anxiety (10 questions), Hostility (6 questions), Phobic Anxiety (7 questions), Paranoid ideation (6 questions), and Psychoticism (10 questions). To calculate the final score, the total scores from questions related to each dimension are divided by the number of questions in that dimension. The survey categorizes mental health into four groups: a score of 0 to 1 represents the absence of a mental disorder, 1 to 2 indicates a mild disorder, 2 to 3 represents a moderate disorder, and a score of 3 or higher indicates a severe disorder (Eslami et al., 2023). The survey will be considered complete at 1.3. In Iran, a research study found that the questionnaire had a Cronbach's alpha value of 0.86 (Mosavian & Nejati, 2016). In this study, the Cronbach's alpha coefficient for the dimensions of Somatization, Obsessive-Compulsive behavior, Interpersonal sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid ideation, and Psychoticism was found to be 0.774, 0.807, 0.782, 0.749, 0.631, 0.701, 0.755, 0.735, and 0.645, respectively. The validity of these dimensions using the AVE index was found to be 0.69, 0.54, 0.75, 0.88, 0.51, 0.51, 0.57, 0.55, and 0.78, respectively.

Air Pollution Perception Survey: Yazdanparast and colleagues (2014) created a survey to evaluate how the public views air pollution, and the researchers confirmed its validity and reliability (Yazdanparast et al., 2014). The questionnaire consists of 57 items covering various aspects such as clean air composition, opinions on air pollution, health effects, acid rain, greenhouse effect, exposure to air pollution, and feelings towards air pollution. Responses are rated on a three-point Likert scale. Total scores are calculated by summing up individual scores, ranging from 57 to 171. The Cronbach's alpha coefficient reported by Yazdanparast et al. was 0.82, while in Iran, it was found to be 0.96 (Hadad et al., 2022). In this study, the Cronbach's alpha for the questionnaire was 0.761 and the Composite

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Reliability value was 0.827. Additionally, the AVE value for convergent validity was 0.78.

Noise Exposure Questionnaire (NEQ): Shakerinia and colleagues (2011) developed a survey in which participants rate their perception of abnormal Noises using a five-point Likert scale, ranging from 1 (very little) to 5 (very much). The scores for participants in the survey range from 25 to 125. Shakerinia et al. achieved a Cronbach's alpha of 0.95 (Shakerinia, 2011). In this study, the Cronbach's alpha for the survey was 0.831 and the Composite Reliability value was 0.899. The AVE value for convergent validity was 0.74 in this study as well.

2.3. Data Analysis

The researchers utilized JAMOVI version 2.4 software for conducting descriptive statistics and examining the impact of the moderating variable. Smart PLS version 4 software was employed to assess the relationships between the variables. The normality of the data distribution was evaluated using the Shapiro-Wilk test, which showed that the research variables did not follow a normal distribution. Consequently, Smart PLS was selected for further analysis. A significance level of 0.05 was deemed appropriate for the study.

3. Findings and Results

The researcher initially analyzed the descriptive statistics of the variables in the study. The participants were categorized into two groups based on gender - men (40.1%) and women (59.9%). Similarly, they were divided into three groups based on education level: Undergraduate (23.7%), Master's degree (25.7%), and Diploma degree (50.7%). When it came to age, the individuals were split into three groups: 20 to 30 years (59.2%), 30 to 40 years (15.1%), and over 40 years (25.7%).

Table 1

Description of the Demographic Variables

Variables	Groups	F	%	Sample Size	Md
Gender	Man	61	40.1	152	2
	Female	91	59.9		
Level of Education	Undergraduate	36	23.7	152	3
	Master's degree	39	25.7		
	Diploma degree	77	50.7		
Age	20-30	90	59.2	152	1
	30-40	23	15.1		
	+40	39	25.7		

Table 2 displays the Mean and variability of the variables examined in the research.

Table 2

Description of the Main Research Variables

Variables	M	SD	Max	Min	N	Skewness	Kurtosis	Shapiro-Wilk	P-value
Level of Noise Perception	60.704	10.509	78.000	41.000	152	-0.205	-0.851	0.953	< .001
Perception of Air Pollution	114.112	9.862	130.000	95.000	152	0.071	-1.206	0.936	< .001
Quality-of-Life	46.007	3.617	53.000	36.000	152	-0.938	0.808	0.909	< .001
Somatization	0.918	0.296	1.600	0.610	152	0.895	-0.815	0.768	< .001
Obsessive-Compulsive Disorder	0.959	0.285	1.600	0.610	152	0.813	-0.716	0.849	< .001
Interpersonal Sensitivity	0.954	0.319	1.600	0.610	152	0.679	-1.283	0.777	< .001
Depression	0.903	0.284	1.800	0.610	152	1.416	1.206	0.784	< .001
Anxiety	0.896	0.296	1.720	0.610	152	1.096	-0.265	0.764	< .001
Hostility or Aggression	0.887	0.295	1.660	0.610	152	1.329	0.100	0.675	< .001
Phobic Anxiety	0.968	0.343	1.690	0.610	152	0.658	-1.263	0.787	< .001
Paranoid Ideation	0.812	0.250	1.710	0.610	152	2.546	5.253	0.511	< .001
Psychoticism	1.048	0.339	1.770	0.610	152	0.207	-1.620	0.816	< .001
Hardiness	37.105	9.725	49.000	15.000	152	-0.761	-0.720	0.871	< .001

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Table 3 displays the relationship between research variables using Pearson's correlation coefficient.

Table 3

Correlation Between Variables

Var.	1	2	3	4	5	6	7	8	9	10	11	12	13
1	-												
2	0.646***	-											
3	-0.625***	-0.652***	-										
4	0.317***	0.477***	-0.343***	-									
5	0.496***	0.682***	-0.468***	0.743***	-								
6	0.470***	0.629***	-0.429***	0.756***	0.777***	-							
7	0.468***	0.696***	-0.492***	0.808***	0.846***	0.780***	-						
8	0.465***	0.630***	-0.447***	0.757***	0.830***	0.768***	0.876***	-					
9	0.434***	0.647***	-0.441***	0.729***	0.789***	0.784***	0.785***	0.796***	-				
10	0.456***	0.620***	-0.440***	0.616***	0.764***	0.772***	0.755***	0.727***	0.762***	-			
11	0.441***	0.478***	-0.424***	0.606***	0.614***	0.564***	0.748***	0.675***	0.557***	0.572***	-		
12	0.302***	0.497***	-0.266***	0.461***	0.681***	0.655***	0.616***	0.585***	0.625***	0.757***	0.465***	-	
13	-0.645***	-0.793***	0.769***	-0.493***	-0.674***	-0.572***	-0.637***	-0.591***	-0.623***	-0.623***	-0.436***	-0.546***	-

1. Level of Noise Perception; 2. Perception of Air Pollution; 3. Quality-of-Life; 4. Somatization; 5. Obsessive-Compulsive Disorder; 6. Interpersonal Sensitivity; 7. Depression; 8. Anxiety; 9. Hostility or Aggression; 10. Phobic Anxiety; 11. Paranoid Ideation; 12. Psychoticism; 13. Hardiness.

* p < .05, ** p < .01, *** p < .001

According to the data in Table 3, there was a clear positive and significant correlation between the perception of Noise levels and air pollution with various mental health issues such as Somatization, Obsessive-compulsive disorder, Interpersonal sensitivity, depression, anxiety, Hostility or aggression, Phobic Anxiety, Paranoid ideation, and Psychoticism ($p<0.001$). On the contrary, there was a negative and significant association between quality of life and Hardiness ($p<0.001$). The next step involved testing the assumptions of the study. The Shapiro-Wilk test was utilized to assess the normality of the distribution of the research variables. The results of this test indicated that the research variables did not follow a normal distribution, leading to the utilization of Smart PLS software for modeling. The researcher's random sampling method ensured that this assumption was satisfied. With a sample size of 152 individuals, the researcher deemed it sufficient to conduct the structural equation model using the partial least squares method. Upon executing the model, the researcher analyzed the path coefficients and P-value between the research variables as presented in Table 4. A bootstrap value of 5000 was set for this study.

Table 4

Standard Research Coefficients in General

Result of the hypothesis	Path	STDEV	P-value	T-value	Result
Hardiness -> Anxiety	-0.224	0.119	0.059	1.887	rejection
Hardiness -> Depression	-0.207	0.115	0.073	1.795	rejection
Hardiness -> Hostility or Aggression	-0.227	0.120	0.058	1.896	rejection
Hardiness -> Interpersonal Sensitivity	-0.192	0.134	0.150	1.439	rejection
Hardiness -> Phobic Anxiety	-0.599	0.143	p<0.001	4.188	confirmation
Hardiness -> Obsessive-Compulsive Disorder	-0.471	0.151	0.002	3.108	confirmation
Hardiness -> Paranoid Ideation	0.003	0.145	0.981	0.024	rejection
Hardiness -> Psychoticism	-0.784	0.126	p<0.001	6.247	confirmation
Hardiness -> Quality-of-Life	0.394	0.096	p<0.001	4.084	confirmation
Hardiness -> Somatization	-0.073	0.118	0.538	0.616	rejection

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Perception of Air Pollution -> Anxiety	0.411	0.118	0.001	3.474	confirmation
Perception of Air Pollution -> Depression	0.531	0.109	p<0.001	4.871	confirmation
Perception of Air Pollution -> Hostility or Aggression	0.468	0.113	p<0.001	4.130	confirmation
Perception of Air Pollution -> Interpersonal Sensitivity	0.428	0.118	p<0.001	3.612	confirmation
Perception of Air Pollution -> Phobic Anxiety	0.192	0.124	0.121	1.551	rejection
Perception of Air Pollution -> Obsessive-Compulsive Disorder	0.319	0.131	0.015	2.424	confirmation
Perception of Air Pollution -> Paranoid Ideation	0.326	0.118	0.006	2.768	confirmation
Perception of Air Pollution -> Psychoticism	0.060	0.128	0.639	0.469	rejection
Perception of Air Pollution -> Quality-of-Life	-0.144	0.079	0.067	1.830	rejection
Perception of Air Pollution -> Somatization	0.381	0.123	0.002	3.093	confirmation
Level of Noise Perception -> Anxiety	0.063	0.086	0.465	0.731	rejection
Level of Noise Perception -> Depression	-0.009	0.078	0.909	0.114	rejection
Level of Noise Perception -> Hostility or aggression	-0.031	0.104	0.761	0.304	rejection
Level of Noise Perception -> Interpersonal Sensitivity	0.083	0.087	0.339	0.956	rejection
Level of Noise Perception -> Phobic Anxiety	0.016	0.087	0.854	0.184	rejection
Level of Noise Perception -> Obsessive-Compulsive Disorder	0.026	0.075	0.728	0.348	rejection
Level of Noise Perception -> Paranoid Ideation	0.211	0.095	0.026	2.220	confirmation
Level of Noise Perception -> Psychoticism	-0.170	0.091	0.061	1.877	rejection
Level of Noise Perception -> Quality-of-Life	-0.229	0.055	p<0.001	4.145	confirmation
Level of Noise Perception -> Somatization	-0.031	0.094	0.739	0.334	rejection
Hardiness x Level of Noise Perception -> Anxiety	0.121	0.084	0.150	1.438	rejection
Hardiness x Level of Noise Perception -> Depression	0.091	0.081	0.258	1.132	rejection
Hardiness x Level of Noise Perception -> Hostility or Aggression	0.042	0.098	0.671	0.425	rejection
Hardiness x Level of Noise Perception -> Interpersonal Sensitivity	0.110	0.069	0.113	1.586	rejection
Hardiness x Level of Noise Perception -> Phobic Anxiety	0.139	0.065	0.031	2.154	confirmation
Hardiness x Level of Noise Perception -> Obsessive-Compulsive Disorder	0.155	0.069	0.026	2.225	confirmation
Hardiness x Level of Noise Perception -> Paranoid Ideation	-0.040	0.110	0.717	0.362	rejection
Hardiness x Level of Noise Perception -> Psychoticism	-0.074	0.094	0.434	0.782	rejection
Hardiness x Level of Noise Perception -> Quality-of-Life	-0.007	0.066	0.911	0.112	rejection
Hardiness x Level of Noise Perception -> Somatization	0.071	0.089	0.425	0.799	rejection
Hardiness x Perception of Air Pollution -> Anxiety	-0.130	0.105	0.215	1.240	rejection
Hardiness x Perception of Air Pollution -> Depression	-0.130	0.096	0.176	1.352	rejection
Hardiness x Perception of Air Pollution -> Hostility or Aggression	-0.150	0.116	0.194	1.300	rejection
Hardiness x Perception of Air Pollution -> Interpersonal Sensitivity	-0.089	0.101	0.379	0.879	rejection
Hardiness x Perception of Air Pollution -> Phobic Anxiety	0.170	0.106	0.109	1.601	rejection
Hardiness x Perception of Air Pollution -> Obsessive-Compulsive Disorder	-0.014	0.122	0.911	0.112	rejection
Hardiness x Perception of Air Pollution -> Paranoid Ideation	-0.060	0.114	0.596	0.530	rejection
Hardiness x Perception of Air Pollution -> Psychoticism	0.485	0.108	p<0.001	4.476	confirmation

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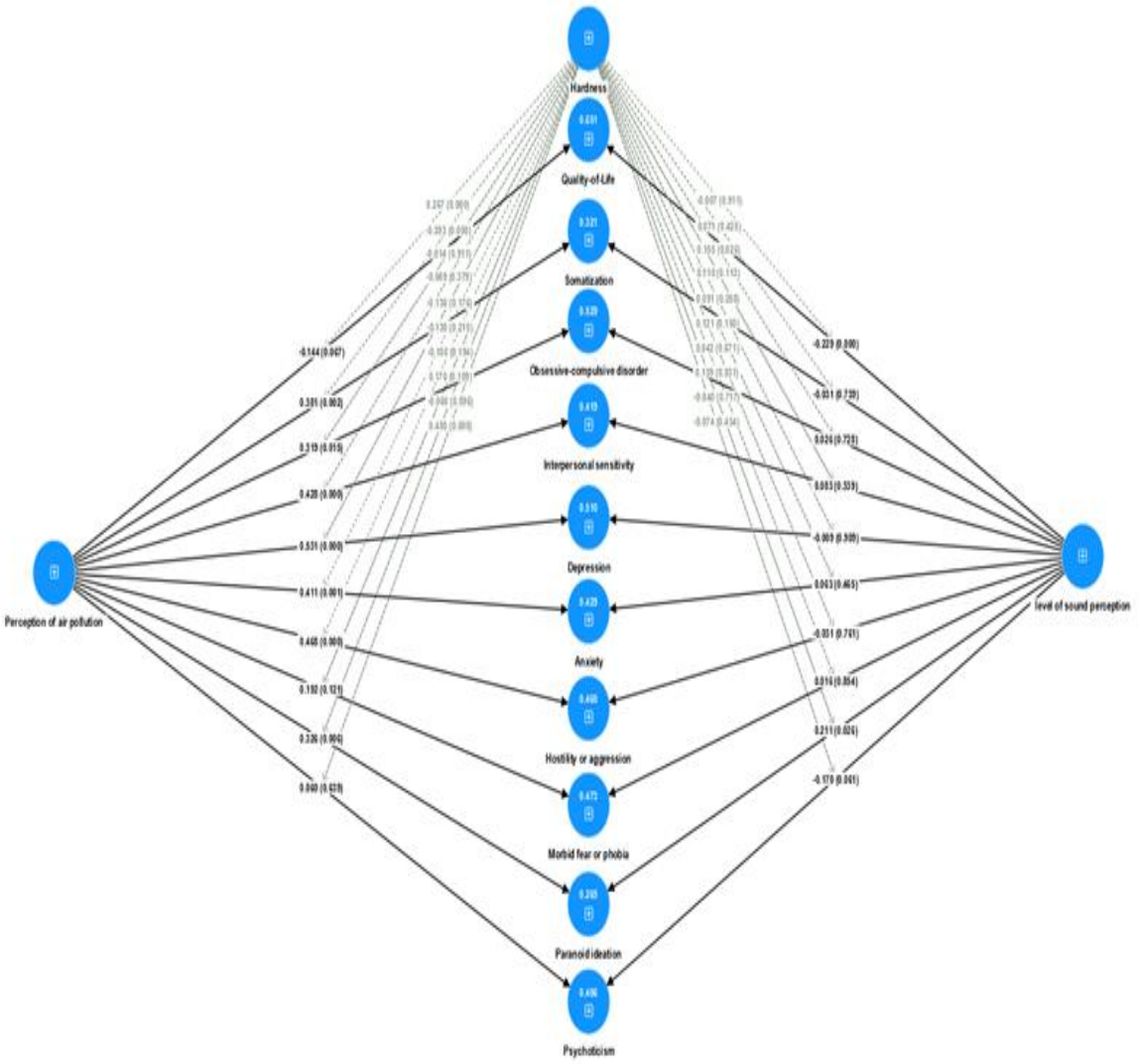
Hardiness x Perception of Air Pollution -> Quality-of-Life	0.267	0.076	p<0.001	3.515	confirmation
Hardiness x Perception of Air Pollution -> Somatization	-0.393	0.107	0.059	3.674	rejection

Figure 1

Path Coefficients Between Variables and Significance Level



Based on the findings presented in Table 4 and Figure 1, it was observed that the Hardiness factor negatively and significantly impacted phobic anxiety (β=-0.599, p<0.001) as well as Obsessive-compulsive disorder (β=-0.471, P=0.002) and Psychoticism (β=-0.784, p<0.001), while having a positive effect on Quality-of-Life (β=0.394, p<0.001). Similarly, the Perception of air pollution variable had a positive and significant influence on Anxiety (β=0.411, p=0.001), Depression (β=0.531, p<0.001), Hostility or aggression (β=0.468, p<0.001), Interpersonal sensitivity (β=0.428, p<0.001), obsessive-compulsive disorder (β=0.319, p=0.015), paranoid ideation (β=0.326, p=0.006), and somatization (β=0.381, p=0.002), but did not significantly impact Quality-of-Life (β=-0.144, p=0.067).Additionally, the level of Noise perception variable had a positive and significant effect on Paranoid ideation (β=0.211, p=0.026) while negatively impacting Quality-of-Life (β=-0.229, p<0.001). Moreover, the interaction between Hardiness and level of Noise perception influenced phobic anxiety (β=0.139, P=0.031) as well as Obsessive-compulsive disorder (β=0.155, P=0.026). It was also observed that the interaction between Hardiness and Perception of air pollution influenced Obsessive-compulsive disorder (β=0.485, p<0.001) and Quality-of-Life (β=0.267,

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p<0.001). Subsequently, the researcher examined how the predictive abilities of the level of Noise perception and Perception of air pollution varied at different levels of the Hardiness variable on the dependent measure.

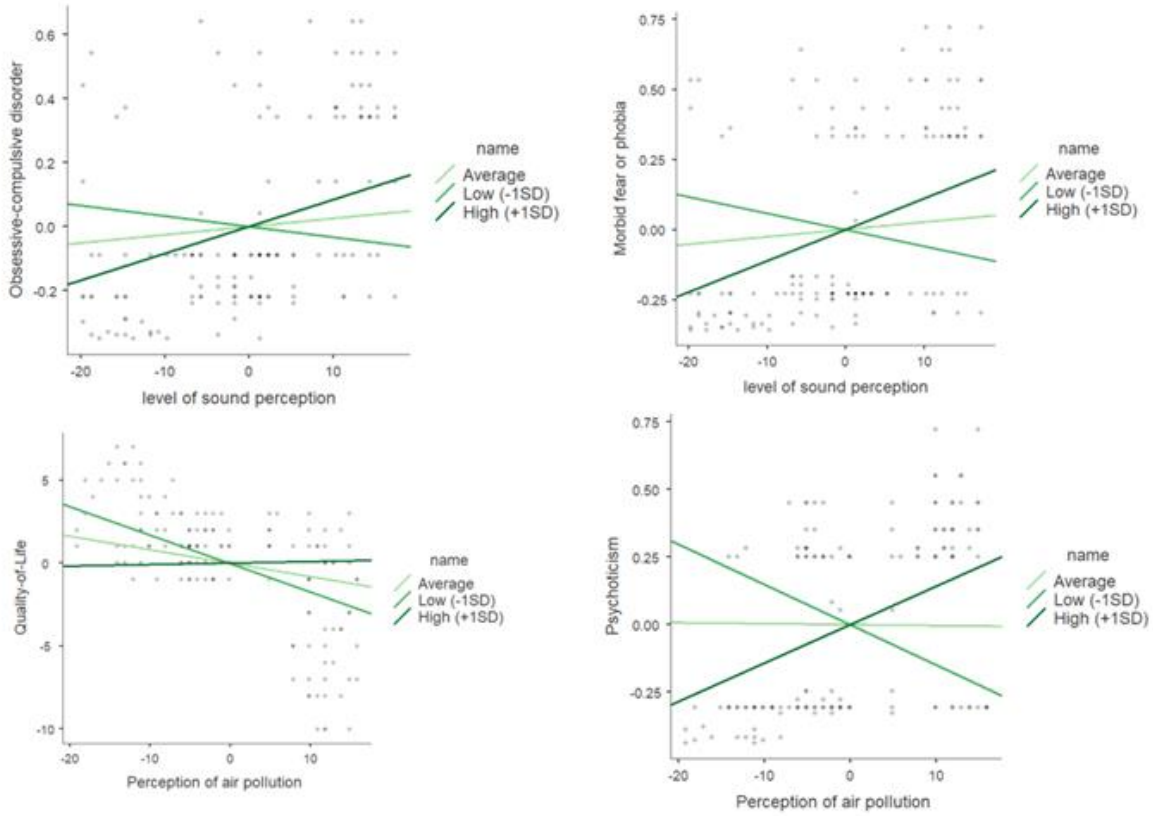
Table 5

Simple Slope Estimates

		Estimate	SE	Z	p
Hardiness x Level of Noise Perception -> Phobic Anxiety	Mean	0.00263	0.00216	1.22	0.222
	Low (-1SD)	-0.00586	0.00260	-2.26	0.024
	High (+1SD)	0.01112	0.00335	3.33	< .001
Hardiness x Level of Noise Perception -> Obsessive-Compulsive Disorder	Mean	0.00256	0.00168	1.52	0.129
	Low (-1SD)	-0.00330	0.00203	-1.63	0.104
	High (+1SD)	0.00841	0.00263	3.20	0.001
Hardiness x Perception of Air Pollution -> Psychoticism	Mean	-3.43e−4	0.00253	-0.136	0.892
	Low (-1SD)	-0.0149	0.00340	-4.386	< .001
	High (+1SD)	0.0142	0.00409	3.477	< .001
Hardiness x Perception of Air Pollution -> Quality-of-Life	Mean	-0.08106	0.0201	-4.033	< .001
	Low (-1SD)	-0.17137	0.0273	-6.287	< .001
	High (+1SD)	0.00925	0.0332	0.278	0.781

Figure 2

Simple Slope Estimates



Based on Table 5, it is evident that the coefficients for the modulating variable are relatively low. The R-squared values for Anxiety, Depression, Hostility or aggression, Interpersonal sensitivity, Phobic anxiety, Obsessive-compulsive disorder, Paranoid ideation, Psychoticism, Quality-of-Life, and Somatization are 0.429, 0.510, 0.460, 0.419, 0.473, 0.529, 0.265, 0.406, 0.651, and 0.321,

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respectively. The researcher assessed the reliability and validity of the variables in Table 6.

Table 6

Reliability and Validity of the Model

Variables	Cronbach's Alpha	Composite Reliability	AVE
Level of Noise Perception	0.831	0.899	0.74
Perception of Air Pollution	0.761	0.827	0.78
Quality-of-Life	0.893	0.913	0.60
Somatization	0.774	0.847	0.69
Obsessive-Compulsive Disorder	0.807	0.862	0.54
Interpersonal Sensitivity	0.782	0.847	0.75
Depression	0.749	0.833	0.88
Anxiety	0.631	0.802	0.51
Hostility or Aggression	0.701	0.732	0.51
Phobic Anxiety	0.755	0.844	0.57
Paranoid Ideation	0.735	0.834	0.55
Psychoticism	0.645	0.788	0.78
Hardiness	0.695	0.760	0.77

According to Table 6, the model's reliability and validity have been verified. The Cronbach's alpha reliability coefficient for the variables exceeds 0.7. The composite reliability of these variables also surpasses 0.7. Additionally, the model's validity was assessed using the AVE index, greater than 0.5 for the research variables, confirming the model's validity. The researcher also evaluated the model's fit, with all fit indices meeting the criteria. The SRMR, or Standardized Root Mean Square Residual Index, measures the difference between observed and structural model correlation matrices. A value below 0.8 indicates a good model fit, with the SRMR value for this model calculated at 0.206.

4. Discussion and Conclusion

The primary objective of this study was to examine how the perception of air pollution, level of Noise perception, and psychological Hardiness play a role in the quality of life and mental health of residents living near industrial areas in Tehran. The findings of this research indicate that psychological Hardiness led to a decrease in phobic anxiety, obsessive-compulsive disorder, and psychosis while improving overall quality of life. Moreover, psychological Hardiness was found to moderate the relationship between noise perception and phobic anxiety as well as OCD, and between air pollution perception and OCD and quality of life. Additionally, air pollution perception was associated with increased levels of anxiety, depression, hostility, interpersonal sensitivity, OCD, paranoid ideation, and somatization. Furthermore, higher levels of Noise perception were connected to an increase in paranoid ideation and a decrease in quality of life.

The current study's results suggest that Hardiness can decrease certain mental disorders and improve quality of life, serving as a significant moderator, which is in line with previous research (Javer et al., 2022; Sadeghi & Einaky, 2020). Previous research has also found that individuals with higher levels of Hardiness exhibit better mental health (Sadeghi & Einaky, 2020). Additionally, another study connected psychological Hardiness to a higher quality of life (Javer et al., 2022). "Nevertheless, a study conducted by Haj Hashemi et al. (2021) revealed that there is no significant correlation between psychological Hardiness and quality of life (Haj Hashemi et al., 2021)."

The discrepancy between this finding and the previous study can be attributed to the fact that the participants in Haj Hashemi et al.'s (2021) study were cancer patients with severe physical and mental health disorders, whereas the current study's participants were healthy individuals or the general population facing various life challenges but without any specific illness. As a result, Hardiness may have had a more significant impact on the quality of life in this population. Additionally, the present study revealed more intricate relationships between Hardiness and other factors (such as air pollution or perception of noise) that were not explored in Haj Hashemi'slink research. Overall, considering demographic variations, health conditions, research methodologies, and cultural aspects may help elucidate the differences between these two studies and emphasize that the effects of Hardiness on quality of life

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could vary depending on individual and demographic circumstances (Haj Hashemi et al., 2021).

The acquired results suggest that individuals with high psychological Hardiness possess better skills in managing and controlling stressful situations, leading to a decrease in irrational fears. Their rational outlook on fears helps them reduce extreme reactions, enabling them to control compulsive thoughts and behaviors. By enhancing focus and reducing flexibility in obsessive behaviors, as well as lowering sensitivity to stress and increasing tolerance to mental pressures, individuals with high psychological Hardiness can prevent mental disorders and improve their overall quality of life by boosting positivity and self-confidence when facing difficulties (Tahmasbi, 2020). Furthermore, psychological Hardiness can act as a mitigating factor against the detrimental impact of environmental factors, such as noise and air pollution, on mental health. Comprised of components like control, commitment, and challenge, psychological Hardiness makes individuals more resilient to stressors. Consequently, individuals with high psychological Hardiness are better equipped to handle environmental stressors like excessive noise, which can exacerbate anxiety and irrational fears, with more ease. Their ability to control emotional reactions helps them reduce phobic anxiety and obsessive-compulsive behaviors. Moreover, their capacity to confront stress and adverse situations enables them to mitigate the negative effects of pollution on their quality of life (Turkington et al., 2023).

The current study also discovered that individuals who perceive air pollution as a problem are more likely to experience mental health issues, and increased sensitivity to Noise can lead to paranoid ideations and a decreased quality of life. These findings align with previous research (Gu et al., 2020; Münzel et al., 2021; Stobbe et al., 2022; Trushna et al., 2021; Velayatzadeh, 2020). Stobbe et al. (2022) found that listening to birdsong can help reduce anxiety regardless of the type of bird, while exposure to traffic noise is associated with higher levels of depression. The positive impact of birdsong on decreasing feelings of paranoia has been demonstrated (Stobbe et al., 2022). Studies have indicated that low air quality can have various adverse impacts on human health, including harm to the respiratory and cardiovascular systems, as well as increasing mortality rates (Velayatzadeh, 2020). Additionally, noise has been connected to cardiovascular diseases such as hypertension, coronary artery disease, heart failure, and arrhythmia, as well as increased stress hormone levels, blood pressure, endothelial dysfunction, and oxidative stress (Münzel et al., 2021). Gu et al. (2020) revealed in their study that air pollution significantly increases the risk of mental disorders, and higher levels of PM2.5 in the air can exacerbate feelings of nervousness, depression, helplessness, and restlessness (Gu et al., 2020). Another study demonstrated that pollution, including ambient air pollution, is a critical risk factor for mental health issues, contributing to increased stress and anxiety disorders (Trushna et al., 2021).

This finding can be explained by stating that air pollution, as a stressful and concerning factor, can greatly impact mental health. Being constantly exposed to polluted air can result in heightened feelings of anxiety and depression, as individuals may feel helpless and lack control over their environment due to environmental threats. The anxiety and pressure stemming from contamination can also contribute to the development or escalation of hostility and aggression, as individuals may experience anger and frustration (Dores et al., 2021; Raimi et al., 2021). Moreover, ongoing exposure to contaminated conditions can influence the onset or worsening of obsessive-compulsive disorder, with affected individuals experiencing obsessive thoughts regarding cleanliness and safety, as well as exhibiting physical symptoms of mental stress and chronic anxiety such as headaches, body aches, or digestive issues. Consequently, the perception of air pollution negatively impacts mental health in various ways, causing individuals to feel discomfort not only mentally but also physically (Zundel et al., 2022).

The perception of noise, particularly in industrial or crowded settings, can induce stress and disrupt mental health. Continuously receiving disruptive Noises can keep an individual's nervous system on high alert, reinforcing feelings of insecurity and perceived threats. These emotions might manifest as paranoid ideations, leading individuals to believe they are being monitored or are in danger. "These emotional conditions not only negatively impact one's quality of life and mental health, but also have detrimental effects on feelings of contentment, safety, and overall joy (Beutel et al., 2020)." Additionally, persistent noise pollution can hinder rest and rejuvenation of the mind and body, with prolonged exposure to abnormal Noises increasing oxidative stress in the body. Over time, this can be correlated to physical and mental health issues, resulting in a diminished quality of life due to increased sleep disturbances, decreased concentration, and heightened irritability (Farooqi et al., 2020).

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The current study had some limitations. One of these was the difficulty in obtaining diverse samples from various regions, leading to potential geographical biases in the results. One solution to this problem is to collect samples from a range of regions representing different industries. The attitudes of respondents towards industries could also impact the findings. To mitigate this, participants should undergo training on bias prevention before the research commences. Additionally, seasonal changes might influence pollution levels and quality of life, so data collection in different seasons is advised. Furthermore, limitations such as the lack of control over non-industrial noise and factors like job stress and economic conditions affecting mental health should be considered separately in future studies and controlled for.

"Furthermore, given that the study was carried out specifically in Tehran, the findings may not apply to all urban areas or countries, indicating the need for similar research in varied settings for comparative analysis. A notable limitation of the study was the lack of public engagement and residents' hesitance to participate, underscoring the importance of raising awareness and incentivizing increased involvement. Other constraints included the potential for inaccuracies in self-reported data and inadequacies in assessing the impact of pollution, suggesting the adoption of objective metrics like physical measurements. Additionally, individuals' varying sensitivities to pollution imply the importance of categorizing participants based on their susceptibility in future studies. Furthermore, it is advisable to conduct further investigations on the enduring repercussions of pollution on both mental and physical health.

The findings of this study indicated that air and noise pollution can contribute to an uptick in mental health disorders and a decline in overall quality of life; however, having psychological Hardiness can help mitigate these adverse impacts. These results have practical implications for individuals living in industrial areas, those working in heavily polluted environments, and public health professionals. It is suggested that educational programs and counseling services in industrial areas help residents improve their coping strategies and psychological Hardiness to deal with these challenges. Moreover, the enforcement of stringent regulations aimed at reducing air and noise pollution, such as the use of air filtration systems, traffic management, and the establishment of green areas, may prove to be successful in lowering pollution levels and ultimately enhancing mental health. Additionally, offering counseling assistance and group therapy for individuals exposed to air and noise pollution may aid in alleviating feelings of anxiety and depression.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the study and participated in the research with informed consent.

References

Abdi, S., Tajaddini, A., & Sabzi, Z. (2022). Management of reducing environmental pollutants effect of industrial states on the life quality of neighbor cities occupants (Case study: Kowsar industrial state and Karaj city). *Civil and Project*, *4*(10), 31-50. https://www.cpjournals.com/article_166574.html?lang=en

Beutel, M. E., Brähler, E., Ernst, M., Klein, E., Reiner, I., Wiltink, J., Michal, M., Wild, P. S., Schulz, A., Münzel, T., & Hahad, O. (2020). Noise annoyance predicts symptoms of depression, anxiety and sleep disturbance 5 years later. Findings from the Gutenberg Health Study. *European journal of public health*, *30*(3), 487-492. https://doi.org/10.1093/eurpub/ckaa015

Derogatis, L. R. (1994). *Symptom Checklist-90-R*. National Computer Systems, Inc.

E-ISSN: 2980-9681

https://onlinelibrary.wiley.com/doi/10.1002/9780470479216.corpsy0970

Dettori, M., Pittaluga, P., Busonera, G., Gugliotta, C., Azara, A., Piana, A., Arghittu, A., & Castiglia, P. (2020). Environmental risks perception among citizens living near industrial plants: a cross-sectional study. *International journal of environmental research and public health*, *17*(13), 4870. https://doi.org/10.3390/ijerph17134870

Dores, A. K., Fick, G. H., MacMaster, F. P., Williams, J. V., Bulloch, A. G., & Patten, S. B. (2021). Outdoor air pollution and depression in Canada: a population-based cross-sectional study from 2011 to 2016. *International journal of environmental research and public health*, *18*(5), 2450. https://doi.org/10.3390/ijerph18052450

Eslami, N., Lal Alizadeh, F., Mohammadzadeh, S., & Nazari, M. S. (2023). Evaluation of mental health of dental students in Mashhad School of Dentistry by SCL-90 questionnaire, 2020-2021. *Journal of Mashhad Dental School*, *47*(4), 352-370. https://onlinelibrary.wiley.com/doi/10.1002/9780470479216.corpsy0970

Farooqi, Z. U., Sabir, M., Latif, J., Aslam, Z., Ahmad, H. R., Ahmad, I., Imran, M., & Ilić, P. (2020). Assessment of noise pollution and its effects on human health in industrial hub of Pakistan. *Environmental Science and Pollution Research*, *27*, 2819-2828. https://doi.org/10.1007/s11356-019-07105-7

Gu, H., Yan, W., Elahi, E., & Cao, Y. (2020). Air pollution risks human mental health: an implication of two-stages least squares estimation of interaction effects. *Environmental Science and Pollution Research*, *27*, 2036-2043. https://doi.org/10.1007/s11356-019-06612-x

Hadad, S., Moheb, N., Abdi, R., & Chalbianloo, G. (2022). The Relation between Resilience, Abnormal Personality Traits and Anger: Testing the Mediating Role of Air Pollution Perception. *Journal of Police Medicine*, *11*(1), 1-4. http://jpmed.ir/article-1-1045-en.html

Haj Hashemi, F., Atashzadeh-Shoorideh, F., Oujian, P., Mofid, B., & Bazargan, M. (2021). Relationship between perceived social support and psychological hardiness with family communication patterns and quality of life of oncology patients. *Nursing Open*, *8*(4), 1704-1711. https://doi.org/10.1002/nop2.808

Javer, M., Rafiepoor, A., & Sabet, M. (2022). The Mediating Role of Perceived Stress in the Relationship Between Psychological Hardiness and Quality of Life in Cardiovascular Patients. *Hormozgan Medical Journal*, *26*(1), 1-6. https://doi.org/10.34172/hmj.2022.01

Johnston, J., & Cushing, L. (2020). Chemical exposures, health, and environmental justice in communities living on the fenceline of industry. *Current Environmental Health Reports*, *7*, 48-57. https://doi.org/10.1007/s40572-020-00263-8

Khooshemehri, G., Kaviani, M., Asmari, M., Rajabian, H., & Naserkhaki, V. (2013). Comparison of quality of life for elderly men and women elderly nursing home resident by Alborz province in 1390. *Alborz University Medical Journal*, *2*(1), 19-24. https://doi.org/10.18869/acadpub.aums.2.1.19

Kobasa, S. C., Maddi, S. R., & Kahn, S. (1982). Hardiness and health: a prospective study. *Journal of personality and social psychology*, *42*(1), 168-177. https://psycnet.apa.org/record/1982-23579-001

Li, H., Zhang, S., Qian, Z. M., Xie, X. H., Luo, Y., Han, R., Hou, J., Wang, C., McMillin, S. E., Wu, S., & Tian, F. (2020). Short-term effects of air pollution on cause-specific mental disorders in three subtropical Chinese cities. *Environmental research*, *191*, 110214. https://doi.org/10.1016/j.envres.2020.110214

Mansouri, S., Karimi Sanai, P., Rahmannezhad, A., & Sadeghpour, S. (2018). The comparison of lifestyle and hardiness in divorced women in Iran (Tabriz) with Iranian women living in Finland (Helsinki). *Shenakht Journal of Psychology and Psychiatry*, *5*(1), 65-76. https://doi.org/10.29252/shenakht.5.1.65

Marquès, M., Domingo, J. L., Nadal, M., & Schuhmacher, M. (2020). Health risks for the population living near petrochemical industrial complexes. 2. Adverse health outcomes other than cancer. *Science of The Total Environment*, *730*, 139122. https://doi.org/10.1016/j.scitotenv.2020.139122

Mosavian, E., & Nejati, S. F. (2016). The investigation of facial affect recognition in people with psychological symptoms based on SCL-90-R scale. *Social Cognition*, *5*(1), 113-129. https://sc.journals.pnu.ac.ir/article_2931.html?lang=en

Muhammed, Z., & Abubakar, I. R. (2022). Improving the quality of life of urban communities in developing countries. In *Responsible Consumption and Production* (pp. 357-370). https://doi.org/10.1007/978-3-319-95726-5_25

Münzel, T., Sørensen, M., & Daiber, A. (2021). Transportation noise pollution and cardiovascular disease. *Nature Reviews Cardiology*, *18*(9), 619-636. https://doi.org/10.1038/s41569-021-00532-5

Nejat, S. A., Montazeri, A., Holakouie Naieni, K., Mohammad, K. A., & Majdzadeh, S. R. (2006). The World Health Organization quality of Life (WHOQOL-BREF) questionnaire: Translation and validation study of the Iranian version. *Journal of School of Public Health and Institute of Public Health Research*, *4*(4), 1-12. https://sjsph.tums.ac.ir/article-1-187-en.html

Raimi, M. O., Samson, T. K., Ajayi, B. S., Adio, Z., Emmanuel, O. O., & Ogunleye, T. J. (2021). Air of Uncertainty from pollution profiteers: Status of ambient air quality of sawmill industry in Ilorin Metropolis, Kwara State, Nigeria. *Research*. https://doi.org/10.21203/rs.3.rs-270757/v1

Sadeghi, A., & Einaky, S. (2020). Relationship between psychological hardiness and resilience with mental health in athlete students in the Guilan Unit of University of Applied Science and Technology. *Sociology Mind*, *11*(1), 10-24. https://doi.org/10.4236/sm.2021.111002

Shakerinia, I. (2011). Relationship examination of noise perception, Psychological Hardiness and Mental Health with Psychological Hardiness and Mental Health with the Quality of life in Inhabitants of Rasht bustle Area. *Iranian Journal of Health and Environment*, *3*(4), 475-484. http://ijhe.tums.ac.ir/article-1-104-fa.html

Stobbe, E., Sundermann, J., Ascone, L., & Kühn, S. (2022). Birdsongs alleviate anxiety and paranoia in healthy participants. *Scientific reports*, *12*(1), 16414. https://doi.org/10.1038/s41598-022-20841-0

Tahmasbi, A. (2020). The relationship between job burnout and mental health: moderating role of psychological hardiness and organization-based self-esteem. *Journal of Industrial and Organizational Psychology Studies*, *7*(1), 91-108. https://jiops.scu.ac.ir/article_16201.html?lang=en

Tortorella, A., Menculini, G., Moretti, P., Attademo, L., Balducci, P. M., Bernardini, F., Cirimbilli, F., Chieppa, A. G., Ghiandai, N., & Erfurth, A. (2022). New determinants of mental health: the role of noise pollution. *International review of psychiatry*, *34*(7-8), 783-796. https://doi.org/10.1080/09540261.2022.2095200

Trushna, T., Dhiman, V., Raj, D., & Tiwari, R. R. (2021). Effects of ambient air pollution on psychological stress and anxiety disorder: a systematic review and meta-analysis of

E-ISSN: 2980-9681

epidemiological evidence. *Reviews on Environmental Health*, *36*(4), 501-521. https://doi.org/10.1515/reveh-2020-0125

Turkington, G. D., Tinlin-Dixon, R., & St Clair-Thompson, H. (2023). A mixed-method exploration of mental toughness, perceived stress and quality of life in mental health workers. *Journal of Psychiatric and Mental Health Nursing*, *30*(6), 1152-1169. https://doi.org/10.1111/jpm.12948

Velayatzadeh, M. (2020). Air pollution sources in Ahvaz city from Iran. *Journal of Air Pollution and Health*, *5*(2), 147-152. https://doi.org/10.18502/japh.v5i2.4243

Whoqol Group. (1998). Development of the World Health Organization WHOQOL-BREF quality of life assessment. *Psychological medicine*, *28*(3), 551-558. https://doi.org/10.1017/S0033291798006667

Yazdanparast, T., Salehpour, S., & Masjedi, M. R. (2014). Air pollution: the cognition and knowledge of school students in Tehran. *Nafas*, *1*(1), 33-43. https://acta.tums.ac.ir/index.php/acta/article/view/4406#home

Zundel, C. G., Ryan, P., Brokamp, C., Heeter, A., Huang, Y., Strawn, J. R., & Marusak, H. A. (2022). Air pollution, depressive and anxiety disorders, and brain effects: a systematic review. *Neurotoxicology*, *93*, 272-300. https://doi.org/10.1016/j.neuro.2022.10.011

E-ISSN: 2980-9681