

ORIGINAL ARTICLE

Psychological Impact of Air Pollution on Undergraduate Students of Lahore Pakistan

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*Department of Psychology, Forman Christian College (A Chartered University), Lahore -Pakistan**Correspondence to Dr. Saima Majeed, Email: saimamajeed@fccollege.edu.pk Tel:+92-317-4633096.***ABSTRACT****Background:** Air pollution has become one of the most prevalent health issues in the entire world. Smog is defined as the fog that is intensified or contaminated by smoke. Psychological distress is the emotional or mental discomfort that can lead to anxiety, stress, and other mental problems.**Aim:** To evaluate the relationship between psychological distress and air pollution in undergraduate students of Lahore.**Study design:** Cross Sectional study.**Methodology:** The sample size (n=194) was calculated with G power analysis. A web-based survey was conducted, and the data was collected from 200 students in the age range of 18 to 25 ($M=21.39$, $SD=1.23$) from both public and private universities. Data was evaluated by using SPSS version 24. Pearson's correlation was applied.**Results:** Results indicated that air pollution and psychological distress are positively correlated $r=.981$, $N=200$, $p < .01$. Air pollution is associated with psychological distress.**Conclusion:** It was concluded that air pollution perception is positively correlated to Perceived psychological distress. Thus better their perception regarding air pollution the more they are having psychological distress.**Keywords:** Air Pollution, Psychological Impact, Psychological Distress and Undergraduate Students.**INTRODUCTION**

Air pollution is harmful toxins present in the air triggered by physical and chemical constituents which change the natural properties of our surroundings. Air pollution i.e., smog turns out to be the major issue in the whole world disturbing our atmosphere and well-being and is getting adverse globally day by day. It is caused by the burning of waste, traffic, and industries. We have tried to evaluate how air pollution affects students globally and its impact on their physical and mental health. Evidence showed that in 2013, air pollution caused chronic health problems which were quite challenging for the citizens living in China, and according to health clinicians, this pollution caused diseases like asthma, lung cancer, myocardial infection, and respiratory tract infection which can affect cardiovascular and respiratory systems¹. Evidence from surveys showed that there is a strong relationship between air pollution triggering mental disorders, and the increased number of contaminants in the atmosphere^{2,3}.

According to literature review "smog" is fog intensified by smoke. In one study, researchers investigated how smog impacted high school students behaviorally and psychologically. According to the world health organization, it was reported that 3.7 million premature deaths happened due to smog in 2012 around the globe⁴.

Air pollution not only affects us mentally or physically but also impacts the functioning of human beings. The main objective of this paper is to see how smog affects students' activities and academic performance and how students react to smog emotionally, psychologically, and socially in their day-to-day life. One study has shown that there was a strong connection between smog and how it affects students' behaviour causing mood swings, mental distress, and poor performance level in their academics and when interacting with other students. Therefore, it is concluded that smog not only affects physical health but also affects the mental health of students resulting in poor academic performance and distress⁴.

Literature review showed that air pollution was causing chronic health problems which are quite challenging for the citizens living in China. Evidence from human studies showed that pollution in the air triggers violent behaviour and anxiety⁶. The principal goal of this study was to find out how there are two types of coping that benefit individuals during environmental stressors such as air pollution. According to researchers, people dealing with forward

focusing easily adjust regardless of their emotional suffering because they are occupied with daily life accomplishments⁷. Another study has shown that people dealing with forwarding focus are more adjusted psychologically while people dealing with trauma focus are more traumatized. So, it is concluded that people that keep themselves busy in activities and use forward focusing as their coping mechanism are in lower distress and perceive stress as controllable⁸.

Another research was carried in Pakistan on how air pollution is not only affecting the physical but mental health and social behaviour of an individual. According to studies, automobiles emit gasses like carbon and lead cause air pollution in major cities like Islamabad, Lahore, Faisalabad, and Karachi.⁸ Many reports confirmed that air pollution is fatal too, causing 153 billion fatalities internationally of which Pakistan registered 11 billion early fatalities.⁹ The main aim of this analysis was to show how air pollution in different areas of Pakistan is causing psychological and developmental problems. They surveyed 4100 students from different universities in Pakistan. The reports showed that air pollution does have a major effect on mental, and physical health, and behaviour. It is concluded that air pollution affects physical well-being (asthma, problems related to ENT, insomnia), psychological well-being (depression and anxiety), and behaviour factors.

According to the World health organization, it has been estimated that 9 out of 10 individuals inhale air pollution which causes seven million deaths per year in the whole world. Dangerous pollutants in the air can be the reason for several neurodegenerative disorders which cause harmful effects on psychological well-being. Some studies showed that some matter in pollutants can trigger stress and inflammation-causing depression¹⁰. In conclusion, there are some very dangerous pollutants in the air that cause mental health problems in individuals and to control air pollution we need to develop green spaces and plantations of forests in the cities. The results of many studies showed that those students who were exposed to the air pollutants had a higher level of stress hormones in their blood and hence the findings demonstrated that higher levels of stress hormones can also increase the risk of high blood pressure and cardiovascular diseases^{11,12}.

Based on previous studies and present conditions that could be seen in every educational institution or house, objective was to evaluate the relationship between psychological distress and air pollution in undergraduate students of Lahore. Present study raised the idea of examining the connection between air-pollutants and mental well-being. Present study results helped us to

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understand that air pollution harms the mental health of students and how it causes emotional discomfort and mood swings among them.

METHODOLOGY

A co-relational study with a cross-sectional research design was used to find the relationship between air pollution and mental well-being. The targeted population were undergraduate students. Sample size (n=194) was calculated through G power analysis where the significance level was 0.05. Two questionnaires were used to measure psychological distress and air pollution perception. The two scales involved in this study were: The Kessler Psychological distress scale also known as the K (10) scale and The Air Pollution Perception survey. The Kessler Psychological Distress Scale K (10) scale is a scale available in the public domain. It was made by Kessler RC, in 2003. This research uses the K10 scale to measure psychological distress. This scale has 10 questions about emotional conditions and each question has a five-level response option. Low scores from 10-19 show low-stress levels whereas high scores from 30-50 show high-stress levels. The air pollution perception scale is a public domain scale. This scale is made by survey monkey, an online website to measure air pollution perception. This scale consists of three parts: the first part consists of 5 questions and has a five-level response option. The second part measures the effects of air pollution on the well-being of an individual and consists of only one question with 7 options and has seven response options: option 1 is to be considered the highest and option 7 is to be considered the lowest concern. While the last and 3rd part of this survey includes the personal information.

Since a purposive and convenient sampling technique was being used, a web-based survey link was generated, and it was forwarded to friends and peers who are students and currently enrolled in the undergraduate program and pasted on Facebook and Instagram. The participation was completely voluntary, based on the free will of the participants. All the ethical concerns were kept under consideration. No form of deception was used. The identity of the participants was not revealed no matter what. The confidentiality was maintained. The participants were not forced to take part in this research. They were also briefed about their rights. They also had the option to refuse to take part as well. An information sheet was also attached at the beginning of the questionnaires. Sampling was done by convenient sampling (non-probability sampling) technique.

Statistical analysis: Data was evaluated by using SPSS version 24. Pearson's Correlation analysis helped in finding out the magnitude of association between two variables. It also helped in determining the direction of the relationship between dependent and independent variables. Age was represented as mean ± SD while qualitative variables were represented as percentage and frequency.

RESULTS

The table-1 depicted that most of the research participants were female and were in their third and fourth semesters. The mean age of the participants was 21.39 years, and most were from Lahore.

Table-1: Baseline Parameters (n=194)

Characteristics	Categories	Study Sample
Age (years)	Mean ± SD	21.39 ± 1.23
Gender	Male	38 (35.5%)
	Female	68 (63.6%)
Academic year	Freshman year	05 (4.7%)
	Sophomore	56 (52.3%)
	Junior	14 (13.1%)
	Senior	32 (29.9%)
	Hostelites	24 (12.4%)
	Day Scholars	74 (38%)

Table-2 indicated the correlation between the perception of air pollution and Psychological Distress was an almost perfect correlation, with the value of r=.981, N=200, p < 0.01*. This showed that both variables are positively correlated i.e., the increase in one variable will increase the other and vice versa.

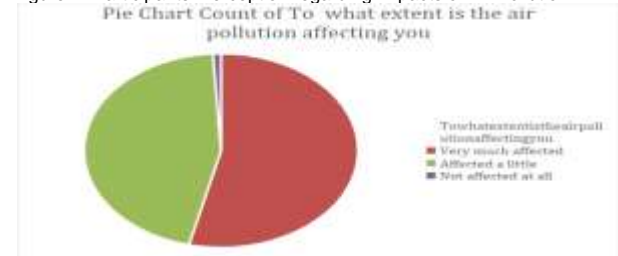
Table-2: Correlation between Air Pollution and Psychological Distress

Variables	Mean	SD	P-value
Psychological distress	32.88	9.15	0.01*
Air pollution Perception	22.85	6.98	

*Statistically significant.

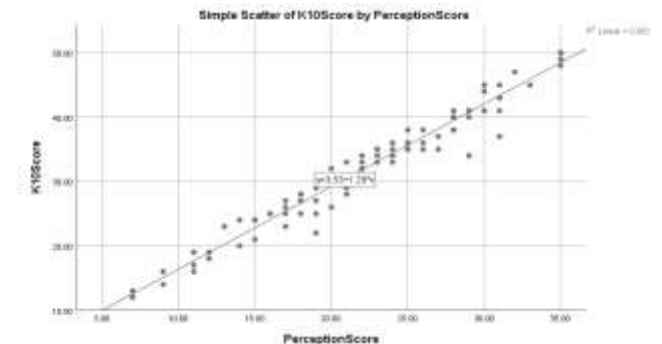
Perception of participants about air pollution on the mental health was demonstrated by figure-1 in pie-chart. Majority had the idea that it affects mental health badly.

Figure-1: Participants' Perception regarding Impacts of Air Pollution



The data were also analyzed for the overall air pollution perception effect on the average participants was evaluated, after the interpretation of the data, it was concluded that 53.8% of participants perceived a large effect of air pollution on their psychological health. Whereas 45.3% of the participants perceived a little effect on their health and only one participant didn't see any effect in the perceived health and showed it was an outlier. The Scatter Plot also showed a perfectly strong correlation between air pollution perception and psychological distress. The value of .98 shows that the variables were perfectly correlated.

Figure-2: Scatter Plot for the relationship between air pollution and psychological distress



DISCUSSION

According to the world health organization, it is to be reported that 3.7 million premature deaths happened due to smog in 2012 around the globe⁴. This research supported the deduced hypothesis that the Prevalence of air pollution and smog causes Psychological Distress among undergraduate University Students. The main aim of this paper was to assess how smog affects the psychological well-being of students that are currently enrolled in Forman Christian College, Lahore. Data were collected from 200 undergraduate students ranging from age 19-to 25 who were currently enrolled in public and private universities of Lahore through a purposive and convenient sampling method i.e., online

surveys. The results showed that both the variables of air pollution and psychological distress are correlated with each other and show signs of positive correlation i.e., the increase in one variable will increase the other variable and vice versa. The findings were consistent with another research conducted in 2018 which says that there is a strong connection between smog and how it affects students' behaviour causing mood swings, mental distress, and poor performance level in academics and when interacting with other students. However, it is concluded that smog not only affects physical health but also affects the mental health of students resulting in poor academic performance and distress¹³⁻¹⁵.

The ratio of males and females experiencing smog is significantly different as our findings showed that females experienced mental health issues more than male is consistent with the findings as those females who were living in smoggy and polluted areas reported more than one symptom of anxiety and the reason is that Air Pollution contains elements which have negative effects on our bodies¹⁴.

Two scales were used to find out the prevalence of psychological distress and air pollution among undergraduate students i.e. The Kessler Psychological distress scale also known as the K (10) scale and The Air Pollution Perception survey. According to the findings of the present research, it shows that 53.8% of participants perceived the large effect of air pollution on their psychological health, and these findings were consistent with the findings of other research conducted in 2008 showed that some matter in pollutants can trigger stress and inflammation-causing depression¹⁰.

Whereas 45.3 % of the participants perceived little effect on their health, and it has been shown in other research conducted in Germany that those who were less exposed to air pollutants had high self-esteem, life satisfaction, and higher stress resilience.¹⁴ In this research, only one participant didn't see any effect on the perceived health showed it was an outlier and this finding is not consistent with other research as air pollution does affect the health: the mental as well as the physical well-being of an individual, seen in research conducted in 2021 that air pollution does have a major effect on mental, physical health, and behavioural factors of students.¹ In general, the findings of this research are in line with other research and different cultures, done on air pollution and the prevalence of psychological distress. Contradictory findings were observed in this research which can be recognized as the differences in culture.

Limitations: Financial limitations followed by low man power for follow-ups. The research study used two different survey questionnaires so there are chances that any other extraneous variable can affect the result. For example, the psychological distress which was present due to air pollution can be related to any other problem like Socioeconomic Stress, Family issues, Academic Stress etc. Another Limitation of this research is that there was no previous data on psychological distress in normal conditions and therefore it cannot be compared whether the psychological distress has increased during the period of air pollution or not. To tackle these two limitations, data can be recorded one more time when air pollution is comparatively less prevalent so that stress levels in both conditions can be compared.

CONCLUSION

It was concluded that air pollution perception is positively correlated to Perceived psychological distress. The participants

who had the awareness of the negative effects of air pollution and perceived climate change as a threat scored high on psychological distress scale.

Author's contribution: SM&HW: Conceptualized the study, analyzed the data, and formulated the initial draft, **SA,ZUA&ES:** Conceptualized the study and contributed to the proof reading.

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