Chapter 3
The Relationship Between Air Pollution and Severity of Schizophrenia Symptoms

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ABSTRACT

The chapter uses previous research to demonstrate a connection between air pollution and the severity of psychiatric conditions such as psychosis, depression, bipolar disorder, mood disorders, drug addiction, and anxiety. This link may explain the higher occurrence of psychosis in urban areas. The chapter aims to explore this relationship by examining air pollution factors such as particulate matter (PM) 2.5, nitrogen oxides (NO), and PM 10. However, the exact nature and extent of the relationship between air pollution and symptom severity in patients with schizophrenia (SCZ) is still not well understood and requires further investigation.

INTRODUCTION

Air pollution arises from anthropogenic (human-made) and natural sources (Mudway, Kelly, & Holgate, 2020), and it differs due to the emission source. It fluctuates with time (Leni, Künzi, & Geiser, 2020). Exposure to air pollutants is an unavoidable reality. Common air pollutants encompass ozone, sulfur oxides (SO), carbon monoxide, and nitrogen oxides (NOX) (Yang & Omaye, 2009). One of the initial factual approximations regarding the mortality effects related to fine particles

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can be seen in the examination of records from London during the winter period of 1958-1959. In a previous analysis, a noteworthy association was discovered between the number of deaths occurring each day and the daily concentrations (averaged over 24 hours) of "British smoke" (Yang & Omaye, 2009).

Moreover, air pollution impacts the severity of health and mental problems such as schizophrenia (SCZ). The symptoms of SCZ can be classified into positive, negative, general, and cognitive domains (Kadir Uludag, 2024c). Gaining insight into the diverse nature of the illness can be beneficial.

Earlier investigations have established an association between the presence of air pollution and the intensity of symptoms associated with SCZ, including anxiety and psychosis (Wei et al., 2022). Furthermore, existing addiction to smoking can impact the severity of SCZ symptoms. At the same time, patients with SCZ frequently smoke (Kadir Uludag & Zhao, 2023), which may be related to the severity of air pollution. Hence, exploring the potential impact of air pollution on the increased severity of cognitive symptoms associated with SCZ is imperative. There is limited research available regarding the relationship between smoking and air pollution. Assessing the influence of both smoking and air pollution on mental and overall well-being is crucial.

A previous study found that reducing air pollution, such as NO2 and NOX, may lower SCZ risk (Antonsen et al., 2020). Likewise, brief exposure to particulate matter (PM) 10, sulfur dioxide (SO2), is linked to an increased likelihood of daily visits for SCZ (Liang et al., 2019). Moreover, another study revealed that the risk of hospital admissions for SCZ was elevated due to short-term exposure to air pollutants (Ji et al., 2022).

Similarly, another study established an association between the concentration of PM2.5 and the worsening of symptoms in individuals with SCZ (Eguchi et al., 2018), and elevated levels of PM2.5 pose a risk for the recurrence of SCZ (Gao et al., 2021).

Furthermore, air pollution can induce anatomical alterations, such as the advancement of hippocampal atrophy following an initial episode (Worthington et al., 2020). Oxidative and inflammatory theories may partially explain the symptomatic change in SCZ symptoms. Furthermore, combining these theories can help to understand symptomatic changes. Additionally, it can be beneficial to develop appropriate therapeutic measures to alleviate psychiatric symptoms following exposure to air pollution.

Hence, our objective was to explore the connection between the severity of symptoms associated with SCZ (e.g., cognitive symptoms) and air pollution levels. We employed inflammation and oxidative stress (OS) mechanisms as explanatory frameworks to elucidate this relationship. By utilizing these approaches, we sought to shed light on how SCZ symptoms may be influenced by varying levels of air