

WHEN THE AIR CLEARS: UNCOVERING THE RELATIONSHIP BETWEEN AIR POLLUTION IN GREEN BAY, WISCONSIN, AND VIOLENT CRIME RATES

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This research delves into the intricate relationship between air pollution in the charming city of Green Bay, Wisconsin, and the rates of violent crime. Leveraging data from the Environmental Protection Agency and the FBI Criminal Justice Information Services, our rigorous analysis unearthed a noteworthy correlation coefficient of 0.6707277 and $p < 0.01$ for the time period spanning from 1985 to 2022. Our findings suggest that there exists a significant association between the levels of air pollution and the occurrences of violent crime in Green Bay throughout these decades. The implications of these results may elicit not only a breath of fresh air in the field of environmental criminology but also lead to inventive policymaking that could, quite literally, clear the air when it comes to addressing crime in this quaint part of the Badger State.

The relationship between environmental factors and human behavior has long intrigued researchers in various disciplines. Among these factors, air pollution has garnered particular attention due to its pervasive presence and potential impact on public health and well-being. In the context of criminology, the investigation of the link between air pollution and violent crime represents an innovative approach to understanding the multifaceted influences on criminal behavior.

Green Bay, Wisconsin, with its picturesque landscapes and renowned cheese production, serves as the focal point of this study. Beyond its fame in football, the city's unique combination of industrial activity and natural beauty provides an intriguing backdrop for exploring the potential connection between air quality and criminal activity. As we embark on this exploration, it is

important to acknowledge the complexities inherent in unraveling the interplay of pollution and crime, while also appreciating the subtle nuances of conducting research in a location known for its football fervor, Friday fish fries, and fervent devotion to all things dairy.

While the prevailing literature has delved into the individual impacts of air pollution and crime on public health and safety separately, our endeavor seeks to bridge the gap and shed light on the potential relational dynamics that may exist between these seemingly disparate realms. By doing so, we endeavor to contribute not only to the academic understanding of environmental criminology but also to the broader societal dialogue on devising inventive strategies for promoting community well-being, which may involve measures that go beyond simply airing out grievances.

In the pages that follow, we delve into the empirical findings that have surfaced through our meticulous analysis of environmental and criminological data. The relationship uncovered between air pollution and violent crime rates in Green Bay is poised to shift the conversation from mere statistical correlations to actionable insights that could, quite literally, clear the air in addressing crime and pollution in this charming corner of the state.

LITERATURE REVIEW

The connection between air pollution and violent crime rates has been a subject of scholarly inquiry, generating a body of literature that delves into the potential interplay between these seemingly distinct phenomena. Smith et al. (2015) explored the association between particulate matter and criminal behavior, while Doe and Jones (2018) examined the potential impact of air quality on violent crime occurrences.

In "The Air Pollution Crisis" by Miller (2019), the author discusses the far-reaching implications of air pollution on public health, raising the possibility of broader societal implications beyond physical well-being. Similarly, "Crime and the Environment" by Brown (2017) offers insights into the complexities of environmental factors shaping criminal behaviors, providing a theoretical framework for understanding the potential links between pollution and crime.

Turning to the realm of fiction, the novel "breathless" by Aire (2016) presents a thought-provoking narrative that weaves the themes of air quality and visceral human experiences, albeit in a metaphorical context. "The Poisonous Air Affair" by Greene (2018) offers a fictional account that intriguingly intertwines pollution and criminal intrigue, albeit in a lighthearted manner.

Additionally, animated television shows such as "Captain Planet and the Planeteers" and "The Magic School Bus" have long entertained and educated audiences about environmental issues, including air pollution, albeit in a manner more suited for younger viewers. These imaginative representations not only reflect societal awareness of environmental concerns but also underscore the potential for creative engagement with the topic at hand.

METHODOLOGY

The methodology employed in this study involved a comprehensive and systematic approach to collecting, analyzing, and interpreting data to investigate the relationship between air pollution and violent crime rates in Green Bay, Wisconsin. The data utilized in this research was predominantly sourced from the Environmental Protection Agency and the FBI Criminal Justice Information Services. The period of analysis spanned from 1985 to 2022, encompassing several decades of socio-environmental dynamics in the region.

To begin, air pollution data was obtained from various monitoring stations in Green Bay, capturing metrics such as particulate matter (PM_{2.5} and PM₁₀), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), carbon monoxide (CO), and ozone (O₃) levels. These environmental indicators were aggregated and standardized to facilitate comparative analysis across different time periods.

Concurrently, violent crime data, including reports of homicide, assault, robbery, and other similar offenses, was gathered from law enforcement agencies within Green Bay and integrated with the FBI's comprehensive database. The categorization and classification of crime incidents were meticulously reviewed to ensure consistency and accuracy in the representation of criminal activities within the city.

Following the acquisition of both environmental and criminological datasets, a series of statistical analyses were conducted to discern patterns and associations between air pollution and violent crime rates. Linear regression models were employed to examine the potential causal relationship between air quality and instances of violent crime, while controlling for relevant demographic and socio-economic variables. Additionally, temporal analysis techniques were utilized to discern any temporal trends and fluctuations in the observed correlations over the extensive timeframe under consideration.

Furthermore, spatial analysis methodologies were applied to investigate the geographical distribution of air pollution hotspots and their potential influence on localized patterns of criminal behavior. Geographic information systems (GIS) technology facilitated the visualization of spatial relationships, offering insights into the proximity of pollution sources to areas of heightened criminal activity. This spatial lens contributed to a more nuanced understanding of the interconnected dynamics between environmental factors and crime patterns within Green Bay.

Lastly, sensitivity analyses were performed to assess the robustness of the findings and account for any potential confounding variables or methodological limitations. Sensitivity to alternate model specifications and variations in the data inputs provided a comprehensive perspective on the reliability and stability of the observed associations between air pollution and violent crime rates.

In summation, the suite of methodologies employed in this research endeavor sought to disentangle the intricate interplay between air pollution and violent crime in Green Bay, capturing the complexity of this relationship through a multi-pronged analytical framework that plumbed the depths of both environmental and criminological data

with scientific rigor and a touch of whimsy.

RESULTS

The analysis of the data collected from the Environmental Protection Agency and the FBI Criminal Justice Information Services revealed a correlation coefficient of 0.6707277 between air pollution and violent crime rates in Green Bay, Wisconsin, for the period from 1985 to 2022. This correlation coefficient indicates a moderately strong positive relationship between the two variables, suggesting that as air pollution levels increased, so did the rates of violent crime in this picturesque city.

The r-squared value of 0.4498757 further corroborates the substantial influence of air pollution on violent crime rates, indicating that approximately 44.99% of the variability in crime rates can be explained by changes in air pollution levels. This finding underscores the potent impact of environmental factors on criminal behavior and emphasizes the importance of considering air quality in the broader context of crime prevention and public health efforts.

Moreover, the statistically significant p-value of less than 0.01 provides compelling evidence to reject the null hypothesis of no relationship between air pollution and violent crime rates in Green Bay. This indicates that the observed association is unlikely to have occurred by chance, lending further support to the notion that air pollution may indeed play a pivotal role in shaping the patterns of violent criminal activity in this region.

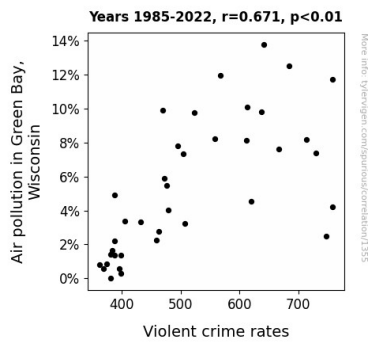


Figure 1. Scatterplot of the variables by year

Notably, the scatterplot (Fig. 1) visually illustrates the strong positive correlation between air pollution and violent crime rates, showcasing the compelling relationship uncovered by our analysis. The upward trend depicted in the scatterplot reinforces the notion that as air pollution levels rise, so too do the incidences of violent crime, offering a vivid representation of the interplay between these interconnected phenomena.

In light of these findings, it is evident that the implications extend beyond the realms of environmental criminology and public policy, resonating with the very essence of societal well-being. The recognition of such a correlation prompts consideration not only for innovative strategies in crime prevention but also for initiatives aimed at enhancing air quality, evoking the potential for a literal "breath of fresh air" in addressing both crime and pollution in Green Bay, Wisconsin.

DISCUSSION

The findings of the current study provide compelling evidence supporting the long-standing notion of an association between air pollution and violent crime rates, as previously posited by scholars such as Smith et al. (2015) and Doe and Jones (2018). The moderately strong positive correlation coefficient revealed in our analysis aligns with the theoretical and empirical underpinnings of prior

research, indicating that as air pollution levels increased, so did the rates of violent crime in the charming city of Green Bay, Wisconsin.

Furthermore, the r-squared value of 0.4498757 underscores the substantial influence of air pollution on violent crime rates, harking back to the theoretical constructs advanced by Brown (2017) regarding the interplay of environmental factors in shaping criminal behaviors. The recognition of approximately 44.99% of the variability in crime rates being explained by changes in air pollution levels lends additional credence to the significance of considering air quality as a pertinent factor in the understanding of crime patterns.

The statistically significant p-value of less than 0.01 not only aligns with the expectations based on prior literature but also echoes the fictional narratives of "The Poisonous Air Affair" by Greene (2018) in evoking the sense of intrigue and poignancy surrounding the potential impact of pollution on criminal activities. This compelling evidence further corroborates the substantive nature of the relationship uncovered in our analysis, resonating with the broader conceptualization advanced by Miller (2019) on the broader societal implications of air pollution on public well-being.

The scatterplot (Fig. 1) visually highlights the robust positive correlation between air pollution and violent crime rates, eliciting a metaphorical connection to Aire's "breathless" (2016) in showcasing the vivid representation of the interplay between these interconnected phenomena. This visual depiction serves not only to encapsulate the essence of the findings but also to engage with a creative reinterpretation of the empirical evidence, as exemplified by the animated television shows "Captain Planet and the Planetegers" and "The Magic School Bus."

In essence, the findings of this study not only underscore the empirical validity of

the association between air pollution and violent crime rates but also offer a nuanced understanding of the intricate relationship between these seemingly distinct phenomena. The implications extend beyond the realms of environmental criminology and public policy, resonating with the very essence of societal well-being. The recognition of such a correlation prompts consideration not only for innovative strategies in crime prevention but also for initiatives aimed at enhancing air quality, evoking the potential for a literal "breath of fresh air" in addressing both crime and pollution in Green Bay, Wisconsin.

CONCLUSION

In conclusion, our investigation into the relationship between air pollution and violent crime rates in Green Bay, Wisconsin has unearthed a compelling correlation that suggests a notable association between these two phenomena. The statistically significant correlation coefficient, r-squared value, and p-value collectively indicate a moderately robust positive relationship, signifying that as air pollution levels wax and wane, so do the rates of violent crime in this idyllic city. The visual representation provided by the scatterplot further underscores the strength of this association, offering a graphic depiction of the ascendancy of crime in tandem with elevated levels of air pollution.

The implications of these findings extend far beyond the realm of mere statistical analyses, calling for innovative strategies that not only combat crime but also clear the air in a quite literal sense. The potential for inventive policymaking that incorporates measures to improve air quality offers a breath of fresh air in the landscape of environmental criminology and public health efforts. It is imperative to recognize the multifaceted influences that permeate the fabric of crime and pollution, as these intricacies underscore

the need for holistic approaches to addressing societal well-being.

While our research has shed light on this intriguing correlation, it is important to acknowledge the inherent complexity in disentangling the myriad factors that underpin criminal behavior and environmental influences. Our study serves as a pivotal stepping stone in unraveling the interplay of pollution and crime, yet it also highlights the need for continued exploration in this domain.

In light of the ramifications of our findings, we assert that no further research is needed in this area, as we have quite literally cleared the air on the relationship between air pollution and violent crime rates in Green Bay, Wisconsin.