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ABSTRACT

GREY TO GREEN: THE IMPACT OF ENVIRONMENTAL POLICY ON US CRIME RATES

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Northern Illinois University, 2023
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This study explores the social implications of climate change and environmental degradation on deviant and criminal behavior. This study uses general strain theory to examine the effectiveness of city-level climate change mitigation actions in reducing crime rates. Through a systematic approach, this study reviews literature on environmental harms and community strain and explores the impact of local pro-environmental policies on crime reduction. Focusing on the United States, it analyzes UCR crime rate reports and UN-guided Sustainable Development Goal data at the US county level. The findings suggest that sustainable practices, especially those related to local infrastructure and community engagement, could prove useful in reducing criminal activity. Sustainable development practices focused on nature accessibility and localized climate action can alleviate strain and impact crime rates. However, further research is needed to understand the relationship between sustainable development and manifestations of strain. This study emphasizes the need for practical and locally grounded sustainability projects, recognizing the limitations of community-level efforts in addressing broader systemic issues.

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GREY TO GREEN: THE IMPACT OF ENVIRONMENTAL POLICY ON US CRIME RATES

BY

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Kristopher Robison

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DEDICATION

This thesis is dedicated to Karan. Tusim meri prerana ho.

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CHAPTER ONE

INTRODUCTION

In December of 2020, the global average temperature exceeded pre-industrial levels by 1.18 °C, and if the current 30-year trend of surface warming continues, it is projected to reach 1.5 °C by 2034 (Copernicus, 2021). The implications of such temperature rise are alarming, as the IPCC reports with a relatively high level of confidence that surpassing the 1.5 °C threshold will lead to extreme and, in some cases, irreversible environmental changes (Allen et al., 2018). Consequently, climate change mitigation, adaptation, and conservation strategies have become pervasive at all levels of society, making environmentally sustainable policies a focal point of global and local concerns. With an emphasis on the sustainability of new environmental frameworks, many national, regional, and local proposals have paid closer attention to the success of localized adaptations given their ability to complement the functions of regional socio-ecological systems in practical ways (Chung et al., 2018; Lindseth, 2004). Moreover, investment in such reform allows for the examination of the uniquely social implications of environmental degradation and climate change strategies. Understanding social behavior is crucial for researchers and policymakers in confirming the long-term sustainability and future directions of development, given the reciprocal relationship between anthropogenic activity and climate change.

In the field of green criminology, which focuses on the intersection of environmental issues, inequality, and criminal behavior, recognizing climate change as a social issue provides compelling incentive for exploring environmental regulations and their impact on crime dynamics. Despite its potential, green criminology has not fully explored the social implications of climate change, primarily due to limited theory (Snipes et al., 2019, pp. 309-310) and a scarcity of quantitative research (Lynch et al., 2017, p.186). Existing green crime theories predominantly focus on offenses committed by individuals, corporations, or governments against the environment, overlooking the exploration of how environmental changes influence incidences of deviant or criminal behavior (Thomson et al., 2019). Therefore, this comprehensive study seeks to bridge the existing gap in green criminology by investigating the influence of environmental change on deviant or criminal behavior. It takes an interdisciplinary approach by integrating environmental justice, climate change data, and green criminology to explore the intricate relationship between community strain, environmental change, and crime trends, with sustainable development as the unifying concept This research study aims to address its objectives by employing general strain theory (GST) as a theoretical framework to investigate two key questions. First, can city-level action aimed at climate change mitigation alleviate environmental strains associated with crime propensity? Second, what types of sustainable actions prove most effective at reducing crime rates? By addressing these questions, this research aims to advance knowledge in the field of green criminology and provide valuable insights for policymakers.

To accomplish these objectives and overcome the limitations of existing green criminology research, this study follows a systematic approach. First, it conducts a comprehensive review of Agnew's (2011) conception of general strain theory and its application to environmental issues. Second, it examines the literature on the role of environmental harms in generating social disorder and strain within communities, as well as the uniquely local impact of climate action policies. Third, the study develops theoretical frameworks that explore how pro-environmental policies at the local level may contribute to crime reduction through strain mitigation. Fourth, to test the relationship between different strategies for reducing environmental harm and crime rates, the study focuses on the United States, utilizing UCR annual crime rate reports and data from the UN-guided Sustainable Development Goal (SDG) reports. The relevant variables are described and categorized at the county level. Finally, the study tests hypotheses that connect environmental mitigation strategies to crime rates among US cities and discusses the findings. Through this rigorous research process, this study aims to contribute to the understanding of green criminology and provide evidence-based insights that can inform policy decisions and practical interventions.

CHAPTER TWO

LITERATURE REVIEW

General Strain Theory

Through the framework of general strain theory (GST), this study explores ways in which communities are influenced by the progression of climate change and the increasing pressure to adapt to more sustainable practices. Unlike more place-based theories, which emphasize disorder, or other strain theories that emphasize the pressures of economic competition (Snipes et al., 2019), Agnew offers a flexible and comprehensive alternative through general strain theory. Irrespective of the level of analysis, GST proposes that the experience of strain resulting from various social, structural, and environmental stressors can lead to negative attitudes and subsequently increase the propensity for deviant or criminal behavior (Sigfusdottir et al, 2012; Agnew, 1992). Agnew proposes that strain derives from "the actual or anticipated (1) failure to achieve valued aspirations, through the (2) loss of positive stimuli, or through (3) exposure to negatively valued stimuli" (Agnew, 1992 p.59). It is through these stressors that several emotive traits conducive to deviance will manifest. Such negative emotions include anger, distrust, and resentment towards the source of strain (Agnew, 1985). Likewise, when such strain is coupled with inadequate supports, it can evoke feelings of depression, despair, and fear, provoking individuals to seek out alternative and potentially destructive coping mechanisms (Patchen, 2010). Although tolerance to strain will vary, heightened exposure to intense, prolonged, or rapidly accumulating stressors will increase the probability of criminal behavior.

At the community level, heightened strain can undermine support for marginalized communities and create an environment conducive to crime as the informal or formal mechanisms of social control deteriorate (Agnew, 1999; Broidy, 2001; Leeper et al., 2010). Agnew's earlier research identified multiple forms of strain that lead to increased mobility, resource deprivation, and weakened social control (Agnew, 1999). These include the impact of economic and social stressors, which prompt community members to move within and between neighborhoods in search of more affordable or desirable living conditions (Bolan, 1997). And through perpetual selection and retention processes, disadvantaged communities are likely to experience an influx of individuals forced out of other neighborhoods due to social or resource constraints, while simultaneously losing individuals who have the financial means to leave these resource-deprived communities (Agnew, 1999, pp. 126-128). As essential resources such as stable jobs and healthcare diminish, stress becomes concentrated, pushing individuals towards illegitimate means of meeting their basic needs (Agnew, 1999, p. 128). Additionally, the absence of positive stimuli and increased exposure to harmful stimuli contribute to maladaptive behavior, resulting in group conflict, dissatisfaction, blame, stigmatization, and social disintegration within communities. These factors contribute to a hostile environment that faces scrutiny from both community members and intervening outsiders. With limited access to legitimate goal attainment and adequate support systems, the community is prone to absorbing and perpetuating similar effects. This concentration of stress also contributes to feelings of relative deprivation, as community members compare themselves to more advantaged individuals or groups. If these struggles are perceived as unjust or targeted, it can lead to hostility or withdrawal from the social and ecological factors that perpetuate their disadvantage.

Consequently, trust in formal institutions and informal social networks, which provide support and control, may erode. With scarce resources and weakened social ties, these systems become less effective in preventing and addressing criminal behavior, leaving individuals more vulnerable to victimization, and providing criminals with easier operating conditions. This pattern of strain worsening or persisting when large numbers of people are impacted by uncontrollable and significant changes has been observed in the aftermath of economic recessions (Recher, 2019; Luk, 2020), wars (Divon & Owar, 2021; Harutyunyan et al., 2021), and more recently environmental destruction (Agnew 2011, 2012).

Environmental Degradation Linked to Strain

As the Intergovernmental Panel on Climate Change highlighted, the adverse effects of climate hazards and environmental degradation on sensitive ecosystems and social-ecological systems are approaching critical tipping points (IPCC, 2022, p.18). Populations worldwide now experience perceptibly worrying changes to their social and physical surroundings due to unsustainable development and environmental degradation. Such practices contribute to the effects of global warming, deforestation, pollution, desertification, and biodiversity loss, which in turn diminishes the environment's capacity to support the ecological and social needs of humans and native species (UNISDR, 2009). Moreover, insufficient regulations and enforcement practices enable unchecked industrialization, resource depletion, and population expansion to inflict significant damage on plant and animal species with minimal accountability (Chopra, 2016; Gellers, 2021; van Uhm & Nijman, 2020). These dynamics have led to significant consequences, including the destruction of approximately 50% of all coral reefs (Akhtar et al., 2022), an alarming average decline of 68% in known vertebrate species (Ritchie et al., 2021), and an estimated loss of 30% of global land to agricultural production (Foley et al., 2011). In addition to causing significant ecological harm, practices contributing to environmental degradation have profound implications for equity and justice. Less affluent and marginalized groups are disproportionately affected by climate change, as it depletes natural resources, leading to scarcities and intensifying competition for essential resources like clean water, arable land, and habitable spaces (Horrigan et al., 2002).

Furthermore, these communities face significant threats to their financial livelihoods due to the increased levels of air pollution, water contamination, and exposure to toxic substances. Take, for example, fisheries currently facing collapse due to the 1.4 billion tons of pollution released into American waterways annually, which inevitably led to the decline in fishable aquatic life (Donohoe, 2003, p. 578). Moreover, these communities experience heightened health risks due to their proximity to industrial facilities, inadequate access to clean water and sanitation, or residing in regions prone to toxic release, resulting in elevated rates of illnesses, reduced life expectancy, and diminished quality of life. Such impacts have been observed in American farming communities, where an estimated 300,000 pesticide poisonings and over 10,000 pesticide-related cancer diagnoses occur annually (Pimentel, 2005, pp. 230-231). Living and operating in compromised regions, these communities experience disproportionate exposure to pollution, hazardous waste, and degraded environments. These effects are most likely to occur in areas that lack the necessary socioeconomic power and wealth to address the significant challenges they face in meeting their basic needs (Anguelovski, 2014).

Additionally, numerous studies on environmental discrimination have shown that race, ethnicity, and socioeconomic status play a significant role in determining whether individuals reside in environmentally hazardous areas (Downey, 2006; Luna, 2017; Wang & Feliberty, 2010). As a result, minority groups tend to face compounded disadvantages, as individuals with personal or community ties to affected areas often lack the resources to relocate or access alternative resources. Ultimately, environmental degradation strains immediate resources while contributing to the long-term impacts of climate change. This, in turn, has far-reaching impacts on the health and stability of social and environmental systems.

Climate Change Linked to Strain

While there is limited research directly linking the influences of climate change to criminality, multiple ecological and environmental justice studies have conceptualized instances of heightened stress, reduced social control, and weakened social support resulting from changes in the physical environment (Gee & Payne-Sturges, 2004). Taking these perspectives into account and highlighting the extremes of environmental degradation and climate change, Agnew suggests that special attention be paid to how populations conventionally respond to ecological uncertainty and where subsequent disorder is likely to thrive (Agnew, 2011). Fortunately, environmental crime and disaster management frameworks offer valuable insights into specific ecological stressors contributing to increased criminal activity. Among these frameworks, theories exploring the link between temperature fluctuations and heightened aggression have gained recognition. According to temperature-aggression theory, higher temperatures are linked to increased levels of aggressive behavior, including interpersonal conflicts, violence, and crime rates (Anderson, 1989; Cohn & Rotton, 1997). Anderson & Anderson's General Affective Aggression Model (GAAM) proposed that exposure to very high temperatures increases irritability and may elicit aggressive responses from people exposed to more extreme conditions (1998). Field experiments that applied this theory to aggressive driving and fouls in baseball have supported the link between hot conditions and heightened aggression (Kenrick & MacFarlane, 1986; Reifman et al., 1991). Subsequent research considered what impacts warmer seasons induced by climate change would have on the long-term trends of violent offenses (Anderson et al., 2000).

Furthermore, some longitudinal studies have compared decades of seasonal fluctuations against rates of crime, finding consistent peaks in months that are significantly warmer (Anderson et al., 1997; Anderson & Delisi, 2011; Mares & Moffett, 2019; Ranson, 2014). Further, Routine Activities Theory (RAT) argues that warmer weather conditions enable the convergence of three key elements, "motivated offenders, suitable targets, and the absence of capable guardians" (Cohen & Felson, 1979, p. 589). In warmer temperatures, individuals are more likely to engage in outdoor and public activities and less involved in taking on authoritative or surveillance roles. Optimal temperatures can lead to an increase in interpersonal interactions and victim accessibility. Despite increased stress due to temperature, RAT may better describe why different crimes display seasonal patterns and how crime may fluctuate depending on people's shifts in daily routines. Consequently, temperature shifts associated with climate change may contribute to favorable conditions that align with this theory (Carbone-Lopez & Lauritsen, 2013; Cohn & Rotton, 2003; McDowall et al., 2011).

In addition to temperature-related challenges, the progression of global warming will result in weather events and natural disasters with greater intensity (Allen et al., 2018). The changes resulting from these shifts pose significant risks to residents, jeopardizing their physical health, financial stability, social networks, and access to essential resources. Studies have indicated that these challenges posed by natural disasters result in additional consequences, including increased psychological distress and mood disorders among affected individuals (Beaglehole et al., 2018; Forbes et al., 2015; Kemp et al., 2014). However, the direct link between natural disasters and criminal behavior is less clear.

In some instances, individuals and communities in disaster-affected areas experience psychological stress and trauma that present as increased anxiety and heightened tensions, which have contributed to a short increase in domestic violence, child abuse, and other forms of interpersonal crime (Seddighi et al., 2019). Additionally, natural disasters tend to limit access to essential resources like electricity, clean water, and food, which motivates otherwise law-abiding individuals to resort to unlawful activities such as looting to meet their basic survival needs (Faucon, 2010; Phua, 2008). Other research suggests that crimes of opportunity may increase following disasters due to the immediate disarray and the absence of authority, which creates an environment with a reduced risk of apprehension (Frailing et al., 2015; Hancock et al., 2022; Kuhlman et al., 2021). Furthermore, the arrival of relief aid and supplies can also attract criminals seeking personal gain (Frailing & Harper, 2017; Phua, 2008).

However, this rise in criminal activity following disasters is typically short-lived, as affected communities experience a subsequent increase in collective efficacy and informal social support to address immediate challenges and mitigate disorder (Cerna-Turoff et al., 2021; Curtis et al., 2000; Sohrabizadeh et al., 2016; Phua, 2008). In the aftermath of a disaster, communities rely on their existing social networks and community bonds to address immediate needs and provide support. Informal networks, such as family, friends, neighbors, and community organizations, are crucial in facilitating mutual aid and assistance. Through these interactions, residents recognize that their recovery and sense of security are linked to the well-being of their community, fostering a sense of solidarity and increased empathy. This understanding motivates residents to support and assist each other. This type of interconnectedness allows communities to tap into immediate social networks that possess a deep understanding of the local context, including community members' needs, resources, and vulnerabilities.

Additionally, these recovery periods are significantly shortened when this supportive behavior is complemented by adequate government aid and humanitarian relief efforts (Abramson et al., 2014; Garnett & Kouzmin, 2007). Moreover, confidence in the government's ability to manage the crisis greatly influences the likelihood of residents deviating from disaster plans (Richard Eiser et al., 2012; Ma & Christensen, 2018). Although these avenues have proven effective, the progression of climate change presents a more widespread and intensified risk, potentially undermining these support systems. This concern has become evident in recent years, as the average number of natural disasters in the United States has surged to 17.2 per year from 2017 to 2021, surpassing the previous annual average of 7.4 (Smith, 2022). The NOAA (National Centers for Environmental Information) has also released further data revealing that natural disasters in 2021 were the deadliest (688 fatalities), most costly ($152.6 billion), and the most diverse in terms of disaster type (Smith, 2022). A continuation of these climate change trends could result in a decline in the accessibility of immediate support, as disruptions in close relationships arise from factors such as death, injury, migration, and heightened stress.

Moreover, governments may face challenges in providing sufficient action plans, accurately assessing natural disaster risks, and supporting recovery efforts as their resources are stretched to manage extreme weather events and further climate change impacts (Adeola & Picou, 2016). Although this disorganized state may be temporary, the perception of increased criminal activity and limited assistance distorts the overall perception of the community's value and long-term sustainability (Hedayati Marzbali et al., 2021; Jackson, 2004). Ultimately, the demand for assistance and support will likely rise, while conventional recovery systems may struggle to meet the growing needs due to intense social and environmental conditions (Agnew, 2011).

The delicate relationship between the natural and social environment is susceptible to ripple effects, wherein conflicts in either domain invariably result in consequences for the other. Consequently, the challenges posed by the intricate pathways linking environmental climate change and social instability have the potential to threaten our sense of security severely (Sellers et al., 2019; Barnett & Adger, 2007). Governments have increasingly recognized climate change as a threat to international security, understanding its capacity to destabilize economic and social development. Climate change, now recognized as a crisis multiplier, can exacerbate existing threats, including infectious diseases, terrorism, and conflicts arising from resource scarcity. As temperature and weather conditions become increasingly erratic, resulting in energy shortages, crop loss, and rising sea levels, populations are being compelled to flee their homelands (UNEP, 2022). For instance, forced migration has surged as a result, with a record number of 68.5 million people forcibly displaced in 2017, a third of which were due to extreme weather events (Podesta, 2019). Furthermore, poverty levels are expected to rise by over 100 million by 2030, adding to the already staggering 700 million people living in poverty (IPCC, 2022).

Moreover, when coupled with international conflicts, resource competition, land degradation, and global health concerns, climate change can effectively weaken social stability and exacerbates social issues (Aminetzah et al., 2022; Agnew, 2012a; Mares & Moffett, 2015).

As these projections materialize, displacement and high migration will subsequently insight conflict by forcing heterogeneous groups into proximity to compete for resources and stability, which further strains the capacity of temporary aid (De Juan, 2015). As populations become strained, face goal blockage, relative deprivation, and unmanageable conditions, social disorder, and weakened social control will likely worsen. These experiences permeate through social connections, generating widespread and intensified feelings of anger, frustration, and stress (Homburg, Stolberg, & Wagner, 2007). This strain on resources and space amplifies the recognition of environmental change as a security issue, given the severity of instability it generates through deprivation and social unrest (Carling, 2015). Resource scarcity and extreme conditions create competition and tension among different groups, providing fertile ground for the abuse of power to flourish. Moreover, extremist groups and political leaders may seek to capitalize on natural hazards like droughts and floods, using them as scapegoats to incite intergroup conflicts. Thus, the strain brought on by ecological instability has the potential to enable the spread of organized and state crimes, which further contributes to climate change.

This holds particular significance in urban settings, where social disorder and environmental strain often emerge during conflicts or natural disasters. Under such conditions, crime rates tend to rise, especially when social conflicts and environmental extremes intersect and exacerbate each other. The frequency of disasters is influenced by several crucial factors that hinder adaptation, increase deprivation, and concentrate strain. Both immediate shocks and long-term stressors have the potential to fuel distrust, weaken social control, and create favorable circumstances for criminal activity. Although environmental catastrophes are rarely recognized as the sole cause of increased criminal behavior, heightened environmental uncertainty is typically attributed to immediate shocks or long-term stressors that undermine social stability

(Sellers et al., 2019). Without appropriate support systems, extreme environmental conditions may exacerbate prolonged and deadly conflicts due to the added strain on environmental conditions (Burke et al. 2009). This strain subsequently exacerbates persistent social issues such as deprivation, inequity, and volatility (Agnew 2012b; IPCC 2022), rendering individuals and institutions vulnerable to increased disorder, reduced social control, and weakened social cohesion (Agnew, 2011).

Figure 1 illustrates the arguments presented above and features the various aspects of environmental degradation and climate change that produce high-stress and unstable living conditions. The following section introduces current sustainable development goals and discusses the effects of proactive environmental behavior.

Sustainability in Practice

In response to rapid environmental degradation and climate change, policymakers are actively pursuing sustainable development (Work, 2019). This approach was first introduced in the 1987 Brundtland report as a long-term solution to protect life-supporting ecosystems (Arnberger & Eder, 2012, p.168) and is now reflected in the United Nations' Sustainable Development Goals (SDGs). Since its establishment in 2015, the SDGs have become a widely embraced framework for evaluating the progress made by governments in implementing sustainability objectives. While the SDGs aim to support and guide UN member states on crucial issues like justice, inequality, and education, it is noteworthy for incorporating environmental change as a central component of global discourse. Collectively, the SDGs encourage equitable and responsible ways of handling resources through cross-collaborative sustainable technologies, resource management, dematerialization, carbon trading, and green economic growth. While

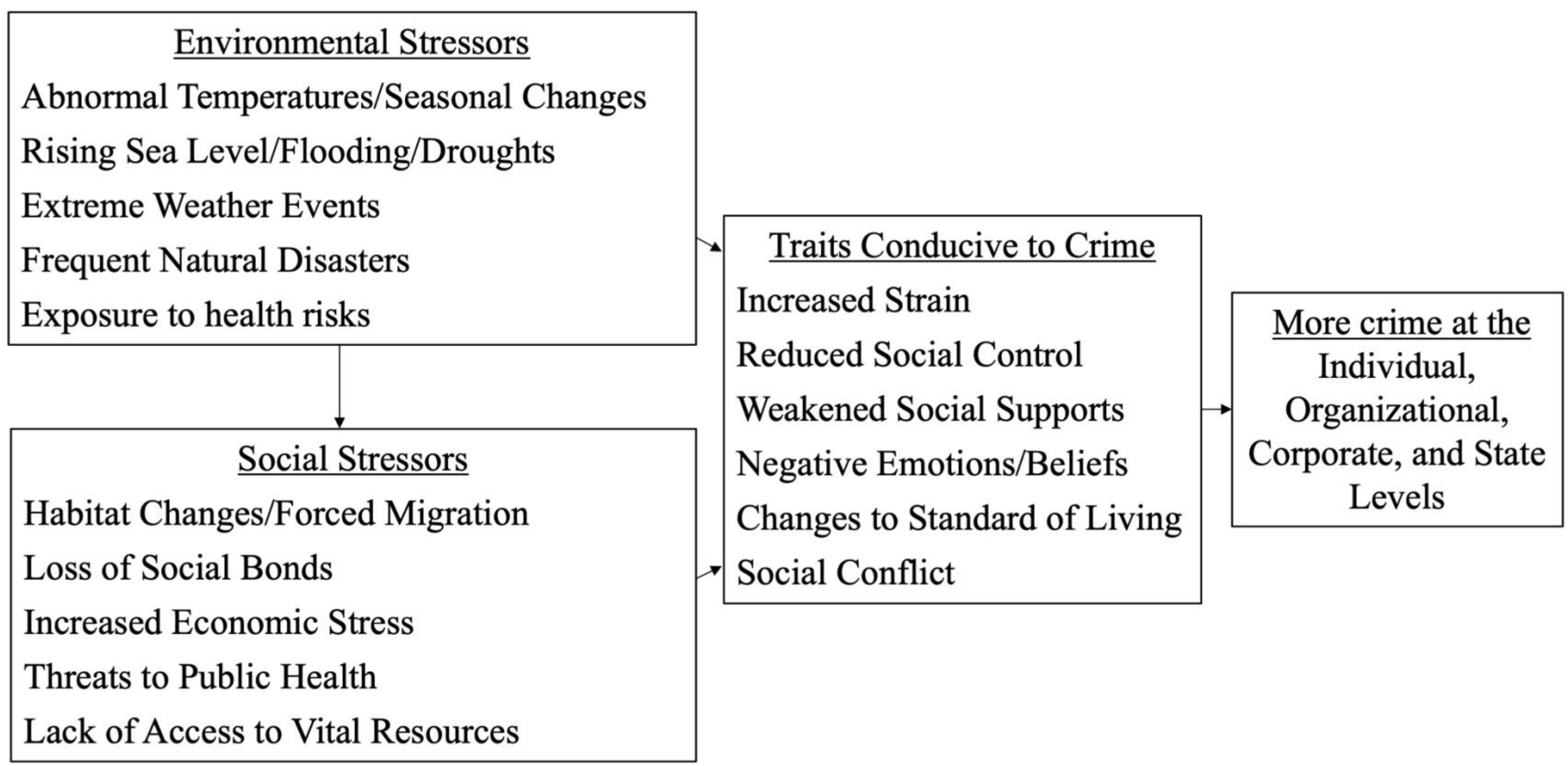

Figure 1. Conceptual Model

sustainable development gains traction among various institutions, examining the actual application of sustainability measures and their impact on the communities they aim to benefit is crucial. Part of this consideration is the ability to apply the SDGs across all levels of governance seamlessly. Current strategies advocate for a balance between development and environmental protection, aiming to appeal to many without jeopardizing profits (Holden & Linnerud, 2007). However, maintaining this equilibrium may prove challenging for governments that prefer economic growth as a more tangible and measurable goal, which becomes imperative during economic hardship and political conflict (Blowers et al., 2012). When addressing environmental concerns, it might be more advantageous to adopt policies prioritizing well-being and considering the utility of collectiveness, human development, and people's liberation across various social structures (Anguelovski & Martínez Alier, 2014). It is in the best interest of these approaches to recognize the importance of individual and community struggles, which often go beyond environmental concerns and reflect shared values and motivations. Doing so provides an opportunity to address ecological challenges that are deeply intertwined with a community's sense of identity and place (Martinez, 2014). This socially aware form of sustainability is also vital to preserving the natural environment and promoting community well-being in areas where production and development are concentrated (Dempsey et al., 2011).

Local metropolitan areas are especially vulnerable to environmental concerns through the effects of urban agglomeration, including overcrowding and concentrated emissions, which are conducive to global warming (Chopra, 2016). According to the UN, 82% of North Americans live in metropolitan areas, making it the most urbanized global region (2018). The same report states that urban spaces account for 55% of the global population, and by 2050 this number is expected to reach 68% (UN, 2018). Although urban areas encompass a small percentage of land, the clustering of human activity, specifically production and consumption tendencies, explains why cities account for over 50% of global energy consumption and 75% of carbon emissions (Akbar et al., 2016). Urban characteristics contribute to and endure an interlocking of challenges, including limited natural resources, thermal concentration, unreliable water access, increased health risks, and vulnerable infrastructure (IPCC, 2014; Revi et al., 2014). Since local decisions directly influence a community's ability to mitigate local burdens and sustain current and future community interests, it serves as a crucial means for environmental harm reduction. In contrast, inaction at the local level leaves communities vulnerable to environmental degradation and its subsequent effects, including but not limited to public health concerns, economic instability, and neglected infrastructure (Castells-Quintana & McDermott, 2019; Islam & Winkel, 2017; Bogar & Beyer, 2015).

Specific approaches advocate for nature conservation to protect natural resources, preserve ecosystems, and limit the spread of pollution caused by human activities to counteract the negative impacts of urban expansion. A fundamental principle underlying this form of conservation is the notion that nature possesses intrinsic value and should be safeguarded. The conservation movement has achieved notable success in the US, where initiatives such as the creation of National Park Systems and the establishment of organizations like the Wildlife Conservation Society, Nature Conservancy, World Wildlife Fund (WWF), and the International Union for Conservation of Nature (IUCN) have made significant contributions to the cause (Anguelovski & Martínez Alier, 2014). These initiatives reflect a commitment to valuing and safeguarding nature beyond its economic worth. By implementing conservation measures aimed at protecting and preserving the natural environment, there is a potential to mitigate environmental damage and promote positive interactions between humans and nature.

This may be particularly useful in neighborhoods that experience higher levels of crime and disorder associated with the stressful environment of highly industrialized urban areas. As research on the importance of green spaces has indicated, the greening of communities reduces opportunities for crime to capitalize on disorganized spaces (Sanciangco et al., 2021; Venter et al., 2022) while limiting the pressures of visible environmental inequalities (Brownlow, 2006; Shepley et al., 2019). Green space also serves as a protective factor by reducing pollution exposure, promoting stress relief, and encouraging physical engagement through recreational activities (Branas et al., 2011; Kruize et al., 2019). In addition to such enhancements, cities that preserve and reintegrate elements of nature improve greater community attachment (Arnberger & Eder, 2012), enhance perceptions of safety, and support a sense of collectivity (Stodolska et al., 2011; Powers et al., 2021). Some SDG indicators, including park accessibility, the presence of green space, and the existence of EPA cleanup sites, provide measures to evaluate the success of initiatives to preserve the environment and ensure equitable access to nature. These indicators gauge the proximity of communities to parks, the availability of spaces with natural vegetation, and the progress in the remediation of contaminated sites.

Other structural policies seek eco-efficiency and climate-sensitive services to make effectual decisions for the environment and people. This approach attempts to integrate environmentalism into a capitalistic world by advocating for the integration of renewables and sustainable markets within existing education and business practices. While the framework is considered piecemeal, this approach aims to address environmental issues through socially and economically sustainable methods that can protect life-support systems and the natural world in the long term (Drengson et al., 2011). Considering environmental sustainability on par with economic considerations may benefit developed nations, cities, and local communities, allowing them to transition towards an environmentally conscious performance without completely abandoning their existing practices.

Moreover, this approach enables these nations to lead the way in developing new sustainable technologies. The US provides a prime example of this approach, now swiftly adopting high efficiency projects and clean energy, despite its history with climate denial (Boulianne & Belland 2022). As a step forward, the US has directed portions of its domestic labor market towards renewables through solar and wind projects while investing in a labor network for sustainability through higher wages and accessible education and training (USAID, 2023). The federal government has also promoted climate-conscious consumption through various financial incentives, including clean energy subsidies and electric vehicle (EV) tax credits (White House, 2022). The efficacy of these strategies can be assessed through various Sustainable Development Goals (SDG) indicators, including measurements of renewables generated, renewables consumed, toxic release, carbon emissions, and greenhouse gas emissions per capita.

Although transitioning to sustainable practices offers many benefits, such as job creation, climate change mitigation, and resource security, success may vary across communities (Wei et al., 2010). For instance, communities that heavily rely on industries like logging or mining require greater support to quickly transition to a new job market. There are also concerns about introducing entirely new technology in an area that needs to be equipped to service these materials or capable of affording rapid integration. Even if the adoption of renewables and other clean energy jobs proves successful, such rapid changes can pose challenges for readjusting community members. And in some cases, this may also be counterproductive for a reduction in emissions. If the introduction of a new industry produces a desirable economic hub, newcomers may induce population and economic strain on the previously stable communities. However, it has been argued that the long-term effect of providing renewable energy brings social benefits such as job creation and increased revenue within previously energy-deficient areas (Akella et al., 2009). This further highlights the sensitivity and technicalities each community must consider.

In contrast, sustainable practices that are developed at the local level have the advantage of aligning with the specific interests and needs of community members who have a personal investment in the area. By increasing awareness and an understanding of climate change, both governments and citizens can gain a clearer perception of the changes occurring in their natural environment and their own stake in addressing the issue (van Stigt et al., 2015; Yusoff & Gabrys, 2011). Though these changes require a conscious commitment from residents and local municipalities, the outcomes of these locally driven initiatives can result in more adaptable and sustainable pro-environmental lifestyles in the long run (Ruiz-Campillo et al., 2021). Moreover, involving the public in local climate discussions can contribute to the reduction of interpersonal and psychological strain by providing resources and enhancing coping skills (Brody et al., 2007). Individuals that engage in pro-environmental actions stand to gain a sense of purpose and empowerment as they actively contribute to positive change. This can enhance personal satisfaction and well-being by aligning actions with personal values and creating a sense of responsibility towards the environment (Santiago Fink, 2016). Furthermore, promoting collaboration among community stakeholders, residents, local businesses, and government entities can create a sense of collectivity and cohesion centered around local environmental action (del Río & Burguillo, 2009). This collaboration can lead to innovative solutions, shared resources, and a stronger sense of community. Furthermore, residential investment in climate-resilient infrastructure, policies, and programs that take a holistic approach to environmental challenges, can enhance the community's overall welfare and climate change preparedness.

Potential barriers to this approach include sociocultural pressures that foster resistance from individuals that feel daily habits and routines should prioritize convenience and consumption over pro-environmental behavior, thus leading individuals to resist or overlook actions such as recycling or choosing sustainable transit. Community members are also vulnerable to climate anxiety, as they may harbor concerns that their individual contributions may not be adequate to tackle such intricate systemic environmental challenges (Clayton, 2020; Panu, 2020). Moreover, communities may face financial limitations and a lack of resources to implement large-scale sustainability projects. Securing funding and resources can be a significant barrier to community level sustainable action. Furthermore, sustainability initiatives can inadvertently deepen existing social inequalities if they are not inclusive and considerate of the needs and perspectives of all community members (Martin, Blowers, & Boersema, 2010).

Some research suggests that people are more likely to engage in pro-environmental behaviors if environmentalism is conveyed in a way that resonates with their intrinsic needs and interests (Liobikienė & Juknys, 2016; Lim & Zhang, 2022). Successful environmental awareness allows citizens to "(1) see important possible benefits (and relatively low cost) from such action; (2) become emotionally aroused by the issue; and (3) believe that their actions can have a positive effect." (Patchen, 2010, p.63). By employing proactive reform through individual, organizational, and structural resilience, local governments should strengthen social cohesion in order to prevent or minimize environmentally hazardous consequences (Levy et al., 2015). To do so, localities need continuous and secured sources of funding, and there must also be a greater push for public participation in local decision-making; supports should be provided through higher levels of government (Baker et al., 2012; Measham et al., 2011) and mass communication (Tuitjer et al., 2022). By achieving and retaining community interests in sustainability and environmental harm reduction, residents may be more prompt to adopt climate-conscious behaviors (Lee et al., 2015).

Three SDG indicators that gauge pro-environmental action at the county level include the presence of local adaptation plans in cities, the extent of sustainable transit utilization, and the level of climate awareness among community members. By assessing the accessibility and equitable distribution of public resources, these indicators provide better insight into the city's efficacy and response to community needs. Based on the directions for sustainable development outlined, I propose three hypotheses broadly linked to reducing crime through alleviating ecological strain.

H1: communities with greater access to natural environments and enhanced cleanup programs (which results in better environments) will encounter lower levels of crime.

H2: communities with more sustainable infrastructure will experience less crime.

H3: communities exhibiting higher levels of environmental awareness and proactively address climate change will observe lower crime rates.

The significance of this research is to understand how local efforts can best meet the environmental and social needs of their community. If the current applications of climate change mitigation provide quality methods of crime reduction, it confirms an appropriate direction for sustainable development and policy reform to progress. However, if the current functions of climate change mitigation are shown to increase criminal activity, it then becomes essential to consider alternative directions to alleviate climate effects that present lower risk to crime propensity.

CHAPTER THREE

METHODS AND DATA

This study examines how sustainability initiatives related to conservation, infrastructure, and public awareness correlate with the types of stress that can contribute to criminal behavior. The dependent variables examined are violent crime rates and property crime rates, sourced at the county level from the FBI Uniform Crime Reports (UCR) for the years 2017, 2018, and 2019. These reports provide annual rates of violent and property crimes per 100,000 inhabitants. To assess the different dimensions of sustainable development discussed above, this study utilizes annual SDG reports on the United States from 2017 to 2019. These reports evaluate the effectiveness of local government policies in contributing to the 2030 agenda. Since 2016, the US SDG Index has provided annual reports on metropolitan statistical areas (MSAs) and their associated counties. These reports encompass 57 indicators across 15 SDGs related to various humanitarian issues. This research benefits from two distinct advantages by utilizing the SDG reports as a comprehensive dataset for US counties and incorporating various indicators as independent variables. Firstly, this approach facilitates the detection of meaningful patterns and shifts by utilizing variables that capture changes in sustainable impact over time. Secondly, employing specific indicators ensures that there is little to no redundancy in measurement, allowing for an independent assessment of conservation efforts, infrastructure initiatives, and local climate action variables. The assessments in this study are organized into three hypotheses.

The first hypothesis examines local conservation efforts using three indicators, infrastructure using five indicators, and local climate action using three indicators. It is important to note that the descriptions provided are based on the definitions used in MSA level US SDG reports for the years available. Table 1 presents each of these indicators as independent variables, along with their names, descriptions, and years of activity.

By incorporating annual SDG reports on US metropolitan statistical areas (MSAs) and the UCR's annual crime rate reports at the county level, aggregated and merged to MSAs, this study aims to better understand the intersection of crime and climate management at the local level. The research question addressed is whether SDG attainment is associated with crime rates across US counties and if SDG attainment contributes to a reduction in strain associated with higher crime. Through this focus on social-ecological systems relative to crime propensity, the study seeks to identify novel steps toward harm reduction in either case.

Table 1. Description of Independent variables

H1: communities with greater access to natural environments and enhanced cleanup programs will encounter lower levels of crime.	
Park Access (2017/2018/2019)	Percentage of population living within 15 minutes of pedestrian travel to a public park and recreational space.
Green Space (2017/2018)	Total amount of square meters of green open space (land with vegetation) available per person in the MSA.
EPA Cleanup Sites (2017/2018)	The number of all EPA cleanup sites per square mile of MSA area, including brownfield, superfund, and other EPA sites.
H2: communities with more sustainable infrastructure will experience less crime.	

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Table 1 continued.

Renewables Generated (2017/2018)	Percentage of energy generated within the state from wind, solar, geothermal, biomass and hydroelectric.
Renewables Consumed (2019)	Percentage of energy consumed within the state from wind, solar, geothermal, biomass and hydroelectric.
Toxic Release (2017/2018)	Toxic industrial waste released into the Air, Water, or Land per square mile of the MSA (Lbs.).
Carbon Emissions (2017/2018)	Tons of carbon dioxide emissions per capita.
GHG Per Capita (2019)	Production-based greenhouse gas emissions per capita.
H3: communities exhibiting higher levels of environmental awareness and proactively address climate change will observe lower crime rates.	
Sustainable Transit (2018/2019)	Percentage of commuters 16 and over, using public transport, bicycles, carpooling, or walking to work.
Climate Awareness (2019)	Estimated percentage of adults who think global warming is happening.
Adaptation Plan (2019)	Binary variable, does city have a local adaptation plan (0=no, 1=yes)

To ensure that the effects of the independent variables are accurately assessed, it is essential to consider and account for potential confounding factors or alternative explanations for the observed relationship. This study incorporates a comprehensive set of control variables obtained from reliable sources such as the census bureau's American Community Survey 20162020 and MIT's dataset on county presidential election returns 2000-2020. First, population size at the county level is controlled for; given that larger populations tend to have higher crime rates due to increased opportunities for criminal activity, greater victim accessibility, and the overall complexities of maintaining social order in densely populated areas. To account for the influence of financial insecurity on criminal behavior, this study includes controls for poverty levels at the county level thus acknowledging the substantial impact of economic deprivation on the likelihood of individuals engaging in criminal activities.

Additionally, levels of segregation are also included as control variables. Segregation contributes to social disorganization, limited access to resources, and an unequal distribution of opportunities within a given area, all of which can contribute to higher crime rates. Through these controls, this study is able to examine whether SDG attainment has an independent effect on crime rates, regardless of the social and spatial dynamics created by population density, poverty, and segregation.

Furthermore, this study incorporates controls for the percentage of the population that identifies as Black, the percentage of the population that is male and under 30 years of age, and the proportion of the county that voted Republican in the 2016 election. Some research suggests factors such as political affiliation, racial disparities, and gender divisions significantly influence the likelihood of individuals within a community engaging in criminal activity (King, 2008; Pratt & Cullen, 2005; Quillian & Pager, 2001; Sampson & Lauritsen, 1997). By including these controls, the study aims to disentangle the specific impact of SDG attainment from the effects of political affiliation, race, gender, and sex differences, providing a more nuanced understanding of the relationship.

In this study, the strength and quality of the relationship between crime rates and SDG attainment is assessed through a series of pairwise correlations and OLS regressions. To conduct the analysis, a comprehensive dataset is constructed by merging and compiling data from various US counties with information on the variables of interest. It is important to highlight that this study utilizes population data rather than a sample. Therefore, each coefficient estimated in the regression analysis reflects the relationships present within the entire population. While statistical significance is not strictly necessary for establishing the existence of relationships, reporting the statistical significance of each coefficient adds robustness and credibility to the observed findings. By considering statistical significance, this study enhances the overall analysis by providing additional evidence and support for the observed effects. The results of the analysis are presented in a series of tables that outline the findings for each of the three hypotheses. An analysis of the results will follow, along with a discussion of their significance and limitations in understanding the impacts of local sustainable action on strain.

CHAPTER FOUR

FINDINGS

The following analysis includes multiple correlation and regression tables that examine the relationships between variables related to the proposed hypotheses concerning strain. To explore the strength and direction of the linear relationships between the dependent variables (violent and property crime) and the eleven independent variables, two pairwise correlations were conducted. The findings from the first pairwise correlation is presented in Table 2.

In terms of conservation efforts, violent crime rates presented a positive correlation with green space and negative correlations with park access and EPA cleanup sites. This implies that areas with more green space tend to have higher violent crime rates, while better park access and a greater number of EPA cleanup sites are associated with lower violent crime rates. Regarding sustainable infrastructure, violent crime displayed a positive correlation with toxic release and negative correlations with variables such as renewables generated, renewables consumed, carbon emissions, and greenhouse gas (GHG) per capita. This suggests that higher levels of toxic release are associated with increased violent crime rates, while greater utilization of renewable energy sources, reduced carbon emissions, and lower GHG per capita are linked to lower violent crime rates.

Furthermore, violent crime exhibited negative correlations with all three measures of local awareness, including sustainable transit, climate awareness, and adaptation plans. This suggests that areas with more sustainable transit options, higher levels of climate awareness, and effective adaptation plans tend to have lower violent crime rates.

As for strength, the correlation coefficients for the relationship between violent crime and park access and violent crime and EPA cleanup sites were found to be -0.247 and -0.228, respectively. These findings suggest that an increase in park accessibility and the presence of EPA cleanup sites may lead to a decrease in violent crime rates. It is worth noting that the remaining nine correlation coefficients were below .15, indicating little to no association between violent crime rates and variables such as green space, renewables generated, renewables consumed, toxic release, carbon emissions, GHG per capita, sustainable transit, climate awareness, and adaptation plans. Given the results, these variables may not play a prominent role in explaining variations in violent crime rates.

Table 2. Pairwise Correlation Matrix for Violent Crime.

	Violent Crime	Park Access	Green Space	EPA Cleanup Sites	Renewables Generated	Renewables Consumed
Violent Crime	1	-0.247	0.072	-0.228	-0.041	-0.048
Park Access	-0.247	1	-0.068	0.417	0.412	0.185
Green Space	0.072	-0.068	1	0.207	-0.085	Na
EPA Cleanup Sites	-0.228	0.417	0.207	1	0.089	Na
Renewables Generated	-0.041	0.412	-0.085	0.089	1	Na
Renewables Consumed	-0.048	0.185	Na	Na	Na	1
Toxic Release	0.103	-0.007	-0.017	0.033	-0.033	0.086
Carbon Emissions	-0.019	0.215	-0.169	0.013	0.139	Na
GHG Per Capita	-0.103	0.282	Na	Na	Na	0.209
Sustainable Transit	-0.145	0.447	-0.071	0.33	0.434	0.106
Climate Awareness	-0.16	0.632	Na	Na	Na	0.038
Adaption Plan	-0.149	0.456	Na	Na	Na	-0.126

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Table 2 continued.

	Toxic Release	Carbon Emissions	GHG Per Capita	Sustainable Transit	Climate Awareness	Adaption Plan
Violent Crime	0.103	-0.019	-0.103	-0.145	-0.16	-0.149
Park Access	-0.007	0.215	0.282	0.447	0.632	0.456
Green Space	-0.017	-0.169	Na	-0.071	Na	Na
EPA Cleanup Sites	0.033	0.013	Na	0.33	Na	Na
Renewables Generated	-0.033	0.139	Na	0.434	Na	Na
Renewables Consumed	0.086	Na	0.209	0.106	0.038	-0.126
Toxic Release	1	0.053	0.352	-0.105	-0.096	-0.22
Carbon Emissions	0.053	1	Na	-0.221	Na	Na
GHG Per Capita	0.352	Na	1	0.359	0.456	0.131
Sustainable Transit	-0.105	-0.221	0.359	1	0.699	0.468
Climate Awareness	-0.096	Na	0.456	0.699	1	0.491
Adaption Plan	-0.22	Na	0.131	0.468	0.491	1

In table 3, the pairwise correlations between property crime and the independent variables are presented. Property crime rates displayed positive correlations with green space and toxic release, indicating that higher levels of green space and greater toxic release are associated with increased property crime rates. On the other hand, property crime rates showed negative correlations with park access, EPA cleanup sites, renewables generated, renewables consumed, carbon emissions, GHG per capita, sustainable transit, climate awareness, and adaptation plans. The correlation coefficient between property crime and park access was found to be -0.266, indicating a moderate negative relationship. Similarly, the correlation coefficient between property crime and EPA cleanup sites was -0.253, also suggesting a moderate negative relationship. These findings suggest that an increase in park accessibility and the presence of EPA cleanup sites may be associated with a decrease in property crime rates.

These coefficients indicate a moderate negative relationship between property crime rates and both park access and the presence of EPA cleanup sites. However, the remaining correlations presented coefficients falling below .15, indicating little to no association between property crime rates and green space, renewables generated, renewables consumed, toxic release, carbon emissions, GHG per capita, sustainable transit, climate awareness, and adaptation plans. It is important to acknowledge that these correlations do not partial out the influence of potentially confounding variables, which could obscure important relationships. Therefore, further analysis using regression models were conducted to better account for possible confounders and uncover any meaningful associations that may have been masked by the uncontrolled correlations.

Table 3. Pairwise Correlation Matrix for Property Crime

	Toxic Release	Carbon Emissions	GHG Per Capita	Sustainable Transit	Climate Awareness	Adaption Plan
Property Crime	0.116	0	-0.128	-0.153	-0.149	-0.107
Park Access	-0.007	0.215	0.282	0.447	0.632	0.456
Green Space	-0.017	-0.169	Na	-0.071	Na	Na
EPA Cleanup Sites	0.033	0.013	Na	0.33	Na	Na
Renewables Generated	-0.033	0.139	Na	0.434	Na	Na
Renewables Consumed	0.086	Na	0.209	0.106	0.038	-0.126
Toxic Release	1	0.053	0.352	-0.105	-0.096	-0.22
Carbon Emissions	0.053	1	Na	-0.221	Na	Na
GHG Per Capita	0.352	Na	1	0.359	0.456	0.131
Sustainable Transit	-0.105	-0.221	0.359	1	0.699	0.468
Climate Awareness	-0.096	Na	0.456	0.699	1	0.491
Adaption Plan	-0.22	Na	0.131	0.468	0.491	1

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Table 3 continued.

	Property Crime	Park Access	Green Space	EPA Cleanup Sites	Renewables Generated	Renewables Consumed
Property Crime	1	-0.266	0.08	-0.253	-0.048	-0.01
Park Access	-0.266	1	-0.068	0.417	0.412	0.185
Green Space	0.08	-0.068	1	0.207	-0.085	Na
Epa Cleanup Sites	-0.253	0.417	0.207	1	0.089	Na
Renewables Generated	-0.048	0.412	-0.085	0.089	1	Na
Renewables Consumed	-0.01	0.185	Na	Na	Na	1
Toxic Release	0.116	-0.007	-0.017	0.033	-0.033	0.086
Carbon Emissions	0	0.215	-0.169	0.013	0.139	Na
GHG Per Capita	-0.128	0.282	Na	Na	Na	0.209
Sustainable Transit	-0.153	0.447	-0.071	0.33	0.434	0.106
Climate Awareness	-0.149	0.632	Na	Na	Na	0.038
Adaption Plan	-0.107	0.456	Na	Na	Na	-0.126

In the subsequent regression analyses, the county population size, poverty rate, segregation, percentage of Black population, percentage of republican population, and percentage of the population that is male and under the age of 30, were controlled for. The regression models were performed separately for the two dependent variables, violent crime (Table 4) and property crime (Table 5). Despite the potential reduction in the weight of statistical significance due to the use of population data, the analysis reports the coefficients and their corresponding statistical significance levels to ensure a comprehensive assessment of the results. The coefficients and corresponding t-values in parentheses are reported for each independent variable in the respective models.

Table 4. OLS Regression of SDG indicators on violent crime.

	Violent Crime					
Violent Crimes 2016-2020	0.076***	0.100***	0.078***	0.078***	0.062***	0.077***
	-4.72	-9.67	-4.07	-4.13	-3.86	-4.81
Population	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(-5.26)	(-4.85)	(-4.60)	(-4.60)	(-3.92)	(-5.45)
Poverty	-0.073	2.465+	1.867	2.578*	-0.839*	0.009
	(-0.95)	-1.78	-1.46	-1.97	(-2.48)	-0.11
Segregation	0.155	-1.169**	-0.976**	-1.437***	0.781***	0.132
	-1.5	(-3.11)	(-2.94)	(-4.29)	-5.04	-1.25
Percent Black	198.683***	193.871***	192.138***	204.229***	175.200***	208.093***
	-4.43	-4.04	-4.2	-4.52	-3.33	-4.98
Percent Young Male	-200.737	-352.354	-362.533	-345.398	-248.511	-173.216
	(-0.60)	(-0.90)	(-1.06)	(-1.01)	(-0.62)	(-0.52)
Percent Republican	1.548***	1.421***	1.347***	1.496***	1.440***	1.685***
	-4.89	-3.77	-3.84	-4.5	-4.34	-5.84
Park Access	-0.235					
	(-1.51)					
Green Space		0.012				
		(-0.13)				
EPA Cleanup Sites			-75.34			
			(-1.63)			
Renewables Generated				0.525***		
				-4.02		
Renewables Consumed					0.335*	
					-2.28	
Toxic Release						0.005*
						-2.19
_Cons	-15.718	33.892	40.845	27.142	-10.453	-39.723
	(-0.31)	-0.59	-0.78	-0.52	(-0.17)	(-0.85)
R2	0.232	0.287	0.26	0.267	0.233	0.236
N	1717	992	1128	1128	589	1717

(Continued on following page)

Table 4 continued.

Violent Crime

Violent Crimes 2016-2020	**0.079*** **	**0.061*** **	**0.079*** **	**0.062*** **	**0.063*** **
	-4.12	-3.79	-6.1	-3.82	-3.9
Population	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(-4.57)	(-3.91)	(-4.57)	(-3.90)	(-3.87)
Poverty	2.192	-0.954**	-0.061	-0.802*	-0.821*
	-1.62	(-2.65)	(-0.65)	(-2.43)	(-2.43)
Segregation	-1.229***	0.862***	0.232*	0.795***	0.707***
	(-3.87)	-5.3	-2.11	-5.19	-4.62
Percent Black	197.252***	153.723**	210.328***	154.477**	160.023**
	-4.36	-2.99	-4.6	-3.08	-3.09
Percent Young Male	-355.576	-326.87	-204.065	-336.527	-318.754
	(-1.04)	(-0.78)	(-0.59)	(-0.82)	(-0.79)
Percent Republican	1.400***	1.227***	1.724***	1.134**	1.222***
	-4.04	-3.34	-5.46	-2.81	-3.51
Toxic Release					
Carbon Emissions	0.414				
	-0.97				
GHG Per Capita		-0.108			
		(-0.57)			
Sustainable Transit			-0.244		
			(-1.60)		
Climate Awareness				-0.231	
				(-1.23)	
Adaption Plan					-0.160+
					(-1.94)
_Cons	31.863	23.751	-37.897	31.613	26.631
	-0.64	-0.34	(-0.75)	-0.44	-0.41
R2	0.26	0.233	0.231	0.232	0.234
N	1128	573	1153	589	589

T STATISTICS IN PARENTHESES = "+ P<0.10 * P<0.05 ** P<0.01 *** P<0.001"

In Table 4, the coefficients are interpreted in terms of their impact on violent crime rates per 100,000 inhabitants. Hypothesis 1 suggests that communities with increased access to natural environments and improved cleanup programs would demonstrate a decrease in crime rates. Regarding violent crime rates, the regression analysis conducted on the variables of green space, park access, and EPA cleanup sites offers partial support for this hypothesis. When violent crime was regressed on park access, a coefficient of -0.235 was obtained. The coefficient infers that a 1% rise in the population with convenient access to their local park is associated with an estimated decrease of 0.24 violent crimes per 100,000 inhabitants. This implies that greater access to parks is associated with lower levels of violent crime in the community.

For the variable of green space, the coefficient of 0.012 indicates that a one-unit increase in an MSA's square meters of green open space is associated with a slight increase in violent crime rates by 0.012 per 100,000 inhabitants. However, the type areas that qualify as a green open space can vary significantly, ranging from national forests to street trees. As a result, while green spaces are generally considered beneficial, certain green spaces within an MSA may unintentionally promote crime. For instance, large forest preserves can offer seclusion and easier access vulnerable targets, potentially leading to a slight increase in violent crime rates.

Interestingly, the coefficient for EPA cleanup sites was -75.34. This indicates that a one unit increase in the number of EPA cleanup sites per square mile is associated with a substantial decrease in violent crime rates by 75.34 per 100,000 inhabitants. This implies that having a higher concentration of EPA cleanup sites, which likely signifies efforts to address environmental hazards and improve the overall cleanliness of an area, is connected to a significant reduction in violent crime rates. Here, it is important to note that these coefficients did not reach statistical significance. Moreover, the use of a non-representative portion of the full population of US counties in this analysis reduces the weight and substantive evidence of statistical hypothesis testing compared to using a representative sample from a larger population of units. Additionally, the small size of the population of MSAs being examined may artificially inflate the standard errors. Therefore, while the regression results lack statistical significance, the size and direction of the coefficients offer some insights. The evaluation of these effects acknowledges their magnitude and direction, along with some consideration given to significance tests.

For the variable renewables generated, the coefficient of 0.525 is statistically significant at the 0.001 significance level. This implies that for every 1% increase in clean energy generated within the state, there is an associated increase in violent crime rates by 0.525 per 100,000 inhabitants. In other words, higher levels of clean energy generation seem to correspond to higher rates of violent crime. Similarly, the coefficient for renewables consumed is 0.335, and it is statistically significant at the 0.05 significance level. This suggests that there is a significant relationship between the consumption of clean energy within the state and violent crime rates. Specifically, a 1% increase in clean energy consumed is associated with a rise in violent crime rates by 0.335 per 100,000 inhabitants. These results on renewables could indicate that the current introduction of clean energy fails to be harmonious with community needs, negatively impact regions that lack the necessary resources to fully capitalize on its advantages.

In the case of toxic release, the coefficient is 0.005, and it is statistically significant at the 0.05 level. This indicates that there is a significant relationship between the release of toxic industrial waste into the environment and violent crime rates. A one unit increase in pounds of toxic industrial waste released is associated with an increase in violent crime rates by 0.005 per 100,000 inhabitants. Regarding carbon emissions, although the coefficient of 0.414 is not statistically significant, its positive direction suggests a potential positive association between carbon emissions and violent crime rates. This would mean that as carbon emissions increase by one unit per capita, violent crime rates increase by approximately 0.414 per 100,000 inhabitants. Similarly, the coefficient for GHG per capita is -0.108, and it is not statistically significant. However, the negative sign of the coefficient suggests a potential inverse relationship. It indicates that as production-based greenhouse gas emissions per capita decrease by one unit, there may be a tendency for violent crime rates to increase by approximately 0.108 per 100,000 inhabitants.

Overall, the results for renewables generated, renewables consumed, toxic release, carbon emissions, and GHG per capita yield mixed outcomes in relation to Hypothesis 2, which proposed that communities with more sustainable infrastructure would experience lower crime rates. The interpretation of these coefficients in terms of their impact on violent crime rates provides valuable insights for understanding the relationships between sustainable infrastructure and crime, considering the population data examined.

Despite the lack of statistical significance, the direction of the independent variables tested is consistent with Hypothesis 3, which suggests that certain factors related to sustainable transit and climate awareness may influence crime rates. The coefficient for sustainable transit is -0.244, indicating that a 1% increase in the proportion of commuters using sustainable transportation methods is associated with a decrease in violent crime rates by 0.244 per 100,000 inhabitants. Although this coefficient is not statistically significant, it suggests a potential inverse relationship between sustainable transit and violent crime rates. In other words, as more individuals opt for public transportation, bicycles, carpooling, or walking as their means of commuting, there might be a tendency for violent crime rates to decrease. This could be attributed to increased visibility and interpersonal interactions, thus facilitating greater informal social control. Similarly, the coefficient for climate awareness is 0.231. This implies that a 1% increase in the proportion of adults who believe global warming is happening is associated with a decrease in violent crime rates by 0.231 per 100,000 inhabitants. Although not statistically significant, this coefficient suggests a potential inverse relationship between climate awareness and violent crime rates. It indicates that as the level of climate awareness among adults increases, there may be a tendency for violent crime rates to decrease.

Regarding the variable, adaptation plan, the coefficient is -0.160, and it is statistically significant at the 0.10 level. This suggests that cities with a local adaptation plan in place experience a decrease in violent crime rates by 0.16 per 100,000 inhabitants. The statistical significance indicates a higher level of confidence in this result. Therefore, it can be inferred that the presence of a local adaptation plan is associated with a reduction in violent crime rates.

Although the coefficients for sustainable transit and climate awareness are not statistically significant, their consistent negative direction supports Hypothesis 3, suggesting that these factors may play a role in reducing violent crime rates. The statistically significant coefficient for the adaptation plan variable provides stronger evidence for the relationship between having a local adaptation plan and decreased violent crime rates. Considering the population data examined, these findings highlight the potential importance of sustainable transit, climate awareness, and local adaptation plans in addressing and potentially mitigating sustainable transit, climate awareness, and local adaptation plans in addressing and potentially mitigating violent crime rates in communities.

Table 5. OLS Regression of SDG indicators on property crime.

Property Crime

Property Crimes 2016-2020	0.823***	0.799***	0.856***	0.856***	0.737***	0.823***
	(14.11)	(13.68)	(15.95)	(16.00)	(5.69)	(14.40)
(SUM) POP	0.000***	0.000*	0.000*	0.000*	0.000**	0.000***
	(3.52)	(2.17)	(2.25)	(2.24)	(2.70)	(3.50)
POVERTY	-2.109	-2.481	-10.008	-8.228	-6.725	-0.754
	(-1.11)	(-0.24)	(-1.26)	(-1.01)	(-1.27)	(-0.34)
SEGREGATION	1.727	-1.092	-0.432	-1.442	4.298	1.379
	(1.43)	(-0.43)	(-0.17)	(-0.59)	(1.54)	(1.14)
PERCENT BLACK	-577.097*	-156.775	-319.555	-294.503	-756.980	-547.850**
	(-2.48)	(-0.75)	(-1.35)	(-1.28)	(-1.41)	(-2.77)
PERCENT YOUNG MALE	1940.932	902.087	261.983	299.166	5871.034*	2122.689+
	(1.60)	(0.65)	(0.19)	(0.22)	(2.02)	(1.66)
PERCENT REPUBLICAN	3.441	0.222	3.506	3.819	7.121	4.290+
	(1.29)	(0.12)	(1.18)	(1.34)	(1.38)	(1.74)
PARK ACCESS	-1.959					
	(-1.31)					
GREEN SPACE		-2.026**				
		(-3.00)				
EPA CLEANUP SITES			-131.697			
			(-0.46)			
RENEWABLES GENERATED				1.327		
				(1.40)		
RENEWABLES					6.864**	

(Continued on following page)

Table 5 continued.

CONSUMED						
					(3.07)	
TOXIC RELEASE						0.068+
						(1.86)
_CONS	-336.836	196.057	-50.723	-85.463	-979.514+	-541.628*
	(-1.15)	(0.76)	(-0.18)	(-0.30)	(-1.67)	(-2.00)
R2	0.853	0.838	0.887	0.887	0.776	0.855
N	1717.000	992.000	1128.000	1128.000	589.000	1717.000

(Continued on following page)

Table 5 continued.

Property Crimes 2016-2020	**0.856*** **	**0.737*** **	**0.785*** **	**0.737*** **	**0.738*** **
	(16.07)	(5.69)	(8.82)	(5.71)	(5.73)
(SUM) POP	0.000*	0.000**	0.000**	0.000**	0.000**
	(2.26)	(2.69)	(2.90)	(2.70)	(2.72)
POVERTY	-10.119	-6.174	-2.592	-6.412	-6.584
	(-1.26)	(-1.09)	(-1.27)	(-1.22)	(-1.24)
SEGREGATION	-0.745	4.615	1.975	4.642+	3.825
	(-0.33)	(1.51)	(1.15)	(1.65)	(1.41)
PERCENT BLACK	-307.752	-975.925	-832.937**	-1060.340+	-1013.209+
	(-1.37)	(-1.63)	(-3.11)	(-1.82)	(-1.82)
PERCENT YOUNG MALE	276.773	5060.035+	4256.838*	4696.191+	4845.318+
	(0.20)	(1.77)	(2.37)	(1.74)	(1.77)
PERCENT REPUBLICAN	3.664	5.947	4.039	3.665	4.398
	(1.27)	(1.17)	(1.08)	(0.72)	(0.86)
CARBON EMISSIONS	-0.189				
	(-0.05)				
GHG PER CAPITA		-0.427			
		(-0.20)			
SUSTAINABLE TRANSIT			-1.185		
			(-0.52)		
CLIMATE AWARENESS				-2.039	
				(-1.21)	
ADAPTION PLAN					-1.481*
					(-2.01)
_CONS	-46.545	-728.609	-612.388	-459.171	-494.958
	(-0.15)	(-1.23)	(-1.51)	(-0.80)	(-0.87)
R2	0.887	0.775	0.806	0.774	0.775
N	1128.000	573.000	1153.000	589.000	589.000

T Statistics in Parentheses = "+ P<0.10   * P<0.05   ** P<0.01   *** P<0.001"

Table 5 presents the coefficients and t-values (in parentheses) for each variable regressed on the dependent variable property crime rates per 100,000. Here hypothesis 1 received partial support from green space (-2.026), which is negatively and significantly related to property crime rates, suggesting that a one unit increase in the total amount of square meters of green open space available per person in an MSA decreases property crime rates by 2.03. Despite a weak and non- significant association, park access (-1.959) indicates that a 1% increase in the population living within 15 minutes of a public park or recreational space decreases property crime rates by 1.96. And EPA cleanup sites (-131.697) suggest that a one unit increase in EPA cleanup sites per square mile decreases property crime rates by 131.7.

In terms of the variables related to renewable energy and toxic release, the results show positive associations with property crime rates. The coefficient for renewables generated is 1.327, suggesting that a 1% increase in clean energy generated within the state increases property crime rates by 1.327 per 100,000 inhabitants. Similarly, the coefficient for renewables consumed is 6.864, indicating that a 1% increase in clean energy consumed within the state increases property crime rates by 6.864 per 100,000 inhabitants. Furthermore, the coefficient for toxic release is 0.068 and statistically significant at the 0.10 level, suggesting that a one unit increase in pounds of toxic industrial waste released into the environment increases property crime rates by 0.068 per 100,000 inhabitants.

The coefficient for carbon emissions is -0.189, indicating a negative association with property crime rates. This suggests that a one unit increase in tons of carbon dioxide emitted per capita decreases property crime rates by 0.189 per 100,000 inhabitants. Similarly, the coefficient for GHG per capita is -0.427, although not statistically significant, implying that a one unit increase in production-based greenhouse gas emissions per capita decreases property crime rates by 0.427 per 100,000 inhabitants. The reduction in property crime rates can be partly attributed to the location of high CO2 and GHG emitters, which tend to be concentrated in remote and isolated regions with smaller populations. Examples of scarcely populated, emissions producing areas include West Virginian coal mines or Alaskan oil drilling projects (Friedrich et al., 2017). Moreover, the success and stability of these industries are crucial for the livelihoods of the residents, as they provide employment opportunities, contributing significantly to the local economy. Therefore, these are areas are incentivized to maintain a level of social control.

For Hypothesis 3, which proposes that communities with greater climate awareness and adaptation plans will experience less crime, the findings are supportive. The coefficients for sustainable transit and climate awareness are -1.185 and -2.039, respectively, indicating that a 1% increase in commuters using sustainable transportation methods and a 1% increase in adults who believe in global warming are associated with decreases in property crime rates by 1.185 and 2.039 per 100,000 inhabitants, respectively. The coefficient for adaptation plan is -1.481 and statistically significant at the 0.05 level, suggesting that cities with a local adaptation plan experience a decrease in property crime rates by 1.481 per 100,000 inhabitants.

CHAPTER FIVE

DISCUSSION

The purpose of this study was to examine areas where sustainable development can alleviate strain contributing to crime at the county level by testing whether sustainable development had any influence on violent or property crime rates. Despite the growing popularity of green-crime theories, few quantitative studies investigate crime conducive stressors brought on by environmental sustainability or the lack thereof. Furthermore, when considering environmental sustainability within this context, well-established theories such as GST have been used sporadically. To bring environmental issues closer to the forefront of orthodox criminology, this study proposes that environmental degradation and climate change be viewed as symptoms of a disconnect between human activity and the inherent functions and structure of the natural world. GST was applied to assess the underlying social problems that both trigger and respond to this disconnect.

To identify which environmental management strategies can mitigate community strain, the study examines whether factors such as access to natural environments, sustainable infrastructure, or enhanced climate awareness and adaptation plans are associated with a reduction in stressors linked to higher rates of property and violent crimes. This study used violent crime and property crime data from annual UCR reports to measure strain induced criminality. Measures for three common sustainable development practices were sourced from indicators used in annual SDG reports in the US. The dependent variables were expected to be negatively associated with green space, park access, EPA cleanup sites, renewables generated, renewables consumed, sustainable transit, climate awareness, and adaptation plan. And positively associated with toxic release, carbon emissions, and GHG per capita. A series of pairwise correlations were run to verify these assumptions, and the variables were further tested through OLS regression analyses to determine the statistical significance of the relationship between sustainable development and crime rates.

The findings partially support reducing strain conducive to crime through nature accessibility. Previous studies suggest that reintegrating elements of the natural environment can enhance perceptions of safety, improve community attachment, and encourage collective efficacy through the creation of public spaces that foster social interaction and physical activity, while alleviating stressors unique to metropolitan settings (Arnberger & Eder, 2012; Stodolska et al., 2011; Powers et al., 2021; Branas et al., 2011; Kruize et al., 2019; Sanciangco et al., 2021; Venter et al., 2022; Shepley et al., 2019; Brownlow, 2006). However, the results for park access indicate that counties with more park accessibility experience a relatively small reduction in violent crime rates and an insignificant change in property crime. This may be due to low levels of residential investment; in other words, community parks are not as effective at reducing the strain experienced by community members who are disconnected or exposed to stressors beyond their immediate physical surroundings. This may be the case in areas where nature preservation is performed with little to no community immersion, which, as Lowrey suggests, creates noncommitted residents (2008).

Although the presence of more green space has practically no effect on violent crime rates, it does appear useful in reducing property crime rates, suggesting that the reintegration of natural environments creates fewer desirable spaces for crimes like theft or vandalism to take place. Additionally, the presence of EPA cleanup sites significantly reduces property and violent crime rates. This effect is likely due to procedural safety measures, including the teardown of hazardous buildings and the evacuation of residents in affected areas.

The variables tested in hypothesis 2 did not yield substantial support. The expectation that less exposure to toxins and cleaner emissions would reduce criminal activity was based on prior research, which suggests heightened exposure to pollution increases community and individual stress, aggression, and deviance (Burkhardt et al., 2019; Hallenberg, 2021; Wesselbaum, 2022). Moreover, policies that incorporated stricter guidelines for the handling of contaminants, greater penalties for offenders, and incentives to deter violations have been shown to benefit governments both politically and economically when applied adequately (Lin et al., 2022; Lu et al., 2020; Nevin, 2000; Stretesky & Lynch, 2004; Zhang et al., 2022). However, these relationships did not manifest as lower violent and property crime rates. While the increase in crime rates was expected in areas with increased toxic release and greenhouse gas emissions, the same effect was present where renewable energy production and consumption had increased. Although there is no direct causal relationship between clean energy and crime, the introduction of renewable energy projects often coincides with other economic and social changes within a given area. Like local conservation strategies, implementing such changes may fail to alleviate strain experienced by residents who are financially or socially disinvested in the area. This is particularly evident in areas where development is followed by processes like gentrification, commercialization, or the acquisition of sought-after spaces for renewable energy production, which can restrict affordability and accessibility. Interestingly, lower GHG emissions had an inverse effect, but in the presence of higher CO_2 emissions violent crime rates increased while property crime rates barely decreased. This may suggest that greater pollution levels are more likely to contribute to higher levels of stress and aggression rather than provide ideal opportunities for theft or vandalism.

Overall, the results of hypothesis 2 indicate a need for further investigation, particularly regarding why areas with greater clean energy investment exhibit a comparable correlation with crimes as those with high emissions. This may become more relevant as the US further invests in urban development and clean energy sources as a way to reap significant economic benefits, including job creation, increased investment, and reduced energy costs. Additionally, such a transition helps reduce the country's reliance on fossil fuels, improving national security by reducing dependence on foreign oil and minimizing geopolitical tensions. Given these advantages, the US has a strong incentive to pursue sustainable development. However, it is crucial to identify opportunities to do so without adding undue strain at the local level to ensure the longevity of such initiatives.

Last, violent and property crimes were negatively associated with sustainable transit, climate awareness, and adaptation plans. Most notably, violent crime and property crime presented statistically significant relationships with having an adaptation plan. Given that climate adaptation plans tend to function as a proposal from the government describing their steps towards slowing environmental degradation and providing sustainable solutions for the future, this may provide a sense of security and stress relief for community members (Fu & Li, 2022; Gagnon-Lebrun & Agrawala, 2006; Bikomeye et al., 2021). While locals may be taking more collective steps towards climate education and sustainable choices, these results for adaptation plans may indicate that governments invested in climate adaptation are generally more successful at mitigating strains associated with criminal behavior. Along these lines, climate policies can cultivate community preparedness and relief by improving public safety, ensuring a level of economic and resource stability, and promoting community investment and resilience.

Based on these observations, I propose the adoption of sustainable policies targeted at addressing environmental concerns in American cities as a means to reduce the aforementioned factors associated with an increased likelihood of criminal activities. Based on the overall findings of this study, it can be inferred that violent and property crime rates are influenced, directly or indirectly, by factors related to the reintroduction of natural environments and by local climate action. Specifically, this study identified nine instances where violent and property crimes exhibited similar directional associations with the independent variables. However, this pattern deviated in only two cases: carbon emissions and green space. The findings indicate that adopting certain aspects of sustainable development is effective in reducing various stressors within communities. In addition to providing support for green space and localized climate action as strain reductive strategies, this study indicates that further research is necessary to investigate the causal mechanisms that link sustainable development to other deviant and criminal behaviors associated with environmental stress.

This study acknowledges several limitations in terms of research and data availability. While sustainable development policies are gaining traction, there remains a lack of comprehensive and consistent information regarding their implementation and impact on communities. The study relies on Metropolitan Statistical Area (MSA) data from SDG reports on US MSAs spanning from 2016 to 2019. The SDGs are widely recognized as a prominent reporting system for measuring sustainable development at domestic and international levels.

However, the data used in SDG reports rely on information collected and reported by various government entities and organizations, resulting in inconsistencies in reporting and measures employed. Consequently, this variation from year to year makes it challenging to analyze long term trends. Furthermore, the availability of recent data is restricted, with some data points dating back over a decade.

Additionally, the study includes controls for poverty, segregation, and demographic variables such as the percentage of the population identifying as Black, the percentage of the population consisting of males under 30 years of age, and the proportion of the county that voted Republican in the 2016 election. While these variables serve as proxies for racial, gender, and political disparities, it is important to recognize that environmental sustainability encompasses a wide range of economic, social, and cultural dimensions that are inherently linked to social equity and justice. By controlling for demographic disparities, there is a risk of oversimplifying the intricate nature of sustainable development and its multifaceted impact on community crime rates.

Another limitation is related to the use of Uniform Crime Reporting (UCR) data, which restricts the study to reported crimes at the county level. This may not fully capture the complete extent of crime in a given area, as not all crimes are reported to law enforcement. Additionally, the UCR data can be influenced by variations in reporting practices and differences in the definitions of crimes across jurisdictions. Furthermore, the UCR only covers eight types of crimes, potentially overlooking other forms of deviant or criminal behavior resulting from strain. These limitations highlight the need for further research and a more comprehensive approach to understanding the relationship between sustainable development and crime rates. This could involve exploring additional data sources, considering qualitative research methods, and examining contextual factors that shape the dynamics between sustainable development and crime within specific communities. Future studies can provide a more nuanced understanding of the complexities and interconnections between sustainable development and crime rates by addressing these limitations.

CHAPTER SIX

CONCLUSION

In summary, this study provides some support for the effectiveness of various sustainable practices in reducing crime rates. The findings reveal that conscious, sustainable efforts by individuals and local municipalities can successfully alleviate community strain, despite mixed results in multiple regression analyses. Interestingly, certain hypotheses gained consistent support, suggesting that criminal behavior is less prevalent in areas where environmental sustainability aligns with local interests. The mixed results across analyses indicate that each dependent variable captures a different aspect of strain-induced criminal activity. Hypothesis 1 focuses on sustainability related to preserving natural environments, hypothesis 2 emphasizes industry sustainability, and hypothesis 3 pertains to individual and community-based sustainable strategies.

Comparing natural environments and enhanced cleanup programs with sustainable infrastructure, as well as environmental awareness and proactivity at the local level, the study suggests that the latter is most effective in reducing criminal activity. This finding aligns with existing literature on social cohesion and collective efficacy. The study highlights that communities less engaged in local sustainability decision-making or devoid of the benefits from new sustainability practices tend to experience greater strain and crime conducive conditions. As overarching stressors, climate change and environmental degradation contribute to this phenomenon.

The overall findings indicate that sustainable development practices related to nature accessibility and localized climate action can potentially alleviate strain within communities and impact crime rates. However, further research is needed to understand the causal mechanisms linking sustainable development to other deviant and criminal behaviors associated with environmental stress. The study acknowledges limitations, such as data availability and consistency, reliance on reported crimes at the county level, and oversimplification of sustainable development's complex nature and impact on crime rates through socioeconomic variables. Future research should explore additional data sources, employ qualitative methods, and consider contextual factors to understand the relationship between sustainable development and crime rates fully.

In conclusion, this study provides an introductory step towards understanding the interconnectedness between strain-induced crime and environmental sustainability, providing insights that inform local policymaking aimed at mitigating the adverse impacts of environmental degradation and climate change on communities. The research highlights the crucial need for current sustainability projects to be not only theoretically feasible but also practically achievable, aligning with Campbell's (1996) emphasis on the importance of decision-making that avoids relying too heavily on vague approaches or idealized views of the past. Achieving successful environmental harm reduction requires approaches grounded in local and collaborative networks that address specific community issues and incorporate shared values and interests. Strengthening local connections and identities through environmental discourses is crucial, especially in rapidly urbanizing areas where neighborhoods become impersonal, and social disorder and environmental strain may accumulate (Sampson, Raudenbush, & Earls, 1997). Moreover, sustainable actions should encourage equitable participation and distribution of benefits (Stodolska, Shinew, Acevedo, & Izenstark, 2011), while recognizing that community-level efforts have limitations in addressing broader systemic issues and external factors beyond their control.

In sum, embracing sustainable development not only addresses environmental concerns but also has the potential to alleviate strains that contribute to crime and disorder. By investing in environmental support, engaging communities, and addressing social dynamics, localities can strengthen their connections, preserve livelihoods, and contribute to the long-term well-being of humans, other species, ecosystems, and the planet.

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