Do cities utilizing smart growth principles have less crime?

By

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Abstract

Smart growth is a building practice that goes to maintain and build better cities by placing housing and transportation options closer to shops, schools, and jobs. This study assesses whether cites utilizing smart growth principles have less crime. Through statistical analysis, this study attempts to show the statistical patterns of crime and their changes within areas utilizing smart growth principles. In order to investigate to what extent crime can be explained by the presence of smart growth principles, crime data was put together with other city demographics and physical characteristics. The results of this study shows varying results, suggesting cities utilizing smart growth principles could play a positive role on crime rates, which would complement existing knowledge and toolset in the literature and could potentially help local governments to attract more funding for smart growth development.

Introduction

Smart growth is an ever advancing and important topic in urban planning; a topic that involves many of today's pressing issues in the economy. Smart growth is a way of building communities in a more compact and efficient way by combining residential property with other types of properties, encouraging people to live nearby where they work. This cuts down on the dependence of the automobile and promotes closer social ties because people live in higher density areas together (Perdue, 2004). In areas utilizing smart growth, there seems to be a connection between closer living and lesser crime. When people live in smart growth community, the "neighborhood watch" effect is strengthened with more eyes to look upon surrounding property and citizens. The Environmental Protection Agency (EPA), through multiple publications, (EPA, 2002; EPA 2009) has identified the benefits of smart growth to the environment and economy of a community. Relatively few studies have shown the consequences of neighborhood densities for urban populations, particularly for the prevalence of crime (Browning, 2010). By demonstrating that crime rates are lower in areas of smart growth communities, policy makers can use this knowledge as another tool for more funding and to advance smart growth into more cities. The public plays a large role in advancing the smart

growth issue (EPA, 2009), and they are also important in spreading knowledge about smart growth. As open spaces in urban and suburban areas are disappearing, building with smart growth principles appears to be a possible solution, its benefits have the ability to last and prosper into the future. More funding and knowledge about the subject will allow for more grants regarding smart growth (EPA, 2009).

In the post world war era, cities were planned in a simple, yet inefficient way (Browning, 2010). Residential areas were separate from commercial areas, which also were separate from industrial areas. As a result, people saw cities in much divided sectors. This was an attempt to buffer residents from different sectors, for example commercial from residential (Perdue, 2004). This "solution" has led to increasing cases of urban sprawl. Urban sprawl is building out on areas that are undeveloped, often in ways that do not use land in an efficient manner (Perdue, 2004). This spaced out style of building makes communities overly-dependant on long distance transportation. An "island effect" is thus observed from the separation of different sectors, making automobiles the only method to navigate to subdivisions, shopping, and commercial locations (Norquist, 1998). With specific sectors of cities, the dependence on vehicles and thus fossil fuels becomes greater (EPA, 2009).

When policy makers have to make choices they often have to research hard to make the best decision. This involves looking at past studies and looking at all the information available. If a policy maker can demonstrate reliability through use of a local example it is even better (EPA, 2009). This study should be used as a resource to determine why smart growth is good for America and should be utilized more in the future. Studies within urban planning and smart growth have shown that there are closer knit communities with smart growth (EPA, 2009). Yet very few studies have made the extra step to show that with closer knit communities, there is less crime (Browning, 2010). More information regarding smart growth needs to be available so policy makers make informed decisions, decisions they will not regret down the road. The future of smart growth does not just lie in the hands of policy makers if the more common citizen is aware of the benefits of smart growth, steps can be made in the right direction (EPA, 2004). Existing data regarding urban sprawl demonstrates that people cannot continue to live in density inefficient communities (EPA, 2009); policy makers and citizens need to look at life in a more

sustainable manner. Through past studies and case study examples (EPA, 2004), policy makers can be confident that communities utilizing smart growth are taking steps in the right direction.

This study examines crime in communities utilizing smart growth principles. There are numerous variables that go into what affects crime rates in an area. This study will eliminate extraneous variables that are shown to have minimal affects on crime data. The results from a study like this one have a potential to contribute significantly to the area of urban planning and the trend of smart growth. Outside the urban planning profession, many people are unaware of smart growth and the affects it can have on a community. By studying the link between smart growth and crime, this paper will examine if there is lower crime in areas where smart growth is implemented. If a positive relationship between smart growth and lower crime rates can be demonstrated, more funding may become available for smart growth. This study may also be used as a placement tool for future communities to utilize smart growth principles.

Literature Review

There are multiple ways in which present conventional building can be seen as problematic. Often time's conventional building does not take advantage of its land to the fullest and leaves areas in which are unsustainable for the future. Table 1 shows the common flaws of conventional building. Separated land use is a extensive issue in conventional building because it naturally involves more automobile use. If citizens do not live near their place of employment more fossil fuels will needed in order to commute back and forth. This then results in further environmental and economic impacts. Inefficient building styles along with few housing choices makes it difficult for people of all incomes to live in conventional communities. In order for businesses to survive in smart growth communities, there needs options for lower, unskilled workers to live as well (EPA, 2009). The dire parking situation in conventional style building is a result of poorly designed regulations and inadequately planned streets. Often times parking lots are made to be comparable to that of football fields, thus increasing the amount of impervious surfaces that can be detrimental to storm water management and infiltration (EPA, 2009). Through smart growth initiatives, parking and improved streets can play a positive role in the environmental and economic impacts from impervious surfaces and storm water management. Overall, conventional building practices leave communities that are unappealing

because there is larger amount of wasted space. Smart growth goes to change this by offering a more developed and more aesthetically pleasing look to communities.

The EPA believes that there is a variety of factors that go into a smart growth community. Overall communities utilizing smart growth principles are made to be more efficient and more sustainable in the future (EPA, 2009). Cities and communities utilizing smart growth principles have also seen other problems solved, problems often stemming from post world war development where urban sprawl was increasing dramatically (Browning, 2010).

Table 1: Showing the conventional post world war problems and the way smart growth intends to solve these problems.

Problem	Smart growth Solution
Separated use land	Mixes land use to combine residential and commercial together
Inefficient building styles	Compact building designs
Few housing choices	Variety of housing options for all incomes
Automobile dependency	Walk able and bicycle friendly communities thus reducing obesity
Unappealing communities	Developed, aesthetically pleasing communities
Parking	Efficient parking options
Poorly designed streets	Streets that are safe and adequate for all types of transportation
Crime	**Closer social ties --> less crime???**

Smart growth involves mixed land uses. In post world war development, land was readily available and jobs were abundant in order to build (Perdue, 2004). In addition, inexpensive fuel created spaced out style building which thus made communities overly-dependant on long distance transportation (Perdue, 2004). With specific sectors of cities, the

dependence on vehicles and thus fossil fuels becomes greater (Edwing, Pendal, & Chen 2003). Smart growth goes to correct this problem. The smart growth trend looks to combine all types of planning into one mixed community. This means that combining different types of development with more compact designs and combining residential with other types of developments to create ideal places to live (EPA, 2004).

Figure 1: Comparing the conventional way of building (left) to a well integrated city of mix use development (right).

Another concept of smart growth is compact building designs. Americans are using more land than ever before, during the last two decades of the 20th century, Americans developed land three times faster than we grew as a nation (Perdue, 2004). Developments in metropolitan cities such as New York City, New York and Portland, Oregon utilize compact building designs. On the street level, there are shops and boutiques where people can walk and shop from the sidewalk. On the second and upper floors there is residential living for families and others to call home. From 1993 to 1999 the average square footage of a home in the United States has risen over 200 ft, a 12 percent increase in just six years (EPA, 2004). With more compact building designs, people are more likely to walk than commute via an automobile (EPA, 2004) In a study in California that created more compact communities, which doubled its household density, it had the effect of reducing vehicle travel by 20 to 30 percent (EPA, 2009). Residents in this example were able to use alternative methods when it came to commuting to work and other

places. With compact building designs, there is less wasted space and buildings are more efficient (EPA, 2009).

Smart growth also offers a wide variety of housing options. When communities start to utilize their infrastructure and designs more efficiently, it becomes essential that they meet the housing needs of everyone in the community (EPA, 2004). By this, all levels of income are able to find housing and be satisfied with where they live (EPA, 2004). Moving away from the post world war two era style housing is crucial when it comes to the development of smart growth, times have changed, and housing needs to reflect this. When we look into the brief future, we will see that one in five American will be elderly. By 2030, we will have many older citizens who are unable to drive automobiles and take care of expansive backyards (EPA, 2004). It is important that there is a variety of housing options not only in new housing developments but also in existing housing as well. The changing of zoning and building codes would allow more options and additional units to become available on existing houses (EPA, 2004). Everyone in a smart growth community must be able to find a housing type that satisfies them (EPA, 2004).

One of the most essential parts of the smart growth movement is having walk able communities. Residents need to be able to walk to work, school, parks, stores, and other places. The benefits of walk able communities are abundant. Walk able communities enhance the mobility of a neighborhood, reduce negative environmental consequences, strengthen economies, and support stronger communities through improved social interactions (EPA, 2009). Walk able communities with sidewalks and bike paths allow residents to get to places they could not before without the use of an automobile. With more people walking, the health of the residents would also improve (EPA, 2009). With non smart growth building designs, physical activity was discouraged and access to healthy options was more difficult to obtain (Perdue, 2004). Inactive lifestyles combined with dietary choices have increased the widespread occurrence of obesity in Americans to the top of public health agendas (Maclennan, 2004). The centers for Disease Control and Prevention reported in 2002, that lack of physical exercise in addition to poor eating habits was responsible for 400, 000 deaths (Maclennan, 2004). Communities utilizing smart growth principles encourage exercise by not making automobiles their only option to get to work or to other places in town (Maclennan, 2004).

With more people walking and less people commuting by automobiles, this would improve the air quality in the community. If there are automobiles driving on the roads, there is also less dangerous air emissions. The dependence on fossil fuels will also decrease if fewer cars needed to be driven. There would less automobiles being on the road, there could also be developments to make parking lots smaller and streets narrower (EPA, 2004). Less automobiles and less dependence on high cost fossil fuels would increase disposable income to individuals living in the community, thereby increasing the likelihood of increase spending and increased sustainability of the community.

Unfortunately there are a lot of barriers that prevent the expansion of walk able communities and neighborhoods (EPA, 2009). Conventional land use prohibits the mixing of land uses, thus making trips and commutes longer. Local governments need to reevaluate their regulations dealing with land use (EPA, 2009). The current regulations regarding land use in many cities are outdated. The outdated regulations were created during the post world war era and need to be updated to become more sustainable (EPA, 2009). There have been radical changes in society and life from the post world era to now and the regulations regarding land use and zoning need to coincide with that (Perdue, 2004).

In order to ensure the success of a smart growth community there is a responsibility by its residents before the development begins (EPA, 2004). Forums and workshops should be held in the community before the development on a community commences. This is the best way to see what residents need and want in their community, residents know first-hand what is needed and what can be overlooked during construction (EPA, 2004). It is also the role of the policy maker and other local government employees to ensure that ordinance and other regulations are in line with smart growth.

A common concept that is often overlooked when it comes to smart growth is how aesthetically pleasing smart growth communities appear. Planting trees throughout the community and preserving all the trees possible during construction are priorities in communities utilizing smart growth principles (EPA, 2009). Trees play important environmental, aesthetic, and economic roles in contributing to vibrant and healthy places to live (EPA, 2009). Trees along the sides of roads and sidewalks are utilized to filter out noise from automobiles on the streets as well as pollution (Maclennan, 2004). Trees make communities and streets more

inviting for people to come to start businesses and shop (EPA, 2009). Storm water and runoff can be approved through the proper planting of trees (EPA, 2009). Trees are invaluable in smart growth construction and add more than just curb appeal to communities.

In addition to trees, designated parks and open space are planned throughout smart growth communities (EPA, 2009). These open spaces not only add to the aesthetic value of the development but also go to promote community amongst residents, and have considerable environmental benefits (EPA, 2009). These open locations are typically centered in the middle of the neighborhood for a spot to gather together and involve in social interactions (EPA, 2009). Sidewalks are no exception to the planning aspect of smart growth. Permits and regulations need to be aligned with vendors and businesses to allow for sidewalk service (EPA, 2009). Dining on the sidewalk is appealing and a way to attract customers to restaurants. Sidewalks need to be widened in areas where restaurants are located; however current regulations do not allow this expansion (EPA, 2009)

Along with open spaces, community spaces are also be utilized to bring residents together in a central place (EPA, 2009) When a central community space is made this can be a location for people to come together and interact with each other. Parties, fairs, and other community events can be held at these spaces; activities on the weekends can also be offered within the community space including farmers markets, local produce, and outdoor theatres (EPA, 2009). These community spaces offer a vibrant place for residents to interact with each other and offer a strong sense of place within the community. (EPA, 2009)

In smart growth communities, parking is also addressed. At stores like Wal-Mart and Target, the parking lots are immense. As economist Donald Shoup explains in his book, *The High Cost of Free Parking,* these parking lots are enormous for no logical reason; at best they are only filled half the way during peak hour. So why are these parking lots so large in the first place? The answer is minimum parking requirements as proposed by the cities. For a store such a Wal-Mart, a minimum number of spots needs to exist to accommodate customers when the store is a maximum operation. This situation rarely ever happens leaving typically a hundred parking spots empty. Cities need to come up a formula specific to cities that will allow people to have and park cars, but encourage people to use other forms of transportation. A parking fee or permit may entice citizens to explore other option of transportation other than automobiles.

Current parking minimums are far too high for today's population and are outdated, with the current gas prices more people are carpooling and using less cars (Shoup, 2005). Large parking lots contribute negatively to the environment because they are large areas of impervious surfaces (Arnold & Gibbons, 1996). These surfaces don't allow for the infiltration of storm water. As a result, there becomes a buildup of storm water in other parts that may not necessarily be able to handle the rain. When it comes to parking lots the negative aspects of coal-tar based sealants are becoming well known. When contractors build a parking lot, in order to make the parking lot aesthetically pleasing, they put a black seal coat on the parking lot. Over time, with automobiles making turns and stopping on the pavement, the sealants starts to wear off and chip off, with particles of the coal-tar sealants washing or blowing away (Arnold & Gibbons, 1996). This very sealant, that has been known lead to cancer, is being washed into our storm water drains and being blown up into the air. There are alternatives to these coal-tar based sealants that last nearly as long and don't have any of the negative aspects like the coal-tar sealants. The EPA is currently dealing with situation and as a result you will see many cities, like a few already, set bans on these types of sealants in their cities.

Streets that are designed in a better and more productive fashion are typically more eco friendly manner as a result (EPA, 2009). In order to address the problems with streets, like other topics in smart growth, local ordinances need to be reformed in a manner that is smart growth friendly (EPA, 2009). Streets can be developed in a multitude of ways, but they should have key characteristics similar throughout each (EPA, 2009). Streets need to be developed in a way that is productive not only to automobiles, but to bicyclists and pedestrians as well (EPA, 2009). Streets should also be built in a way that is eco-friendly. Green streets are becoming more and more popular for their storm water management. These streets have reservoirs pre built inside them so they limit the amount of runoff towards local rivers and ponds. Trees are also a part of green streets as they provide shade to cool the street and sidewalk and improve air quality (Maclennan, 2004). Parking is the last characteristic similar throughout all new developed streets. More on street parking adds value to local properties, but also makes safer streets to walk on (Browning, 2010). Expected benefits from newly developed streets include streets that are safer for thee motorist, people on bicycles, and pedestrians. There is less storm water runoff and a reduction in the environmental footprint of so much impervious pavement. People are

more willing to walk if they know they will be safe and the location is more aesthetically pleasing.

It is apparent that urban sprawl has many negative consequences. The post world war two style of housing is not efficient anymore (Perdue, 2004). Smart growth is a possible solution to outdated style building. Of the many benefits of smart growth communities, closer social ties are also perceived. One would conclude, when there are closer social ties, this would trend towards lower crime rates (Maclennan, 2004). The way that smart growth communities are laid out, they deter crime. With more people walking to get to place to place, the perceived safety factor would increase because people are less apt to commit crimes in a crowded place (Browning, 2010). Neighborhoods that are more densely populated, more people are drawn onto the street. This effect keeps a constant "eye on the street" because there is a steady stream of pedestrians (Browning, 2010). This is demonstrated in Jane Jacobs 1964 book *The Death and Life of Great American Cities.* Christopher browning sums up the interaction of residents and street safety:

> "Active streets that draw the participation of residents in neighborhood public life result in casual but consequential acquaintanceship networks among neighbors, business owners, and regular users of the streets. The contacts that feed such networks are exemplified by the largely trivial but routine interactions associated with errand running, dog walking, passing children using a regular play space, and other activities of daily urban living. The result of ongoing public contact is "a web of public respect and trust" and an "almost unconscious assumption of general street support when the chips are down" (Jacobs 1964:56)."

When there are more people on streets, people all share a piece of the safety on it. A good samaritan in a neighborhood would not let crime happen within a neighborhood without resistance. The concentration of people on any given street is thought to reduce the prevalence of crime (Browning, 2010).

Crime

Change in Activities

There have been many changes in American culture in the past 50 years which have affected crime rates. Economic and social development in the United States have brought change in routine activities, especially pertaining to the dispersion of activities away from the home, thus heightening opportunities for crime (LaFree, 1999). With the advancement of the

internet and technology, we have seen differences in the types of crimes occurring. Easy-to-steal items such as electronics and items easily turned over to cash have been more widespread (LaFree, 1999). The use of credit cards has also reduced the amount of targeted property crimes in recent years (LaFree, 1999).

Prisons and incarceration rates have also played a role in the dispersion of crime over the years. From the end of the World War II until the mid 1970's, imprisonment rates in the United States hovered around 100 prisoners per 100,000 United States residents (U.S Bureau of Justice Statistics, 1997). However, from 1974 to 1996, United States imprisonment rates have nearly quadrupled. (LaFree, 1999) One can make the argument that punishments and sentencing have been getting harsher over the years. A possible explanation for increased prisoners in recent years is the privatization of prisons (Useem & Goldston, 2002).

After the World War II era, we have also seen a difference in family structure. No longer is just the husband working in a family. Women are working as well to support families, meaning more time spent away from the house (LaFree, 1999). The relationship between parents and children also must be taken into account when discussing crime. Children that care about their families are more likely to avoid behavior they know will bring shame and distress for their family (Hirschi, 1995). Strong family ties also reduce crime because there are more people around the home to protect each other. This helps ward off potential harm from muggers and other possible criminals (Hirschi, 1995). After 1960's there have been fundamental changes in the amount of Americans living outside of families. The rates of divorce, children born to unmarried parents, and single parent households have increased (Goldscheider & Waite, 1986).

Economic Stress

Economic Stress on the American population has been shown to increase crime (LaFree, 1999). Poverty, lower median incomes in an area, and high unemployment rates in an area are thought to increase crime. Poverty is known to cause additional stress on people in communities (LaFree, 1999). In a 1999 study, Gary Lafree concluded based on national crime rate data from the early 1960's to late 1970's; postwar crime rates were specifically linked with political, family, and economic change (LaFree, 1999). As people have less material goods, this may cause people to branch out to theft and robbery in order to acquire these goods (Brill, 1999).

Areas with lower median income are at more risk for crime as they are associated with areas of poverty. The direct relationship between crime and unemployment has been more difficult to show in communities (Baron, 2008). Young men are already likely to break the law than most; having more free time, more motives and less to lose (Economist, 2011). A number of researchers have reported to have identified a causal link between increased youth unemployment and increased crime, specifically regarding property crime (Economist, 2011).

Climate

It has been shown that crime is not directly related to temperature and humidity. Crime rates are more strongly related to the psychological stress resulting from an uncomfortable climate, the psychological stress theory (Cheatwood, 1995). For example, the psychological state of mind of a person on a cold, rainy day would be different than that of a person on a warm, sunny day. People also tend to stay inside their homes on rainy days instead of going outside; this also can go to limit the amount of crime on days like this (Ikegaya & Suganami 2008). In 2008, Ikegaya and Suganami conducted a study in eastern part of Tokyo to see if there was a connection between weather and crime. The study used data from 204 cases of murder and bodily injury resulting in death and 58 cases of hit and run accidents. The authors of this study concluded that climate plays a negligible role in the amount of crime in a city (Ikegaya & Suganami 2008).

Education

Education attainment and crime have been shown to be related. The more education attainment an individual has, the less likely he or she is to commit crime (LaFree, 1999). There is a well know tendency for offenders to be drawn from those with low levels of educational attainment (Elliot, 1966). The longer children are in school the less likely they are to get caught up with crime. Schools can reduce crime by effectively monitoring and supervising the children under their custody. Research shows that juveniles are less likely to engage in crime if they are involved in and are successful in school (LaFree, 1999). The San Diego Police department's 2001 annual report indicated that juvenile arrests during after school hours went down 13.1 percent as a result of after school programs. This was down from the previous year where there was an absence of after school programs (Ferrin & Amick, 2002).

Population

Many factors regarding population play a role in crime in cities. When considering a population of a city, the age of a population plays a factor. Young people ages 14 to 34 are at highest risk for committing crimes. Of 24 longitudinal studies on the effects of age structure on homicide reviewed by Marvell & Moody (1991), 19 reported a significant positive relationship with the proportion of young people aged 14 to 34. Of these 19 specific studies 16 of 19 studies found there to be strong and moderate correlations with crime rates and age (LaFree, 1999). Crime is further shown in figure 2 to be concentrated in lower ages between 14 to 34. Males have also been shown to commit more crimes than females (LaFree, 1999). In 1995, there were 1,104,074 sentenced prisoners. According to the Bureau of Justice statistics in 1995, only 6 percent of prisoners were women. This is compared to women comprising a total of 51 percent of the total population in the United States.

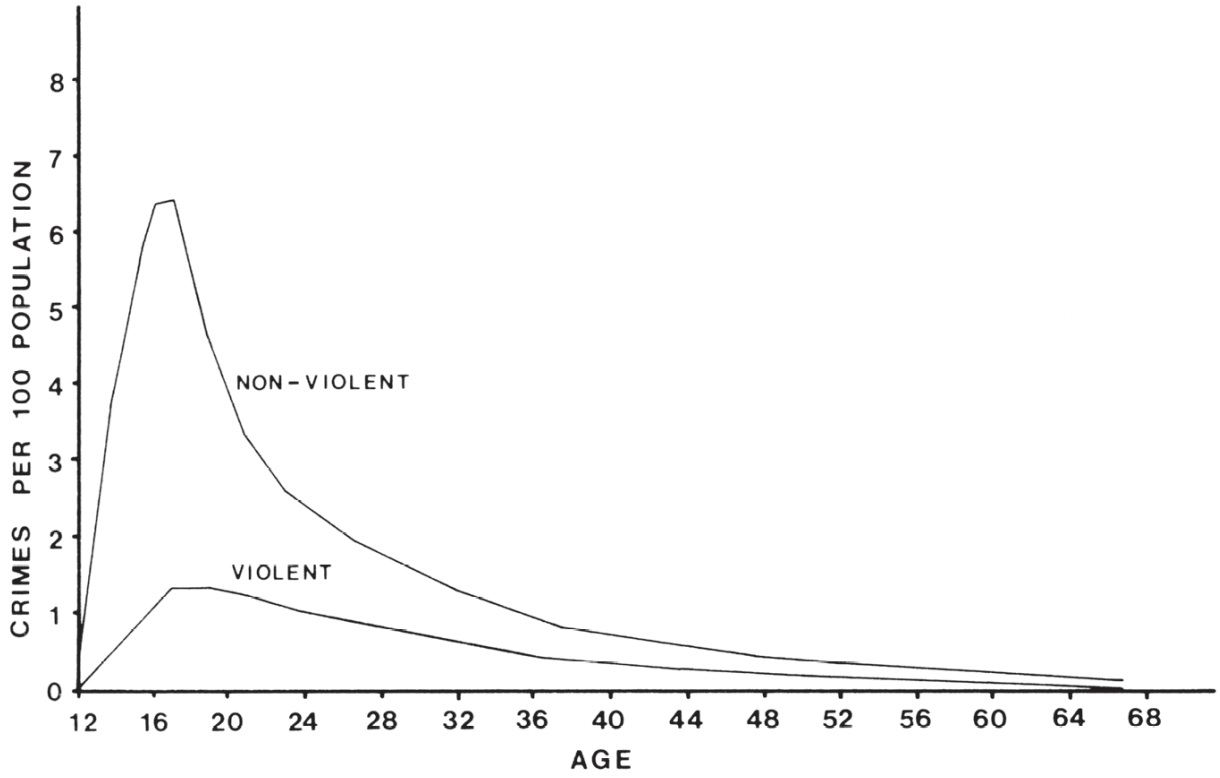

Figure 2: Violent and Non-Violent crimes with age breakdown, 1946-1997; data supplied by the U.S Federal Bureau of Investigation “Crime in the United States”.

Other Factors

There are a multitude of different factors that could affect crime rates from the majority race of a community to the number of community centers in area (LaFree, 1999). With this being said, it is nearly impossible to account for all of these into a study. Economic stress, climate, education, and population are the four factors that have been identified as being the most prevalent factors in communities (Economist, 2011; Elliot, 1996; Ikegaya & Suganami 2008; LaFree, 1999). Based on the literature reviewed on both smart growth and factors of crime, a hypothesis was conceived and a number of different analyses were run to evaluate this subject. Therefore, cities that utilize smart growth principles will have less crime.

Methodology

To address the question of whether cities utilizing smart growth principles have less crime, multiple sets of case study examples were used. Select case studies that have been recognized by the EPA as excelling in the area of smart growth were compared against similar cities not utilizing smart growth principles. Cities selected for excelling in smart growth must have been awarded the overall excellence achievement in smart growth, an annual award to be included in the study. This award is judged by many criteria including innovative polices and strategies that strengthen economies, programs that provide a wide variety of housing and transportation choices, developing concepts that bring multiple benefits to citizens, and protecting the environment. Three sets of two case studies will be used comparing crime rates between cities. Prior and post crime rates from when a smart growth award was received will be measured between two contrasting cities.

Case Studies

In this study, a total of 6 cases studies were used as shown in table 2. The initial three case studies deal with smart growth directly. These case studies have been chosen by the EPA to excel in at least one or more aspects in smart growth. The final three case studies examples were

chosen to compare and contrast against the initial smart growth examples selected out by the EPA. In all examples, all of the outside variables and factors (population size, geographical location, and climate) were intended to be held constant.

Table 2: A total of six cities were used for this study. Three pairs of smart growth and non-smart growth cities with were compared and contrasted throughout the study.

City	Smart growth award winner?	Year of award if applicable	Population (2000 Census)
Portland, OR	Yes	2007	529,121
Seattle, WA	No	n/a	563,371
Wichita, KS	Yes	2006	344,284
Tulsa, OK	No	n/a	393,044
Winooski, VT	Yes	2006	6,561
Springfield, VT	No	n/a	9,078

Portland, Oregon

Portland, Oregon is a city that is well known for smart growth. This city was awarded the overall excellence for smart growth in 2007. In the year 2000, there was a total population of 529,121 people. Whites are the largest race in Portland, consisting of 73.5% of the population (source – U.S Census 2000). With the close proximity to the ocean, Portland's climate is consistent with warm, dry summers, and wet and mild winters. The average age in Portland is 35. The median income for a household is $40,146. For the population of ages 25 and over, 32.6% of people have a bachelor's degree or higher.

Seattle, Washington

Seattle Washington is located on the west coast and is the largest city in the region. The total population of Seattle in 2000 was 563,371. The largest race in Seattle is white with 69% and asian is second with 13.1% (source – U.S Census 2000). Seattle's climate is considered to be typical of the marine west coast with warm, dry winters and wet, mild winters. The average

age in Seattle is 35. Seattle's median income for a household is $45,736. For the population of ages 25 and over, 47.2% of people have a bachelor's degree or higher.

Wichita, Kansas

Wichita, Kansas was awarded an award in smart growth in 2006. This city is located in the Midwest and had a population of 334,284 people in 2000. Wichita's racial breakdown includes 67.7% whites, 13.3% hispanic, and 10.5 % blacks (source – U.S Census 2000). With Wichita being away from large bodies of water and mountains, its climate is characterized by hot, humid summers and cold, dry winters. Wichita has an average age of 33. The median income for a household is $39,939. For the population of ages 25 and over in Wichita, 25.3% of people have a bachelor's degree or higher.

Tulsa, Oklahoma

Tulsa, Oklahoma is the second largest city in state of Oklahoma. The city had a total population of 393,044 in 2000. According to the U.S Census in 2000, whites made up approximately 60.7% of the population, blacks making up 15.2% and hispanics at 13.2%. Tulsa follows a temperate climate. The four seasons are clearly defined with cold, dry winters and hot, rainy summers. The average age in Tulsa is 34. Tulsa's median income for a household is $35,316. For the population 25 and over, 28.3% of people have a bachelor's degree or higher.

Winooski, Vermont

Winooski, Vermont is a relatively small city with a population of 6,561 in 2000. Winooski was awarded a smart growth achievement award in 2006. Whites dominate the racial breakdown in Winooski with 88.7% and asians come in second at 4.7%. Winooski, Vermont has distinct four seasons with mild summers and cold winters. Precipitation tends to be moderate in all seasons. Winooski has an average age of 33. The median income for a household in Winooski is $30,592. For the population 25 and over, 22.9% of people have a bachelor's degree or higher.

Springfield, Vermont

Springfield is another relatively small town situated in Vermont which had a population of 9,078 in 2000. The racial breakdown in Springfield is very one sided, with whites controlling 96.5% of the population and hispanics coming in second at 2.2% of the population. Springfield is very similar in Winooski, as it also has four distinct seasons with mild summers and cold winters. The precipitation also tends to be moderate within all four seasons. The average age in Springfield is 32. The median income for a household is $33,031. In Springfield, the population of ages 25 and, 13.8% of people have a bachelor's degree or higher.

Data Acquisition

Three smart growth cities were selected from the EPA's yearly publication, *National Award for Smart Growth Achievement.* The publication chooses 4 cities each year that excel in different aspects of smart growth principles. Since 2002, these awards have been given out to various cites across the country. For this study, award winning cities have been chose from 2006 and 2007. The three remaining non smart growth cities were selected to be comparable to selected smart growth cities. Population and geographical location were attempted to be held constant between locations. The population and racial breakdowns for different cities was based on the U.S Census Bureau statistics from the year 2000.

Crime data was acquired through the Federal Bureau of Investigation (FBI). Each year the FBI creates *Crime in the United States (CIUS)*, a publication that provides a variety of crime statistics including violent crime, property crime, and hate crime. This publication reports statistics for an assortment of locations such as states, cities, and colleges. This study specifically analyzed violent crime from the city level. According to the FBI's Uniform Crime Reporting (UCR) program, violent crime is composed of four offenses: murder and manslaughter, forcible rape, robbery and aggravated assault. Violent crimes are defined in the UCR program as those offenses which involve force or threat of force (FBI, 2010). These publications are available by mail by request, however were acquired from the FBI webpage

(http://www.fbi.gov/about-us/cjis/ucr/ucr). Once at the UCR webpage, links may be followed to each CIUS publication dating back to 1960. After a specific year was selected, table 8 (offenses known to law enforcement) within the "violent crime" portion of the page was downloaded in order to view violent crime offenses by city.

In order to standardize the data, an equation was used to calculate crime rates per 1000 people:

((Total Number of Crimes) / (Population/1000))

For example if the crime rate was 4.5 in a specific city, this would mean that 4.5 crimes occur per 1000 people.

Statistical Analysis

To analyze the crime rate data, Statistical Package for the Social Sciences (SPSS), a computer program used for statistical analysis was utilized. Specifically for this study, a one way ANOVA was used for this dataset. The one-way ANOVA function compares the means of one or more groups based on an independent variable. For the statistical analysis, a one-way ANOVA was run to compare the crime means of the different cities and their time periods whether being before or after the issuance of a smart growth achievement award.

The data was divided into a total of 12 separate groups. There were six total studies to be compared with a before and after period for each case study. Three years worth of data before and after each smart growth award winner was used. This allowed for an understanding about crime rates before implementation of smart growth principles and then their effects on crime rates after implementation. These 12 separate groups were run as the dependent variables in the equation with crime rates as the independent variable.

A separate sub-test within the one-way ANOVA called a Tukey B test was also run. The Tukey B test compares the means between each other and looks for comparisons between means. The means that are significantly different from each other will be identified from this test.

Results

Statistical Analysis

The results from the one-way ANOVA did offer an advisable explanation for crime rate as varying results were shown. Smart growth case studies showed 2 out of 3 cities having less crime after smart growth development, non-smart growth cities also showed 2 out of 3 cities having less crime after the smart growth award. The one-way ANOVA resulted in F = 86.83 and p = .00 (see tables 5 & 6). The p value in this test is significant because it is below the .05 criterion point. The greatest decrease in crime was shown in the smart growth case study city of Portland, changing by 1.37. The greatest increase in crime was shown in the smart growth case study city of Wichita with an increase in crime rate by 1.64 crimes per 1000 people. Tukey B testing is included in the appendices (Table 1 through 5).

Table 3: Shows the results from the one-way ANOVA that used for this study comparing smart growth and non-smart growth cities.

City (before or after)	Number	Mean (Crime Rate)	Std. Deviation	Std. Error
Portland before	3	7.40	.17	.10
Portland after	3	6.03	.41	.24
Seattle before	3	6.90	.34	.20
Seattle after	3	6.40	.45	.25
Wichita before	3	7.76	1.09	.63
Wichita after	3	9.40	.40	.23
Tulsa before	3	11.90	.85	.49
Tulsa after	3	11.67	.76	.44
Winnoski before	3	3.46	.25	.15
Winnoski after	3	3.33	.67	.38
Springfield before	3	2.43	.35	.20
Springfield after	3	3.16	.68	.39

Table 4: The one-way ANOVA resulted in F = 86.83 and p = .00. The p value in this test is significant because it is below the .05 criterion point.

	Sum of Squares	df	Mean Square	F	Sig
Between groups	340.96	11	30.99	86.83	.00
Within groups	8.57	24	.36		

Discussion

Summary of Main Findings

The results of the statistical analysis showed varying results when analyzing if cities utilizing smart growth principles have less crime. Both 2 out of 3 smart growth and non-smart growth cities showed decreased crime rates after a smart growth award was given. The largest increase in crime rates was shown actually in a smart growth city (Wichita, KS) and not in a non-smart growth city as expected.

The only outlier in the data set was Wichita, Kansas, which by expectation; the crime rate would decrease as a result of smart growth. This was not the case, actually showing the opposite with an increase of crime rate by 1.64 crimes per 1000 people. There are plenty of factors that could account for this increase in crime rate. There could have been more gang activity in the recent years within the city with higher percentages of certain races or total population. There could have been a dismissal of police officers in one of the years after smart growth implementation resulting in less crime. There could just flat out be budget cuts in the city that could lead to numerous problems including higher crime. The list is possibly endless and further research into events occurring in Wichita is needed to formulate a explanation.

Possible Errors in Study

There were many challenges in this study. The first challenge in this study was acquiring the ideal data to be used through geographical information systems (GIS). The data required for analysis with GIS is point data consisting of crimes that have occurred in specific years. Point data can be overlaid with cities utilizing smart growth principles to identify and reveal patterns and trends. Through using GIS's many functions, users can identify hot spots of crime and see if these are in areas where smart growth has been implemented. Addresses or locations of crimes that have occurred in certain areas were not available for download. If addresses of crime incidents were available for download, users could geo-code this data to make point data, the ideal data for this study.

There were further problems acquiring data when it came to the FBI's crime dataset. The webpage indicated that crime data was available until the year 1960. Only data up until the year 2002 was able to be downloaded due to a modification in formatting. Due to this technical difficulty, only 3 years before and after smart growth implementation was able to be analyzed instead of recommended 5 years, which was originally planned.

Difficulties also occurred when choosing the different case study cities that implemented smart growth principles. Some smart growth award winning cities were large cities like Portland; however the majority was smaller cities. This turned out to be challenging because the FBI's crime report did not typically list cities smaller than 10,000 people. Originally it was thought to involve three cases consisting of a large population city, a medium population city, and a small population city for analysis. The data of smart growth cities from the EPA does not allow for this type of study. It was then difficult to choose cities that were similar because the effects of outside factors on crime rates. It was determined that population and climate were the most efficient factors in this study to be held constant. There could be dozens of other factors that could have had an influence on crime rates that were not examined for this study

Limitations played a considerable role in this study and would play significant roles in future studies as well. The main limitations occurring in this study were the factors of crime rates that I held constant in this study. Population and climate were the only two factors influencing crime rates that were held similar between the different case study examples. These two factors were choose because they are easy to pick out and are broad enough to make a connection to. For example, majority of people know the difference between a small versus

large city and the difference between a cold versus warm climate. It is acknowledged these factors are two of the many factors that can have an influence on crime rate. Obviously there are numerous factors, possibly infinite if you get specific that could affect crime rates. For this study only two were held constant because the more variables that are held constant, the more and more difficult it is to find worthwhile case study cities to use as examples.

There are plenty of lessons that can be taken away through the completion of this study. Based off struggles with data acquisition, acquiring the right data needed for the study needs to be the first priority of the study. The right data set would include a list of crimes that have occurred in a city. These crimes would be in a table format to include the address, date of offense, and type of offense. From this it would be effortless to manipulate the data to show areas of high crime concentration, specific time periods of crime, etc. In order to find appropriate data to map crime rates, connections and governmental outreach needs to be made with specific police and city departments. These departments have the crime data that a user is looking for, or at least have a contact in order to track down the ideal data needed.

Future Outlook

In order to study the effects that smart growth principles have on cities, more studies and the right data source are needed. A more detailed study at the block group or census tract level would find a more significant association of smart growth and crime. Researchers could isolate different crime factors at a more detailed level to achieve further significant results. A larger list and comparison of smart growth cities is needed in order to lessen the effect outliers have on a data set. A comparison list around 100 or more cities seems adequate to achieve significant results about smart growth and crime. Larger time spans before and after the smart growth awards are given would further show the before and after change due to smart growth implementation. With smart growth being such an up and coming topic, it may be a few years before a study is able utilize time to identify changes associated with smart growth.

Better results could be achieved in future studies if GIS is used in the study. GIS unfortunately could not be use in this study because access to crime data in the point (data) format was not available. With the GIS and the acquisition of crime data in the point (data) format, hot spot analysis could be utilized to show areas clustering crime at specific years. After

these areas have been identified, users could overlay this map layer with a detailed community layer to see the effects of smart growth principles. While GIS is an important tool in finding the connection between smart growth and crime rates, it is important to not get overly focused in the mapping of this connection. GIS analysis should never be a substitute for actual "on the ground" analysis. GIS is used best when partnered with other forms of research to identify spatial patterns and seek possible explanations spatially.

Conclusion

This study lays the ground work for future studies to investigate the association of cities implementing smart growth principles and the effects on crime. Though convincing results were unable to be achieved, the possibilities of improved results are more likely with access to the proper data and the use of suitable methods. Through larger and more detailed studies, a positive relationship of smart growth principles and decreased crime rates will provide increased confidence for people wanting to become more sustainable by implementing smart growth principles.

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Work Cited

Arku, Godwin. "Rapidly Growing African Cities Need to Adopt Smart Growth Policies to Solve Urban Development Concerns." *Urban Forum* 20.3 (2009): 253-70.

Arnold, Chester L., and C. James Gibbons. "Impervious Surface Coverage: The Emergence of a Key Environmental Indicator." *Journal of the American Planning Association* 62.2 (1996): 243-58.

Baron, Stephen W. "Street Youth, Unemployment, and Crime: Is It That Simple? Using General Strain Theory to Untangle the Relationship1." *Canadian Journal of Criminology and Criminal Justice/La Revue Canadienne De Criminologie Et De Justice Pénale* 50.4 (2008): 399-434.

Browning, C. R., R. A. Byron, C. A. Calder, L. J. Krivo, M.-P. Kwan, J.-Y. Lee, and R. D. Peterson. "Commercial Density, Residential Concentration, and Crime: Land Use Patterns and Violence in Neighborhood Context." *Journal of Research in Crime and Delinquency* 47.3 (2010): 329-57.

Cheatwood, Derral. "The Effects of Weather on Homicide." *Journal of Quantitative Criminology* 11.1 (1995): 51-70.

De Sousa, C. A., C. Wu, and L. M. Westphal. "Assessing the Effect of Publicly Assisted Brownfield Redevelopment on Surrounding Property Values." *Economic Development Quarterly* 23.2 (2009): 95-110.

Easterbrook, Gregg. "Comment on Karen A. Danielsen, Robert E. Lang, and William Fulton's "Retracting Suburbia: Smart Growth and the Future of Housing"." *Housing Policy Debate* 10.3 (1999): 541-47.

Edwards, M. M., and A. Haines. "Evaluating Smart Growth: Implications for Small Communities." *Journal of Planning Education and Research* 27.1 (2007): 49-64.

Elliott, Delbert S. "Delinquency, School Attendance and Dropout." *Social Problems* 13.3 (1966): 307-14.

EPA. *Essential Smart Growth Fixes for Urban and Suburban Zoning Codes*. 2009. Print

EPA. *Getting to Smart Growth: 100 Policies for Implementation*. 2004. Print.

Ewing, Reid, Rolf Pendall, and Don Chen. "Measuring Sprawl and Its Transportation Impacts." *Transportation Research Record* 1831.1 (2003): 175-83.

Filion, Pierre, and Kathleen Mcspurren. "Smart Growth and Development Reality: The Difficult Co-ordination of Land Use and Transport Objectives." *Urban Studies* 44.3 (2007): 501-24.

Ferrin, Deborah. "San Diego's 6 to 6: A community's commitment to out-of-school time." *New Directions for Youth Development.* 94. (2022) 109-18.

Goldscheider, Frances, and Linda Waite. "Nonfamily Living and the Erosion of Traditional Family Orientations Among Young Adults." *American Sociological Review* 51.4 (1986).

Greenberg, M., K. Lowrie, L. Solitare, and L. Duncan. "Brownfields, Toads, and the Struggle for Neighborhood Redevelopment: A Case Study of the State of New Jersey." *Urban Affairs Review* 35.5 (2000): 717-33.

Hirschi, Travis. "The Family." *Crime* (1995): 121-40.

Ikegaya, Hiroshi, and Hideki Suganami. "Correlation between Climate and Crime in Eastern Tokyo." *Canadian Journal of Criminology and Criminal Justice/La Revue Canadienne De Criminologie Et De Justice Pénale* 50.2 (2008): 225-38.

Jacobs, Jane. *The Death and Life of Great American Cities*. Harmondsworth: Penguin, 1964. Print.

LaFree, Gary F. "Street Crime and the Decline of Social Institutions in America." *Annual Review of Sociology* 25 (1999): 145-58.

"Left Behind Economist." *Economist* 400.8750 (2011).

Martínez, L. Miguel, and José Manuel Viegas. "Effects of Transportation Accessibility on Residential Property Values." *Transportation Research Record: Journal of the Transportation Research Board* 2115.-1 (2009): 127-37.

Nguyen, M. T. "Does Affordable Housing Detrimentally Affect Property Values? A Review of the Literature." *Journal of Planning Literature* 20.1 (2005): 15-26.

O'Connell, Lenahan. "The Impact of Local Supporters on Smart Growth Policy Adoption." *Journal of the American Planning Association* 75.3 (2009): 281-91.

Perdue, Wendy Collins, Carol Maclennan, John O. Norquist, and Toni N. Harp. "Smart Growth for Community Development." *The Journal of Law, Medicine & Ethics* 32.S4 (2004): 27-31.

Shoup, Donald C. *The High Cost of Free Parking*. Chicago: Planners, American Planning Association, 2005.

Useem, Bert, and Jack Goldston. "Forging Social Order and Its Breakdown: Riot and Reform in U.S. Prisons." *American Sociological Review* 67.4 (2002).

Appendices

Table 1 - One-way ANOVA (Descriptives)

Crime_Rate

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Portland Before	3	7.4000	.17321	.10000	6.9697	7.8303
Portland After	3	6.0333	.41633	.24037	4.9991	7.0676
Seattle Before	3	6.9000	.34641	.20000	6.0395	7.7605
Seattle After	3	6.4000	.43589	.25166	5.3172	7.4828
Wichita Before	3	7.7667	1.09697	.63333	5.0417	10.4917
Wichita After	3	9.4000	.40000	.23094	8.4063	10.3937
Tulsa Before	3	11.9000	.85440	.49329	9.7776	14.0224
Tulsa After	3	11.6667	.76376	.44096	9.7694	13.5640
Winnooski Before	3	3.4667	.25166	.14530	2.8415	4.0918
Winnooski After	3	3.3333	.66583	.38442	1.6793	4.9874
Springfield Before	3	2.4333	.35119	.20276	1.5609	3.3057
Springfield After	3	3.1667	.68069	.39299	1.4757	4.8576
Total	36	6.6556	3.16015	.52669	5.5863	7.7248

Table 2 - One-way ANOVA (Descriptives)

Crime_Rate

	Minimum	Maximum
Portland Before	7.30	7.60
Portland After	5.70	6.50

Seattle Before	6.70	7.30
Seattle After	6.10	6.90
Wichita Before	6.50	8.40
Wichita After	9.00	9.80
Tulsa Before	11.00	12.70
Tulsa After	11.00	12.50
Winnooski Before	3.20	3.70
Winnooski After	2.90	4.10
Springfield Before	2.10	2.80
Springfield After	2.40	3.70
Total	2.10	12.70

Table 3 - One-way ANOVA (Descriptives)

Crime_Rate

	Minimum	Maximum
Portland Before	7.30	7.60
Portland After	5.70	6.50
Seattle Before	6.70	7.30
Seattle After	6.10	6.90
Wichita Before	6.50	8.40
Wichita After	9.00	9.80
Tulsa Before	11.00	12.70
Tulsa After	11.00	12.50
Winnooski Before	3.20	3.70

Winnooski After	2.90	4.10
Springfield Before	2.10	2.80
Springfield After	2.40	3.70
Total	2.10	12.70

Table 4 - One-way ANOVA

Crime_Rate

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	340.962	11	30.997	86.839	.000
Within Groups	8.567	24	.357		
Total	349.529	35			

Table 5 - One-way ANOVA (Crime_Rate)

Tukey B[a]

		Subset for alpha = 0.05				
Cities before and after	N	1	2	3	4	5
Springfield Before	3	2.4333				
Springfield After	3	3.1667				
Winnooski After	3	3.3333				
Winnooski Before	3	3.4667				
Portland After	3		6.0333			
Seattle After	3		6.4000	6.4000		
Seattle Before	3		6.9000	6.9000		
Portland Before	3		7.4000	7.4000		

Wichita Before	3			7.7667		
Wichita After	3				9.4000	
Tulsa After	3					11.6667
Tulsa Before	3					11.9000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3.000.