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Applying situational crime prevention to terrorism against airports and aircrafts.

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APPLYING SITUATIONAL CRIME PREVENTION TO TERRORISM AGAINST AIRPORTS AND AIRCRAFTS

By

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DEDICATION

This dissertation is dedicated to my parents, Mr. Thomas Block and Mrs. Anita Block, my sister, Jennifer Block, and my friends, Dani DeVincentis and Taylor Elliott. Without their love and support this dissertation would not be possible.

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ABSTRACT

APPLYING SITUATIONAL CRIME PREVENTION TO TERRORISM AGAINST AIRPORTS AND AIRCRAFTS

Molly Mae Block

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This dissertation identifies the characteristics of terrorism against airports and aircrafts and the appropriate measures to prevent or reduce the damage of this crime. The situational crime prevention framework, incorporating routine activity theory, rational choice theory, and crime pattern theory, is used to identify techniques to reduce the opportunity for terrorism targeting airports and aircrafts. This study is a first attempt to determine which situational characteristics may be relevant in attacks specifically targeting airports or aircrafts. Data for this dissertation comes from the Global Terrorism Database and covers terrorist attacks targeting airports or aircrafts from 2002 to 2014. The sample includes 44 different countries and 244 terrorist incidents. Logistic regression is used to test to see which elements related to routine activity theory are significantly associated with attacks targeting airports or aircrafts. The findings suggest that attacks against airports are likely to be perpetrated by domestic terrorists groups, are successfully implemented, and are likely to include explosives and suicides tactics as methods of attacks. Aircrafts, on the other hand, are found to be perpetrated by international terrorist groups and are not likely to be successfully implemented or include

explosives as a method of attack. Opportunity reduction measures are discussed based on these findings.

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CHAPTER ONE: INTRODUCTION

Although terrorism is a relatively rare crime event, it is one of the few crimes that has the ability to escalate into war between multiple states (Ben-Yehuda & Levin-Banchik, 2014), and because of these serious consequences, the patterns of this rare crime event should be studied so that prevention measures can be put into place. Since September 11th, 2001, attention to terrorism and its prevention has increased on an international scale (Valeriano & Powers, 2010; Danziger, 2012; Sinha, 2013; North, Gordon, Kim, Wallace, Smith, Pfefferbaum, Hong, Ali, Wong, & Pollio, 2014; Rytter & Pedersen, 2014). This dissertation examines terrorism against airports and aircrafts in terms of situational crime prevention and will discuss opportunity reduction techniques. Chapter 1 defines and typologizes terrorism as it is used in the context of this study. Additionally, this chapter reviews the patterns, effects, and subsequent policies of terrorism. Finally, the purpose of this dissertation is discussed.

The Problem of Terrorism

States should be concerned about terrorism because while terrorism does not occur with the same frequency as other crimes, the number of attacks and consequent damage are not insubstantial. In 2012, eleven years after the attacks on September 11th, 6,771 terrorist attacks occurred worldwide (Department of State, 2013). The increase in terrorist attacks in recent years is staggering; in 2014 more than 16,800 attacks occurred

worldwide (Miller, 2015). During the 2012 attacks, 11,098 people were killed and 21,652 people were wounded (Department of State, 2013). The number of deaths and injuries in 2014 increased to over 43,500 and 40,900, respectively (Miller, 2015). Also during 2012, 1,283 people were taken hostage or kidnapped during terrorist incidents (Department of State, 2013). For 2014, this number increases to over 11,800 (Miller, 2015). This dramatic increase in terrorist incidents over recent years is a cause for concern (Department of State, 2013; Miller, 2015).

In addition to the occurrences and immediate victims of terrorism, there are political, economic, and social consequences (Braithwaite, 2013; Malik, Abdullah, & Uli, 2014; Shaffer, 2015; Toker, Laurence, & Fried, 2015; Hobbs, Schaupp, & Gingrich, 2016). Since the 9/11 terrorist attacks, massive changes have occurred in counter-terrorism policies and governments are spending more than ever on counter-terrorism measures (Shaffer, 2015). Terrorist attacks also impact the economy and the workplace (Malik, Abdullah, & Uli, 2014; Toker, Laurence, & Fried, 2015; Hobbs, Schaupp, & Gingrich, 2016). Hobbs, Schaupp, and Gingrich (2016) found that stock returns are adversely affected by terrorist events, particularly on the day the terrorist event occurs. According to a thorough review of the literature conducted by Malik, Abdullah, and Uli (2014) the workplace is adversely affected by terrorist attacks in that fear of terrorism causes negative work attitudes, which lead to undesirable behaviors. Toker, Laurence, and Fried (2015) found fear of terrorism increases job burnout over time in a random sample of 670 Israeli employees. The authors found fear of terrorism is a stressor which leads to resources loss, such as insomnia, which then translates to a lack of emotional, physical, and cognitive resources (Toker, Laurence, & Fried, 2015). Ultimately, these

lack of resources at work lead to job burn out over time when not mediated by factors such as co-worker support (Toker, Laurence, & Fried, 2015). A systematic review of the literature conducted by Braithwaite (2013) found in the 2001 – 2010 period there are typically high levels of fear and stress in a population exposed to terrorism. Also, public fear of terrorism is typically related to media consumption (Braithwaite, 2013).

While there have been substantial security increases after 9/11, opportunity for terrorism to be committed against airports and aircrafts still exists. From November 2001 to July 2011, more than 25, 000 security breaches at U.S. airports have occurred (Jackson, 2011). This averages to a little over five security breaches per year, over a ten year period, at each of the United States' 457 commercial airports (Jackson, 2011). The Transportation Security Administration (TSA) has argued that this number is misleading because it represents only 1 percent of the 5.5 billion people screened in this time (Jackson, 2011). Also, the TSA contends what is considered a security breach covers a very broad range of instances including a checked bag being misplaced once it has gone through the security screening (Jackson, 2011). Congressman Jason Chaffetz criticizes the TSA for this attitude. Claiming security must be right every time because a terrorist only has to be successful once (Jackson, 2011). Included in the security breaches are 14,000 people who have made their way to sensitive areas and 6,000 people who have made it past security without proper screening (Jackson, 2011). In a review of open source news articles, the Associated Press (2015) found at least 268 instances of perimeter security breaches at U.S. airports since 2004. These instances include fence jumping, sneaking past guard stations, driving through security barriers, or otherwise infiltrating the protected airfield (Associated Press, 2015). A report from the

Government Accountability Office (2009) found while airports are required to report perimeter security breaches to TSA, not all of these incidents are actually reported. The same report found TSA had not completed a required vulnerability assessment on 87 percent of the 450 commercial airports in the U.S. (Government Accountability Office, 2009).

More recently, in 2015, the acting director of TSA was reassigned after a report showed that airport screeners failed 95 percent of security tests (Bradner & Marsh, 2015). Undercover teams from the U.S. Department of Homeland Security attempted to smuggle explosives and other weapons through security at dozens of airports across the country (Bradner & Marsh, 2015). In 67 out of 70 tests, the TSA agents allowed the banned items to pass through security without detection (Bradner & Marsh, 2015). The government is not the only organization able to fool airport security (Goldberg, 2008). A writer for *The Atlantic* was able to get past airport security using fake boarding passes which were created using a basic laptop and printer (Goldberg, 2008). While opportunities for terrorism have been reduced, opportunity still exists.

Two main patterns emerge in terrorist attacks against airports and aircrafts: 1) more sophisticated methods of detecting metal detectors and other security methods are being used, and 2) less sophisticated methods of attacking the airport itself (Flintoff, 2012; Mulrine, 2011; Jenkins, 2011). On one extreme, terrorists are devising more ways to get past security measures, such as in 2009 when a terrorist attempted to smuggle a bomb in his underwear onto a plane (Jenkins, 2011). Also, counterterrorism officials have received intelligence terrorists are experimenting with surgically implanted bombs (Jackson, 2011). At the opposite end of the spectrum, since security screenings have

been increased at airports, radical leaders are encouraging younger members to plan simpler attacks less likely to be foiled (Flintoff, 2012; Jenkins, 2011; Mulrine, 2011). Instead of hijacking airplanes, a trend of simple bombings or shootings at airports has begun to emerge (Jenkins, 2011; Mulrine, 2011). A few instances of these attacks are both the shooting at the Frankfurt Airport and the bombing of Moscow's Domodedovo Airport in 2011 (Jenkins, 2011; Mulrine, 2011).

Future policy should focus on implementing opportunity reduction techniques which concentrate both on more thorough screening technology and on increasing security in airports before the security checkpoint. In order to prevent or reduce the damage of future terrorist attacks, the current terrorism reduction techniques and policy are examined in this dissertation. Public policy regarding terrorism is a matter of global concern and ceryain states have adopted reactionary policies (Lyons, 2006; Valeriano & Powers, 2010; Davis & Bondy, 2010). For example; Valeriano and Powers (2010) find, that despite some differences regarding the war in Iraq, the United States and Mexico have considerable policy convergence on the issue of terrorism. While public policy on terrorism covers a wide range of topics, one of the most studied aspects of the literature focuses on the treatment and perception of Muslims in a post 9/11 world (Davis & Bondy, 2010; North et al., 2014; Rytter & Pedersen, 2014). Davis and Bondy (2010) find being Muslim plays into the ideology of the Australian government in terrorist identification. Studies based on Denmark and the United States have also shown how Muslims have become the usual suspects regarding terrorism (North et al., 2014; Rytter & Pedersen, 2014). In terms of prevention policy, many countries have focused on cutting off the funding for terrorists (Danziger, 2012; Sinha, 2013). Danziger (2012)

found the United States, the United Kingdom, and Israel all employed similar methods of combating the financing of terrorism after major attacks occurred in these countries. Although these are just a few policy areas, there is a worldwide trend of countries implementing and experiencing similar reactionary policies after the 9/11 attacks.

Definition of Terrorism

For the purposes of this dissertation, the definition of terrorism discussed is that used by the U.S. Department of State and the National Consortium for the Study of Terrorism and Responses to Terrorism (START) at the University of Maryland, which produces the Global Terrorism Database (GTD). This U.S. Department of State's definition is beneficial because of its inclusiveness of motivations that are not strictly political and because it is highly related to the criteria by which terrorist incidents are included in the GTD which is discussed in greater detail in Chapter 3. The GTD is one of the largest and most trusted sources of terrorism data in the world (LaFree & Dugan, 2007; LaFree & Dugan, 2009). The U.S. Department of State uses data collected and analyzed by the GTD to prepare their annual country report on terrorism (Department of State, 2013). Their definition of terrorism includes four main criteria:

1. The violent act was carried out by a non-state actor,
2. The violent act was aimed at attaining a political, economic, religious, or social goal,
3. The violent act included evidence of an intention to coerce, intimidate, or convey some other message to a larger audience (or audiences) other than the immediate victims, and
4. The violent act was outside the precepts of International Humanitarian Law insofar as it targeted non-combatants (Department of State, 2013).

Essentially, this definition means terrorism directly conducted by states are not included. However, acts which are merely speculated to be state-sponsored terrorism are

included. The condition that the violent act must have been conducted for the purpose of achieving a political, economic, religious or social goal, is broader than some definitions of terrorism which can limit to political goals. For example; if a person is kidnapped for a monetary ransom under this definition it would not be considered terrorism. However, if that same person was kidnapped and the ransom demand was the release of political prisoners, it would fit the criteria for terrorism. The third criteria is the violent act must be intended to cause fear in the general population; this makes terrorism unique as a crime because its intent is to influence how people feel. The victims of terrorism are not limited to the primary targets of the attack. The public at large becomes the secondary victims of a terrorist incident because they live in fear that another attack could occur. Finally, the fourth requirement indicates targets of terrorism must not be in a combat situation. This does not exclude the military or soldiers from being targets of terrorism; they just cannot be in an active combat situation when the violent act occurs.

The conceptualization and classification of terrorism is dependent upon how the term is defined (Shultz, 1978; Gibbs, 1989). Because there are a multitude of possible definitions of terrorism, there are numerous ways to categorize terrorism (Shultz, 1978; Gibbs, 1989). Typologies of terrorism range from intricate and highly detailed to straightforward and parsimonious. While only one typology is utilized in this dissertation, it is important to understand the possible factors that can be used to categorize terrorism.

Shultz (1978) created a detailed typology that includes three general categories of political terrorism: Revolutionary Terrorism, Sub-Revolutionary Terrorism and Establishment Terrorism. Revolutionary Terrorism is the "threat and/or employment of

extranormal forms of political violence, in varying degrees, with the objective of successfully effecting a complete revolutionary change (change of fundamental political-social processes) within the political system" (Shultz, 1978, p. 9). These acts may be implemented by either endogenous or exogenous actors of the political system (Shultz, 1978). Revolutionary Terrorism, groups from inside or outside the country work to overthrow the current government through violent acts (Shultz, 1978). An example of a Revolutionary Terrorism organization would be Basque separatist groups. The Euskadi Ta Askatasuna (ETA) is a Basque nationalist and separatist group which uses terror tactics to accomplish their goal of independence from Spain. Alternatively, Sub-Revolutionary Terrorism attempts to make certain changes to the current political system but does not seek to create an entirely new system (Shultz, 1978). This type of terrorism is typically employed by groups which are indigenous to the political system and includes ethnic, religious, regional, linguistic, secessionist, and reactionary organizations to name a few (Shultz, 1978). Single issue terrorism, such as attacking abortion clinics, is an example of Sub-Revolutionary Terrorism because there is not an attempt to change the overall political system. The third general category of terrorism, Establishment Terrorism, differs from the other two forms because the threat or use of violence is perpetrated by an established political system against internal and external opposition (Shultz, 1978). In this form of terrorism, the state attempts to control the domestic populace or other nation-states through the threat or use of force (Shultz, 1978). Saddam Hussein's use of violence against the Kurds is an example of Establishment Terrorism.

After creating the three general categories, Shultz (1978) further classifies terrorism according to seven concepts: *causes*, *environment*, *goals*, *strategy*, *means*,

organization, and *participation*. *Causes* are any economic, social, political or psychological conditions which motivate the decision to use political violence (Shultz, 1978). For example; the causes of the Troubles in Northern Ireland relate back to centuries of British oppression of Irish Catholics, which resulted in a lack of civil rights and economic opportunities. The *environment* concerns primarily whether the political violence takes place domestically or internationally (Shultz, 1978). Within the example of Northern Ireland, both international and domestic terrorist organizations were active. The next concept, *goals*, are the objectives which terrorists attempt to achieve; this includes both broad strategic objectives and specific tactical objectives (Shultz, 1978). According to Shultz (1978), *strategy* is the comprehensive plan which is used to achieve their goals. This includes both primary and secondary strategies involved in achieving long term and short term goals (Shultz, 1978). In the context of Northern Ireland, the goal of the Irish Republican Army and other similar groups was reunification of Ulster with the rest of Ireland. The strategy to achieve this goal was to target British military and police officers. *Means* are capabilities and techniques that are utilized to achieve goals within the strategic framework (Shultz, 1978). One means employed by the IRA and other organizations was the use of proxy bombs. Instead of a suicide bomber, a terrorist organization would coerce an unwilling individual to deliver a bomb to the intended target. Within this typology, *organization* is the formalized structure implemented for the planning, coordination, and application of political violence; the success of the violence is highly dependent upon the organization (Shultz, 1978). As previously discussed, the IRA was one of the most well-known organizations operating during Troubles. The IRA implemented violence to achieve their goals but they also had

affiliations with the political party Sinn Féin. Finally, *participation* is the type of offender who is involved in political terrorism (Shultz, 1978). This can include both individuals and leaders who are acting on behalf of the government (Shultz, 1978). In the context of the Troubles example, it was primarily individuals who participated in terrorist acts, although there is some debate as to whether the British military's actions on Bloody Sunday and other occasions can be described as Establishment Terrorism.

While Shultz (1978) created a highly detailed typology, other classification systems are more parsimonious. This dissertation utilizes a typology created by Mickolus (1981) which constructs four classifications for terrorism: interstate, domestic, state, and international. This typology primarily depends upon the amount of government control or direction in the act of terrorism, and whether citizens of more than one state are involved as offenders or victims (Mickolus, 1981). Interstate terrorism occurs when individuals or organizations controlled by the state commit a terrorist act and involve citizens of at least two countries (Mickolus, 1981). Essentially, while these terrorists may have some autonomy, they are engaging in surrogate violence for the state (Mickolus, 1981). State terrorism occurs when a government engages in terrorist acts within their own borders (Mickolus, 1981). The actions are similar to interstate terrorism, but there is no international component (Mickolus, 1981). Domestic terrorism occurs when the offenders are not associated with the government and the attack does not involve the citizens of more than one state (Mickolus, 1981). International terrorism is carried out by non-state actors and involves the citizens of two or more states (Mickolus, 1981). This dissertation will examine domestic and international terrorism incidents in terms of attacks against airports and aircrafts.

Purpose

The purpose of this dissertation is to identify characteristics of terrorism against airports and aircrafts and the appropriate measures to prevent or reduce the damage of this crime. Situational crime prevention is a framework that identifies techniques to reduce the opportunity of crimes (Clarke, 2008); this focus on specific crime reduction techniques makes the situational crime prevention framework ideally suited for this study. This framework is based on the environmental criminology perspective: routine activity theory, crime pattern theory and rational choice theory (Clarke, 2008). These theories are based on the idea of rationality, that crime is a choice and that opportunity plays a major part in the development of a criminal act (Clarke, 2008). Opportunity is an important cause of crime, even crimes such as terrorism which are deliberately planned, under these theories (Clarke, 2008). The level of crime is related to the opportunities present to commit specific crimes (Clarke, 2008). The overall level of crime can be reduced by decreasing opportunities for specific crimes (Clarke, 2008).

Chapter 2 explores situational crime prevention and the associated theories of routine activity theory, crime pattern theory, and rational choice theory and applies the literature on terrorism against airports and aircrafts in a situational context. Chapter 3 describes the methodology used in this study. Chapter 4 explains the results of the analysis using descriptive statistics, correlations, and logistic regression. Finally, in Chapter 5 the findings of the models are discussed in the context of situational crime prevention methods, and future avenues of research will be identified.

CHAPTER TWO: TERRORISM AGAINST AIRPORTS AND AIRCRAFTS

Chapter 1 defined and categorized terrorism for the purposes of this dissertation. Also discussed were some of the current patterns and trends in terrorism and its related policies. This chapter discusses the framework of situational crime prevention and its associated environmental criminology theories of routine activity theory, crime pattern theory, and rational choice theory. The literature identifies situational characteristics of terrorism against airports and prevention techniques based on the components of the situational crime prevention framework.

The Rational Choice Perspective

While routine activity theory, crime pattern theory, and rational choice theory have been incorporated into the situational crime prevention framework, these theories stem from the rational choice perspective which was first developed by Cesare Beccaria and the Classical School (Freilich, 2015). Beccaria (1764) called for the scientific study of crime. Like Hobbes (1651/1991) and Bentham (1789/1970), Beccaria believed people lived in a state of nature where individuals seek out pleasure and avoid things they deem unpleasant, thus individuals act on their self-interest (Freilich, 2015). Conflicts form from individuals acting on their own self-interest, crime is an example of these conflicts (Beccaria, 1764). Offenders operate under the same pleasure-maximizing framework as non-offenders (Beccaria, 1764). Beccaria (1764) argued all individuals operate under

their own agency and have the ability to make their own rational choices. Bentham (1789/1970), a colleague of Beccaria, argued offenders make these choices under a bounded rationality. Since offenders have agency they are responsible for their own actions and should be punished by the state (Beccaria, 1764).

Situational Crime Prevention and Terrorism

As just mentioned, situational crime prevention is based on opportunity theories such as routine activity theory, crime pattern theory, and rational choice theory (Clarke, 2008). Essentially, situational crime prevention is a framework for combating specific crime problems (Clarke, 2008). Situational crime prevention concentrates on the crime problem rather than the offender because it can be difficult to change the motivation of the offender to reduce crime (Clarke, 2008). This is an appropriate framework to use when discussing terrorism because terrorists are a small portion of the population that can be hard to identify and reach through non-situational techniques. While many theories focus on preventing crime by reducing the criminogenic tendencies of the offender, an offender-based approach is not appropriate for terrorism. Terrorists are extremists who are willing to commit violence, sometimes even suicide, in the name of their ideology. It is unlikely that even if an offender-based crime prevention program would have the desired effect, even if it were possible to accurately reach potential offenders, because of the level of commitment terrorists tend to have to their cause. Because terrorism is relatively rare, compared to other crimes, and terrorists are a difficult population to target in terms of crime prevention, it is more effective to use a theory that focuses on the situational characteristics of the crime.

Clarke (1980) also argues under situational crime prevention that crime can be prevented when the circumstances of the situation change (Clarke, 1980). To prevent crime, the approach focuses on the near causes of crime (Clarke, 2008). A near cause of crime is some sort of opportunity present in a particular location that allows an offender to commit a crime (Clarke, 2008). An example of a near cause of terrorism at an airport would be a lack of metal detectors or other screening technology. Conversely, an example of a distant cause of terrorism at an airport would be an international or civil conflict that attracts members to join the terrorist organization's cause. Specific crimes can be prevented by altering the most immediate, or near, causes of the crime (Clarke, 2008). In order to determine which factors in a situation should be changed, it must be determined how the crime is being committed (Clarke, 2008). Possible solutions include both hard and soft techniques (Clarke, 2008). Situational prevention is usually more effective when a variety of measures are implemented (Clarke, 2008). By concentrating on situational elements, this dissertation ascertains techniques and policies which may reduce the opportunity for terrorism against airports and aircrafts.

Hard and soft techniques to prevent terrorism.

Hard techniques include increasing the effort to commit the crime, increasing the risk of getting caught, and reducing the rewards for successfully committing the crime (Clarke & Eck, 2003; Cornish & Clarke, 2003). Techniques which increase the effort of committing the crime include target hardening, controlling access to facilities, screening exits, deflecting offenders, and controlling tools or weapons (Clarke & Eck, 2003; Cornish & Clarke, 2003). In the context of terrorism at airports, increasing the effort can include metal detectors, baggage screening, and security checkpoints. To increase the

risks involved in a crime, Clarke and Eck (2003) contend guardianship can be extended, natural surveillance assisted, anonymity reduced, place managers used, and formal surveillance strengthened. For example; installing and monitoring CCTV cameras and increasing the number of security guards or agents increases the risks of terrorists getting caught at airports or on aircrafts. Reducing the rewards involve concealing targets, removing targets, identifying property, disrupting markets, and denying benefits (Clarke & Eck, 2003; Cornish & Clarke, 2003). In terms of terrorism, rewards can be reduced if terrorists are not given the attention they are seeking from the media.

Alternatively, soft techniques consist of reducing provocations to commit crime and removing excuses as to why it is justifiable to participate in crime (Clarke & Eck, 2003; Cornish & Clarke, 2003). Provocations can be reduced by decreasing frustrations and stress, avoiding disputes, reducing temptation and arousal, neutralizing peer pressure, and discouraging imitation (Clarke & Eck, 2003; Cornish & Clarke, 2003). Examples in terrorism can include responding to legitimate grievances terrorists might have. The final category of removing excuses include: setting rules, posting instructions, alerting conscience, assisting compliance, and controlling drugs and alcohol (Clarke & Eck, 2003; Cornish & Clarke, 2003). As demonstrated by the case of Cuba, the criminalization of acts such as hijacking remove excuses to commit certain forms of terrorism. Situational crime prevention techniques have been applied to a wide variety of crimes, including terrorism, and have generally been effective in reducing crime (Clarke, 2008).

The literature on situational crime prevention at airports tend to incorporate both hard and soft techniques. Most techniques attempt to either increase the effort of the attack, increase the risk of undertaking the attack, or removing excuses to implement an

attack. In the past, one of the most prominent types of attacks against aircrafts was hijacking (Dugan, LaFree, & Piquero, 2005). The U.S. and Cuba both criminalized hijacking and agreed to prosecute offenders in the early 1970s which drastically reduced this type of attack between the two countries (Dugan, LaFree, & Piquero, 2005). As previously mentioned, this is an example of the soft technique of removing excuses and the hard technique of increasing the risks. Once the act was criminalized, no longer was there a legal loophole and hijackers would have to face the consequences of their actions. Situational techniques that increased the effort of an attack consist of the installation of the first metal detectors and the implementation of a security screening process, which were established in 1973 through legislation, and contributed to the reduction in hijackings (Dugan, LaFree, & Piquero, 2005; Haas, 2010).

Many of the early situational techniques stem from the reforms implemented in the 1970's (Syzliowicz, 2004; Dugan, LaFree, & Piquero, 2005; Clarke & Newman, 2006; Fahey et al., 2011; Hsu & Apel, 2015). These reforms laid the foundations for future situational prevention techniques in airports. One legal aspect of airport security to develop out of these early situational techniques gave airport security the ability to search luggage (Sickman, 1983). This policy increases the effort and risk of getting caught during a potential attack (Sickman, 1983). The pre-9/11 situational techniques and policies developed mostly from court cases, such as *U.S. v. Place* where the Supreme Court made the decision that the Drug Enforcement Agency legally searched Place even though they did not have a warrant (Sickman, 1983).

Much of the literature in this area is more descriptive rather than analytic (Sickman, 1983; Etzioni, 2004; Welch, 2004), so there are few empirical studies which

show the effectiveness of these policies. While the literature did find that overall hijackings were deterred because of historical situational reforms (Syzliowicz, 2004; Dugan, LaFree, & Piquero, 2005; Clarke & Newman, 2006; Fahey et al., 2011, Hsu & Apel, 2015), Dugan, LaFree, and Piquero (2005) found that terrorists were not as deterred from attempting an attack as offenders who hijack planes for different reasons. This suggests that different situational techniques may need to be utilized to prevent terrorist attacks.

Techniques that increase the effort required for an attack, such as controlling access to facilities or screening exits and entrances, are the foundation of airport security. The United States the Code of Federal Regulations, Title 49 Transportation, Part 1542 Airport Security lays out security protocols that must be put into place at every commercial airport (TSA, 2013). The first step is to develop an airport security program that is approved by the TSA (TSA, 2013). The TSA also holds the right to review the security program and inspect the airport at any time (TSA, 2013). Other techniques involve securing sensitive areas. Some of the specific policies include intensive background checks for anyone who has clearance to be unescorted in secure areas (TSA, 2013). The identification for persons with clearance to secure areas must meet the TSA standards in terms of size and content of the badge (TSA, 2013). The TSA also requires any personnel working security at airports be given specific training which includes escort and challenge procedures, identification procedures, and restrictions on divulging security information (TSA, 2013). Finally, the TSA requires airports come up with a contingency security that is rehearsed and implemented as directed by TSA (TSA, 2013).

While the TSA creates and enforces civil aviation security policy for the United States, the International Civil Aviation Organization (ICAO), a specialized United Nations agency, helps to develop and coordinate effective global aviation security policy (International Civil Aviation Organization [ICAO], n.d.). The ICAO is responsible for creating Standards and Recommended Practices (SARPs) for international aviation security (ICAO, n.d.). SARPs cover a wide variety of topics including "dangerous goods awareness training, screening technology and equipment, screening of vehicles and supplies, air cargo and mail secure supply chain measures, and threat and risk assessment methodology" (ICAO, n,d.). In addition to these policy areas, the ICAO advocates Security Tamper-Evident Bags (STEMs) for Liquids, Aerosol and Gels (LAGs) that were purchased at airport retailers (ICAO, n.d.). This would allow passengers to avoid volumetric controls on LAGs that ICAO developed after a 2006 terrorist plot to create an improvised explosive in-flight by using normal looking liquids (ICAO, n.d.).

Social and ethical issues of situational crime prevention.

One of the biggest criticisms of situational crime prevention is it creates issues where it blames the victim or creates policies which restrict personal freedoms (Cullen, Agnew, & Wilcox, 2014). While situational crime prevention is a useful framework, negative implications must be examined to determine if the prevention measures are worth the costs. The first major criticism of situational crime prevention, victim blaming, does exist in this literature, but it occurs at a macro level. When discussing pre-9/11 patterns of aviation security, Hainmüller and Lemnitzer (2003) argues European countries, particularly Germany, experience a much higher level of aviation security because of institutional factors such as privatization. Unlike Europe, the United States

placed the responsibility of security on the airlines (Hainmüller & Lemnitzer, 2003). Thus safety became a cost cutting measure in the U.S. which resulted in low performance and lax controls (Hainmüller & Lemnitzer, 2003). On the other hand, Germany made the responsibility of aviation security the government's, which yielded a higher performance not contingent upon market pressures (Hainmüller & Lemnitzer, 2003). Hainmüller and Lemnitzer (2003) maintain the government holding responsibility for aviation security is a necessary condition to provoke satisfactory performance. Americans are again revisiting the topic of privatizing airport security due to prohibitively long lines at security checkpoints (Vasilogambros, 2016). It has been suggested since TSA can still oversee aviation security process for quality control, the government agency is under-funded and under-staffed to adequately handle the number of travelers passing through U.S. airports (Vasilogambros, 2016).

Unlike Hainmüller and Lemnitzer (2003), Argomaniz and Lehr (2016) do not find European aviation security measures to be nearly as robust in either a pre or post 9/11 landscape. The authors argue when the 9/11 attacks occurred, aviation security in Europe was unprepared for an attack that implemented suicide bombers (Argomaniz & Lehr, 2016). Along with the United States, the European Union also reengineered their aviation security policies (Argomaniz & Lehr, 2016). However, the authors argue, this readjustment of policy has created polity transformation and caused heavy politicking amongst institutional actors in the EU (Argomaniz & Lehr, 2016). Ultimately, this has caused reactive and haphazard policy development that does not necessarily reflect the actual terrorist threat (Argomaniz & Lehr, 2016). For example, the amount of liquid and gels allowed to be carried onto a plane in the EU was the result of a political negotiation

with no research or evaluation conducted as to the effectiveness of the rules (Argomaniz & Lehr, 2016).

While the criticism of victim blaming does not seem to be as serious on a macro level, another major criticism of situational crime prevention is the creation of social controls which restrict personal freedom and invade privacy (Clarke, 2008). This criticism is an extension of the tension which exists between the crime control model, which prioritizes security, and the due process model, which advocates individual liberty. The terrorism literature tends to be highly divided on the appropriate balance between safety and liberty, this can be found in studies from around the world. For example; the 9/11 attacks also radically changed policy and response to terrorism in Australia (Davis & Bondy, 2010). Most notably, Davis and Bondy (2010) contend the Australian government redefined what it meant to be a terrorist. The authors found the Australian government had nine underpinning beliefs about terrorists: 1) can be identified by intrinsic physical and behavioral traits, 2) will attack on a plane by hijacking, 3) will have suspicious behavior in airports, 4) will carry explosive mixtures in airports, 5) will plant bombs in airports, 6) will use firearms in airports, 7) will base their attack from or focus on a major metropolitan airport, 8) attack could be launched at a regional airport, 9) terrorist will most likely be Muslim (Davis & Bondy, 2010). There is a disconnect between aviation security and the overall discourse on terrorism in Australia (Davis and Bondy, 2010). Davis and Bondy (2010) argue the government's discourse and resulting policy of aviation security is the product of ideologies the Australian government holds. This is a clear shift towards a more crime control model of criminal justice and is another dubious method for creating terrorism prevention policies.

Since the 9/11 terrorist attacks, and the reactionary policies that follow, the discussion of rights, as seen in the due process model, versus security, represented in the crime control model, has been brought to the forefront of American society (Etzioni, 2004). While there are many points of contention, the center of this debate is the Patriot Act which was signed into law on October 26, 2001 (Etzioni, 2004). One of the biggest disputes about government policies regarding terrorism is the divide between the political right, which advocates for security above all else, and the political left, which Etzioni (2004) calls civil libertarians, who argue that individual liberty should not be compromised to increase security. The political left, particularly organizations such as the ACLU, argue that the Patriot Act is dangerous because it expands the government's powers to intrude in the lives of its citizens and it violates the rights of individuals, particularly the right to privacy, and will lead to the fall of the democratic society (Etzioni, 2004). On the other hand, the political right argues that the Patriot Act should have been made stronger because liberty means nothing if people are not safe (Etzioni, 2004). Etzioni (2004) argues extremism in either the direction of due process or crime control is not useful and instead proposes a different way to examine the debate called, responsive communitarianism.

In the context of the debate about the government's response post 9/11, Etzioni (2004) refers to several surveys conducted in April 1995, right after the Oklahoma City bombing; May 1995, August 1996, September 2001, and January through March 2002. Each of these surveys asked questions whether Americans would be willing to give up some civil liberties in order to gain more security; the surveys also asked about trust in the government to not misuse their powers (Etzioni, 2004). In every survey following a

crisis, such as the Oklahoma City bombing or the 9/11 attacks, the majority of people were willing to give up some liberties for security. However, as fear receded over time, this willingness decreased (Etzioni, 2004). Trust in the government to not misuse new powers was also higher right after an attack and receded over time as people became less scared and reclaimed their civil liberties (Etzioni, 2004). The author argues this demonstrates course correction and there would be more danger in the government not responding by increasing a security right after an attack because this would decrease the people's faith in the democratic government while it is reaffirmed with initial strong security measures with a gradual correction back towards liberty (Etzioni, 2004). While Etzioni (2004) does argue in the short run public interest should be protected over individual liberty, he states this is the case only if it is reasonable to do so. Etzioni's (2004) findings indicate criminal justice should incorporate a model which is able to move fluidly from the crime control end of the spectrum to due process and back again in response to immediate security threats.

More recently, the U.S. Department of Homeland Security has created "Future Attribute Screening Technology" (FAST) which Christopher Rogers (2014) describes as nothing less than Orwellian and too far in the crime control direction. This screening technology is designed to scan a person's vital signs such as heart rate, respiratory rate, eye movement, pheromones, body temperature, and audio levels (Rogers, 2014). Fluctuations in these vital signs can indicate whether that subject is suffering from stress and anxiety and thus may have the intention to commit a crime (Rogers, 2014). FAST is intended to be used as a preliminary screening measure to identify potential offenders which require further scrutiny. The system would not provide probable cause for an arrest

(Rogers, 2014). The author argues the FAST system is a major violation of fourth amendment rights and exceeds the scope of what is allowed in a warrantless search at an airport (Rogers, 2014). While a warrantless search can be performed in an airport due to the severe threat of terrorism, this threat has to be weighed with the invasion of personal privacy that occurs in the search (Rogers, 2014). Rogers (2014) argues FAST tips the scale because the extremely personal data that can be extracted including: asthma, cardiovascular disease, psychiatric conditions, and a woman's stage in her ovulation cycle. Instead of subjecting every passenger to this screening process, Rogers (2014) contends that FAST should only be used when there is credible intelligence of a threat.

The United States is not the only country that struggles to find a balance between liberty and safety. David Lyons (2006) argues that since the 9/11 terrorist attacks Canada has become a growing "surveillance society" or a "safety state." The author argues surveillance is not relegated to suspects, but rather is used to sort the population into groups based upon the government's view of their risk of committing a terrorist offense (Lyons, 2006). The government now uses the Passenger Name Record and the Advanced Passenger Information as a means of collecting as much data as possible on passengers before they land to ensure that high-risk people do not cross the border (Lyons, 2006). Since Canada is a neighbor and trading partner of the United States, there is pressure to both tighten border security while still allowing for the free movement of people and goods (Lyons, 2006). This balance is found by the Canadian government gathers as much information as possible about passengers, especially those moving between the United States and Canada, and sorting them into risk groups (Lyons, 2006). This is a contentious issue for some in Canadian society who feel the government is overstepping

their bounds (Lyons, 2006). However, Lyons (2006) argues a certain amount of surveillance is required for modern day governance. The real security issues, the author argues, come from the implementation of technological security measures without properly skilled personnel (Lyons, 2006).

While the criticism that situational techniques may reduce personal freedoms is undeniably an issue when it comes to terrorism against airports and aircrafts, Clarke (2008) argues these criticisms stem from the practice of situational crime prevention and not the principles of the framework. By using the principles of situational crime prevention governments should be able to implement useful techniques while the democratic process keeps techniques that would impinge upon personal liberty from being executed (Clarke, 2008). Also, Clarke (2008) argues, and the literature (Etzioni, 2004) supports, to prevent terrorism people are willing to accept some reductions in liberty. Any situational techniques may infringe upon individual liberty, should only be implanted when it is grounded in theory and empirical evidence. Some of these contestable techniques can be explained by the use of routine activity theory.

Routine Activity Theory

Cohen and Felson (1979) stated in order for a crime to occur a motivated offender, a suitable target, and the lack of a capable guardian must converge in the same time and place (Cohen & Felson, 1979). The authors assert when a target is exposed, close to the offender, and there is a lack of guardianship, or supervision, the target is more likely to be victimized (Cohen & Felson, 1979). People live their day-to-day lives performing routine activities, or patterns of conduct, these legal routine activities create opportunities for crime (Cohen & Felson, 1979). Felson (1995) modified the theory to

include a form of external control known as the handler. While a suitable guardian watches over the target of a crime, the handler supervises the motivated offender (Felson, 2008). For example, a present parent can supervise their children while an absent parent gives children the opportunity to offend (Felson, 2008). In terms of terrorism, handlers can be often be found in suicide bombings (Clarke & Newman, 2006). In these situations, handlers are the real terrorist while the suicide bomber is merely the weapon (Clarke & Newman, 2006). It is the job of the handler to indoctrinate the potential suicide bomber and provide all logistical support (Clarke & Newman, 2006). The handler is the one responsible for making decisions such as shaping messages to the public while the suicide bomber is merely used as a mouthpiece (Clarke & Newman, 2006). While handlers are not as common in other crimes, they are an integral aspect of suicide terrorist attacks (Clarke & Newman, 2006).

The theory was originally developed in relation to property crime (Cohen & Felson, 1979). Cohen and Felson (1979) argue the rise of residential burglaries during 1960s and 1970s is related to the increased number of women entering the work force and thus leaving houses unattended and new opportunities for burglary to occur. Routine activity theory has received much empirical support in the literature in terms of studies based on property crimes (Miethe, Stafford, & Long, 1987; Miethe & Meier, 1990; Mustaine & Tewksbury, 1998). In terms of property crime, routine activity theory has found support across a variety of populations including college students and adolescents (Mustaine & Tewksbury, 1998; Burrow & Apel, 2008) as well across different geographic areas (Fisher & Wilkes, 2003; Zhang, Messner, & Liu, 2007). Empirical support for violent crimes is mixed compared to the property crimes findings (Miethe,

Stafford, & Long, 1987; Sampson, 1987). The findings for violent crime has also received support among special populations such as high school and college aged students (Schreck & Fisher, 2004; Burrow & Apel, 2008). Macro level tests of routine activity theory have also found support (Messner & Blau, 1987; Smith, Frazee, & Davidson, 2000; Rice & Smith, 2002; Bernasco & Luykx, 2003).

Like the larger framework of situational crime prevention, routine activity theory focuses on the incident rather than the offender (Clarke, 2008; Felson, 2008). By focusing on the opportunity created from a motivated offender, suitable target, and lack of capable target coming together in time and space, situational crime prevention offers prevention techniques based on the elements of the theory (Clarke, 2008; Felson, 2008). The first element of routine activity theory, the motivated offender, is firmly rooted in rational choice theory, and thus situational crime prevention in which rationality is an underlying assumption (Clarke, 2008).

Motivated offender.

The first element of routine activity theory, the motivated offender, is ordinarily assumed because it must be present in order for a crime to occur (Felson, 2008). Similarly, the very definition of terrorism assigns motivation to the offender. As discussed in Chapter 1, terrorism must be "aimed at attaining a political, economic, religious, or social goal" (Department of State, 2013). By definition, in order for an offender to be considered a terrorist, they must have a particular motivation. One of the assumptions of the motivated offender is that the perpetrator has experienced background factors which make offending a rational choice (Felson, 2008). The motivated offender element is based on the principles of rational choice theory. Even though the motivated

offender is assumed in routine activity theory, there is disagreement in the literatures as to whether terrorists can be considered rational actors (Dugan, LaFree, & Piquero, 2005; Fussey, 2011). The rationality of terrorists as motivated offenders is examined in the discussion of rational choice theory.

Suitable target.

The next element of routine activity theory is the suitable target (Cohen & Felson, 1979). Once a terrorist organization has formed with a political goal in mind, or become a motivated offender, they must look for a suitable target. Acts of terrorism are committed on suitable and opportune targets (Clarke & Newman, 2006). Because the purpose of terrorism as a tactic to achieve political goals is to inspire fear in the general population, an attractive target is one that disrupts the routine activity of law-abiding citizens. By disrupting routine activities this allows terrorists to interrupt vital infrastructures, pick legitimate, symbolic, occupied, and relatively easy targets (Clarke & Newman, 2006). Attacking a target commonly used in routine activities is symbolic of attacking a culture or way-of-life. It is also likely during routine activities potential targets are lulled into a false sense of security and the guardians will be less likely to suspect an attack.

Four elements that determine the suitability of a target include: Value, Inertia, Visibility, and Access (VIVA) (Felson, 2008). The VIVA concept was developed based on property crime (Felson, 2008); however, this concept is also applicable to target selection of terrorism at airports. Airports and aircrafts are targets for terrorism for multiple reasons. One of the most obvious reasons for this is the attacks that occurred on September 11th, 2001 (Flintoff, 2012). People have a heightened awareness of terrorist

activity involving aircrafts and airports and, as a result, people have reacted to this fear through demands for increased security (Flintoff, 2012). For terrorists with international targets, they are attractive because it gives the first available opportunity to attack a particular nationality (Flintoff, 2012). For example; a radical group in Eastern Europe can target Americans without leaving their home country. This gives a symbolic value to the attacks that creates alarm both locally and internationally (Jenkins, 2011). Airlines are symbols of their home nations, such as American Airlines or Air France, and this often increases their values as targets of terrorist attacks (Dempsey, 2003).

Additionally, the general public has access to the areas outside of security so there is easy access for a simple attack. It is easy for a person of any nationality to blend in at an airport and because everyone is a stranger, most people will not stand out. Airports are highly visible targets because they are public facilities that thousands of people travel through on a daily basis (Nacos, 2002). Thus, attacking an airport is likely to attract media attention (Nacos, 2002). Aircrafts are also attractive because it can be used as a weapon itself in an attack (Dempsey, 2003; Fussey, 2011), which speaks to the Inertia quality of VIVA. A plane provides a strategic setting because it is difficult for the passengers to rush a terrorist. Flight attendants will keep passengers calm and in their seats allowing terrorists to take over planes with relatively little resistance (Clarke & Newman, 2006).

In addition to the general concept of VIVA, Clarke & Newman (2006) developed the concept of EVIL DONE which specifically defines the attractiveness of terrorist targets. The first element of EVIL DONE is Exposed (Clarke & Newman, 2006). A target which is exposed is more suitable than a hidden target because it is easier to attack

and it is obvious when an attack has occurred (Clarke & Newman, 2006). Vital is the second element, this is the idea that the target is essential to day to day activities (Clarke & Newman, 2006). Infrastructure such as airline and traffic systems, electricity grids, water supply, and computer systems are examples of vital targets (Clarke & Newman, 2006). The third element Iconic, is a target which is well-known and representative of the population being targeted (Clarke & Newman, 2006). The 9/11 attacks demonstrate this concept with the well-known targets of the World Trade Center and the Pentagon (Clarke & Newman, 2006). L stands for Legitimate (Clarke & Newman, 2006). In order for a terrorist attack to express political and social goals, the reasoning behind selecting certain targets must be apparent to the public (Clarke & Newman, 2006).

The fifth element of Clarke and Newman's (2006) concept is Destructible. This is the idea that the target must be susceptible to attack and can either sustain heavy damage or be destroyed (Clarke & Newman, 2006). Sixth, occupied, targets of attacks should include large number of cars or people in order to increase the fear that results from the attack (Clarke & Newman, 2006). Near is the seventh element of EVIL DONE (Clarke & Newman, 2006). Offenders will select targets that are either close to where they live or is easily accessible by transportation (Clarke & Newman, 2006). The closer the target, the less likely the terrorist will be detected before the attack takes place (Clarke & Newman, 2006). The final element of EVIL DONE is Easy (Clarke & Newman, 2006). The less security present, the more appealing the target, although sometimes increasing the security of a target can sometimes make it more valuable to terrorists (Clarke & Newman, 2006). For example; after the 1993 bombing on the World Trade Center security in the parking garage increased which did not deter the 2001 attack (Clarke &

Newman, 2006). When terrorists can successfully attack heavily protected targets then they create a greater air of fear (Clarke & Newman, 2006).

Airports and aircrafts are attractive targets according to the EVIL DONE elements because they are highly visible, public targets. Related to this, they are vital to the transportation infrastructure and an attack on either an airport or an aircraft could cause flights to be grounded nationwide. As previously discussed, airlines are often named after countries and are highly symbolic which makes them both Iconic and Legitimate. Airports are highly populated public buildings, which make them both Destructible and Occupied. Because airports are part of the transportation system, they are often a Near target. Finally, while the security increases since the 9/11 attacks do not make airports and aircrafts Easy targets, the hype around the security increases does add extra fear value when an airport is successfully attacked, such as the 2016 attack in Brussels.

Capable guardianship.

The final element of routine activity theory is the capable guardian (Cohen & Felson, 1979). Unlike with most criminals, where a capable guardian does not need to be law enforcement, but rather is just someone who acts as a deterrent to crime (Felson, 2008), terrorists are not deterred simply by supervisors. In terms of terrorism, the level of capableness for a guardian must be higher than for ordinary crime (Johnson, Yalda, & Kierkus, 2010). A study conducted by Johnson, Yalda, and Kierkus (2010) found when guardianship increased in O'Hare airport in the aftermath of 9/11 there was a persistent decrease in the number of reported larcenies (Johnson, Yalda, & Kierkus, 2010). While typically guardianship is equated more with public vigilance rather than the guardian posing a physical threat to the offender, this has not been sufficient with terrorism and

after the 9/11 attacks guardianship in airports was increased (Johnson, Yalda, & Kierkus, 2010). In the immediate time period after September 11th, 2001 National Guard troops, police, and federal agents were used to increase guardianship; in the long term federal TSA agents have become the primary form of human guardianship (Johnson, Yalda, & Kierkus, 2010). Another form of human guardianship at airports is the presence of Federal Bureau of Investigation (FBI) liaison agents (FBI, 2008). Since there are few circumstances where potential terrorist targets are left completely unguarded, terrorists must compensate by using methods mostly likely to go undetected by guardians. Bombings are by far the most common attack method because they are relatively inexpensive, simple to construct, and do not require a group to implement; a lone terrorist can easily plant a bomb where a group could be more easily detected (Ross & Stohl, 2014).

Human guardians are not the only method of increasing guardianship in airports (Johnson, Yalda, & Kierkus, 2010). After 9/11, increased security related technologies were implemented as another method of increasing guardianship (Johnson, Yalda & Kierkus, 2010). Some technology related guardianship measures mandated by the TSA include Explosive Detection Systems that use Computer Tomography and explosives trace detection equipment that uses chemical analysis to find small amount of explosives (Johnson, Yalda, & Kierkus, 2010). In addition to technological guardianship, there has also been an increase in awareness of the guardianship measures present because of the media attention after 9/11 (Johnson, Yalda, & Kierkus, 2010). Johnson, Yalda, and Kierkus (2010) argue that the increased perception of guardianship measures increases the overall level of guardianship in the airport.

However, while a perceived increase in guardianship measures may enhance the overall level of guardianship, a perception of lack of capable guardianship may persuade offenders to act on seeming opportunity. Groff (2007) created a simulation model testing routine activity theory which is predicated upon the offender's perception of suitable target and capable guardianship. The author argues the level of capable guardianship present is the first situational characteristic considered by the offender when considering a potential crime (Groff, 2007). The perception of the capableness of a guardian is evaluated by the potential offender on a continuum (Groff, 2007). The perception of capable guardianship informs the offender of the opportunity present to commit a crime, by increasing the perceived effort involved successfully committing a crime guardianship can be increased (Shane & Magnuson, 2016). When examining sea piracy, Shane and Magnuson (2016) found by increasing the perceived effort and risk of accessing the ship, guardianship is increased and vessels can reduce the likelihood of a successful attack. Reyns, Henson, and Fisher (2011) examine how perceived inertia in response to illegal online actions leads to lack of guardianship in cyberstalking situations.

Since the introduction of increased forms of human, technological, and perceived guardianship, a lack of guardianship tends to occur when TSA personnel do not enforce place management policies (Jackson, 2011; Bradner & Marsh, 2015). Guardianship fails in airports when passenger movements are unrestricted, metal detectors or other screening measures fail and fake identification is not recognized (Jackson, 2011; Bradner & Marsh, 2015). For aircrafts; this would also mean poor place management policies such as allowing the passengers near the cockpit within 20 minutes of takeoff or landing (Clarke & Newman, 2006). A lack of sky marshals on airplanes would also be a lack of

guardianship (Clarke & Newman, 2006). These are all opportunities for terrorism to occur.

Identification is another important aspect of capable guardianship as demonstrated by the 9/11 hijackers who were able to use fake IDs without question (Etzioni, 2004). Several undercover operations were conducted by the General Accounting Office (GAO) to show just how easy it is to get into sensitive areas using fake identification (Etzioni, 2004). Using items and computer programs that can be found in the average household, the GAO created fake driver's licenses, fake birth certificates, fake social security numbers, and in some cases fake law enforcement identification. Undercover agents then went to border security, federal buildings, airports, and military facilities trying to gain access using the fake IDs (Etzioni, 2004). The undercover agents had nearly 100% success rate at gaining access to these facilities on the first try; three of the federal buildings turned the agents away on the first attempt, but they were admitted on the second (Etzioni, 2004, p. 99). Using the fake law enforcement identification and claiming they were armed, the undercover agents were able to enter secure areas and board planes without being searched and carrying valises (Etzioni, 2004). At military facilities, the agents carried identification claiming to be from a made-up agency in the Department of Defense and were not only allowed into secure areas but the undercover agents were allowed unimpeded access to weapons (Etzioni, 2004).

Being able to detect potential terrorists through spotting fake identification is especially important because Hastings and Chan (2013) also found making airports more secure does not deter terrorists but instead makes airports more valuable targets to terrorists. Even if a bomb did not detonate, Al Qaeda began to see the attacks as a

success because it demonstrated their power to successfully meet a challenge by infiltrating a highly secured areas (Hastings & Chan, 2013). Despite these findings, the literature still finds target hardening appears to be an effective method of guardianship. Metal detectors were first installed and a security screening process established in 1973 in a round of airport and airline reforms, which succeeded in its purpose of reducing hijackings (Dugan, LaFree, & Piquero, 2005; Haas, 2010). Hsu and Apel (2015), using the Global Terrorism Database (GTD), found while metal detectors are effective, that both displacement and diffusion can result depending on the types of attack, weapon, or the target being used by the terrorists. A more recent innovation, Advanced Imaging Technology (AIT), has been introduced to airports and has been found to be effective in reducing the risk of an Improvised Explosive Device (IED) from being smuggled on board a plane or further into the airport beyond the security checkpoint (Stewart & Mueller, 2011). However, while AIT has been found effective, a cost-benefit analysis has shown the risk of a terrorist attack occurring would have to be extremely high for the widespread implementation of the technology to be cost-effective (Stewart & Mueller, 2011).

Rational Choice Theory

Rational choice is the foundation of the crime prevention framework (Cornish & Clarke, 2008). Since there have been arguments made that terrorists are not rational actors in the same way other criminals are rational (Dugan, LaFree, & Piquero, 2005; Fussey, 2011), the rationality of terrorists as motivated offenders cannot be assumed. This dissertation argues terrorists are rational actors. Rational choice theory fits into situational crime prevention because, like routine activity theory and crime pattern

theory, it is related to the decisions made by offenders (Clarke, 2008; Cornish & Clarke, 2008, p. 21). Cornish and Clarke (2008) argue the rational choice perspective views "criminal behavior as the outcome of stable criminal motivations." Offenders' and potential offenders' desires, preferences and motives are similar to those of non-offenders; through continual interaction with opportunities and constraints, criminal behavior is reinforced or reduced (Cornish & Clarke, 2008). The rational choice perspective is present-centered and recognizes the importance of the environment on behavior and decision-making (Cornish & Clarke, 2008). There are six core concepts related to rational choice theory: 1) criminal behavior is purposeful, 2) criminal behavior is rational, 3) decision-making is crime-specific, 4) criminal choices can be categorized as either "involvement" or "event," 5) there are separate stages of involvement, 6) events occur in a process of stages and decisions (Cornish & Clarke, 2008).

Although rationality is presumed, the theory does not presume perfect rationality (Cornish & Clarke, 2008). Under perfect rationality, an individual makes an optimal decision by calculating all possible choices and outcomes (Simon, 1972). The process which creates an optimal outcome is highly impractical, individuals do not tend to compute the hundreds or even thousands of possible outcomes in a situation (Simon, 1972). Rational choice theory differs from the rationality presumed in economic and decision theory because it presumes that the decision maker has a limited or bounded rationality (Cornish & Clarke, 2008). Simon (1972) argues instead of finding an optimal solution, individuals look for a satisficing resolution. The satisficing process is problem solving and decision making which determines an aspiration level, examines possible solutions, and chooses the alternative which best fits the aspiration level criteria (Simon,

1972). Cornish and Clarke (2008) also recognize this satisficing process, in which decisions in the real world are made with less than perfect information and in less than ideal circumstances. Offenders make the decision to commit crime by weighing the costs and benefits of the situation with the information that they have available (Cornish & Clarke, 2008). Rational choice theory is ideal for examining the offender's perspective and identifying factors which can influence the decision to commit a crime (Cornish & Clarke, 2008).

Based on these theories that influence situational crime prevention, Clarke (2008) argues crime is the product of the interaction between motivation and situation. Motivation is the desire to commit crimes and is often associated within the rational choice paradigm (Sasse, 2005). The motivations of crime, although usually rewards based, specifically vary depending upon the offenses and motivations are not necessarily realized when opportunity and time converge (Sasse, 2005; Drawve, Thomas, & Walker, 2014). In the cases of some crimes, victimization will not occur in the heat of the moment as a result of the offender being in the right place at the right time, rather, the motivation of some crimes can cause the victimization process to occur over a long period of time (Sasse, 2005). Therefore, motivation can be present before a crime is committed or a victim is identified (Sasse, 2005). The motivation of the crime has been related to victim outcomes (Drawve, Thomas, & Walker, 2014). For example; Messner, McHugh, and Felson (2004) found offenders who assaulted their victims based on violence or hate were more likely to seriously injure their victim. Also, offenders motivated by hate or a personal grudge are more likely to ignore the level of guardianship present or the suitableness of the target (Drawve, Thomas, & Walker, 2014). Terrorism

is a good example of a crime where the motivation, which is political, economic, religious or social in nature, can increase the appeal of certain targets despite a level of guardianship that would deter a less motivated offender.

While terrorism has an international impact, it is a crime that has been difficult to incorporate into many theories of crime prevention and opportunity reduction, mostly due to the debate on whether terrorists are rational actors and can be incorporated into theories that assume rationality (Clarke & Newman, 2006; Fahey, LaFree, Dugan, & Piquero, 2011). Clarke and Newman (2006) argue terrorism resembles ordinary crime and while terrorist organizations have specific political motives, the group members have their own motives that are similar in nature to the motives of ordinary offenders. Essentially, Clarke and Newman (2006) contend the motives of a terrorist organization may not seem rational because there is no obvious immediate benefit to the group; however, members of the group join based on a rational calculation of costs and benefits that any offender employs. The authors place emphasis on the background conditions that are necessary for terrorist groups to form; it is these conditions that affect the decision to commit terrorist acts (Clarke & Newman, 2006). Terrorist groups form out of social and economic background conditions and the decision to commit terrorist acts are impacted by the opportunities provided by the level of security and societal regulations (Clarke & Newman, 2006; Fahey et al., 2011). Whether terrorists will use these opportunities depends upon factors such as the accessibility of available targets, ease of procuring the appropriate weapons, or societal conditions that facilitate attacks (Clarke & Newman, 2006; Fahey et al., 2011).

Terrorist acts are more likely to occur when there are ample motivating political, social, and economic factors which encourage the formation of terrorist groups, and these groups will act when there is a perceived opportunity to commit terrorist acts (Clarke & Newman, 2006; Fahey et al., 2011). This means that given real world circumstances, decisions are made in less than perfect conditions (Cornish & Clarke, 2008). A terrorist takes somewhat methodical and logical steps to accomplish their goals in a rational manner. Their goals and how they choose to accomplish them are rational based upon the background factors, such as culture, that influence offenders. In a study examining the rational calculation of suicide bombers, Perry and Hasisi (2015) found there was no fundamental difference in the decision-making process of the suicide bombers from other criminals. The authors discerned while the act of suicide for a cause may seem irrational or altruistic, the bombers expect to receive future self-gratifying benefits (Perry & Hasisi, 2015). Even though the action may seem irrational, it fits into a cost-benefit calculation based on self-interest; terrorists assume they will benefit from the attack (Perry & Hasisi, 2015).

An example of how terrorists are rational actors can be demonstrated in the steps taken to achieve a suicide bombing. Suicide bombings are often the main reason terrorists are not considered rational. Only 9 percent of terrorist attacks against airports and aircrafts from 2002-2014 were suicide attacks (START, 2015). The steps a terrorist organization takes to achieve their goal are rational. Clarke and Newman (2006) argue that "thinking terrorist" is the best way to prevent terrorist attacks. To "think terrorist" is to get into the heads of offenders to understand what they hope to gain from the crime and trace the sequence of practical and tactical decisions made at each step of the attack

(Clarke & Newman, 2006). This process is the same for terrorists or other offenders (Clarke & Newman, 2006). Clarke and Newman (2006) demonstrate how terrorists resemble other criminals by developing a crime script for a suicide bombing:

1. Arrange a safe base of operations
2. Select a target or targets
3. Select bomber candidate
4. Specify exact location for a detonation
5. Specify route to target
6. Establish group commitment
7. Train bombers
8. Prepare propaganda

To obtain their goals, terrorists must engage is a decision-making process that is similar to the same process that all individuals use in their everyday lives (Clarke & Newman, 2006). This decision-making process attempts to maximize the potential benefits (Clarke & Newman, 2006). Terrorists make decisions based on the opportunities open to them, while the objectives and opportunities open to terrorists are different from the average non-offender, the determinants of choice are the same (Clarke & Newman, 2006). Given that only bounded rationality is assumed in situational choices (Cornish & Clarke, 2008; Coyne & Eck, 2015), terrorists do fit the requirements for the motivated offender.

An example of treating terrorists as rational actors is Israel's counterinsurgency policy (Brym & Andersen, 2011). By consistently responding to insurgent activity with disproportionate military responses, which guarantee consistent Israeli victories, Israel is attempting to increase the costs of engaging in insurgency (Brym & Andersen, 2011). Brym and Andersen (2011) found rational calculations also take into account institutional, cultural, and historical forces that can mitigate the effect of a policy of

disproportionate military response. Crime pattern theory expands on this premise of terrorists engaging in rational calculations by examining the geographic locations of offenders and targets.

Crime Pattern Theory

Although the literature which uses crime pattern theory to explain terrorism is relatively sparse, there is some evidence which suggests that terrorists fit the theory by planning attacks within their awareness space and that this space increases through their criminal activity. Brantingham and Brantingham (2008, p. 79) describe crime pattern theory as recognizing the "inter-connectiveness of objects, rules and processes." Rules behind the pattern of crime can be found at both macro and the micro levels of analysis (Brantingham & Brantingham, 2008). Related to the bigger situational crime prevention framework, Brantingham and Brantingham (2008) argue crime does not occur uniformly or indiscriminately across space, time, or society. Like the larger framework, crime pattern theory is based on the idea the crime occurs because of the intersection of offenders and targets in time and space to create opportunity (Brantingham & Brantingham, 2008; Clarke, 2008). The neighborhoods and social groups frequented, impact the likelihood of crime occurring in an individual's day-to-day activities or lifetime (Brantingham & Brantingham, 2008). The daily activities of both offenders and non-offenders impact the opportunity for crime to occur (Brantingham & Brantingham, 2008). The factors that shape non-criminal activities also help to facilitate criminal activities (Brantingham & Brantingham, 2008).

Brantingham and Brantingham (2008) argued eight rules govern the patterns of how crime is committed:

- Rule 1: Individuals consistently perform activities in which they habitually make the same decisions. This habitualness creates a guiding template and for offenders a crime template is created.
- Rule 2: People do not tend to function independently as individuals but rather they have networks of family, friends, and acquaintances. Individual decisions impact the other members of the network.
- Rule 3: Individuals make decisions independently thus average or typical patterns for groups can be determined by aggregating the patterns of individuals.
- Rule 4: Crime is committed when there is a triggering event and a process by which a target or victim can be located that fits the crime template. Criminal actions will bring new experiences and change the course of future actions.
- Rule 5: Individuals participate in daily routine activities at nodes such as school, work, home, shopping, or on the pathways between nodes.
- Rule 6: Offenders have regular spacial-temporal patterns like non-offenders; crime is likely to occur near their normal activity and awareness space.
- Rule 7: Potential targets and victims have activity spaces that overlap with those of potential offenders. Crime occurs when the potential offender's willingness is triggered and the potential targets or victims fit the crime template.
- Rule 8: Crime generators are created with the flow of large numbers of

people to and through nodal points. Crime attractors are created at nodal points where potential offenders and targets tend to gather.

Cothren, Smith, Roberts, and Damphousse (2008) examined the spatio-temporal patterns of American terrorists and found that about half of their sample (n = 184) prepared their attacks within thirty miles of their residences. The authors found there was significant variation in this result based on the type of terrorist organization (Cothren, Smith, Roberts & Damphousse, 2008). International terrorist groups tended to plan out their attacks longer than domestic terrorist and single-issue terrorist organizations (Cothren, Smith, Roberts & Damphousse, 2008). This may suggest international terrorists are less familiar with the area of the attack or they must acquire more resources before implementing the attack. As the time of attack approached, terrorists tended to operate closer to the target location (Cothren, Smith, Roberts & Damphousse, 2008). In a study on American terrorist attacks from 1970-2004, Webb and Cutter (2009) found attacks to be highly localized. While public buildings symbolic of the government were frequently attacked, the authors found a growing trend of terrorists targeting everyday locations such as supermarkets (Webb and Cutter, 2009). These findings are generally consistent with Brantingham and Brantingham's (2008) rules; terrorists may have to go further to find a suitable target than other types of criminals, but they still attempt to stay within their awareness space.

Similar results were found in a spatial and temporal study conducted by LaFree, Dugan, Xie, and Singh (2011) of Euskadi Ta Askatasuna (ETA), a Basque separatist group located in Spain, attacks between 1970 and 2007. Earlier attacks

were concentrated on the Basque region they were attempting to control while later attacks, after 1978, tended to focus on gaining territory (LaFree, Dugan, Xie, & Singh, 2011). The later the year, the more likely the target was in a distant location (LaFree, Dugan, Xie, & Singh, 2011). This suggests the awareness space of the organization increased over time. (Like Cothren, Smith, Roberts & Damphousse (2008), LaFree, Dugan, Xie, and Singh (2011) found time elapsed longer the more distant the attack.) Although there is relatively little literature testing crime pattern theory on terrorism, the preliminary evidence does suggest that terrorists plan attacks within their awareness space and that this space increases through criminal activity.

The Current Study

The literature shows that while situational crime prevention or opportunity reduction solutions regarding airports and aircrafts have been identified, not all of these measures are effective. Also, there are not any studies that examine elements of routine activity in terms of both airports and aircrafts. Reports have shown that, at least in the United States, current aviation security measures are not sufficient to prevent weapons from being smuggled into airports and aircrafts (Jackson, 2011; Bradner & Marsh, 2015). This dissertation applies situational crime prevention, particularly routine activity theory, to terrorism prevention regarding airports and aircrafts. To determine how to prevent a crime, in this case terrorism, first patterns must be studied (Clarke, 2008). The elements of routine activities theory show patterns in opportunity of attacks against airports and aircrafts on an international scale. Once these patterns in opportunity are examined in terms of lack of capable guardianship, possible opportunity reduction solutions based on these patterns are discussed. This dissertation will test three hypotheses.

The first two hypotheses are based on the assertion that when a target is exposed, close to the offender, and there is a lack of guardianship, or supervision, the target is more likely to be victimized (Cohen & Felson, 1979; Clarke & Newman, 2006). The first two hypotheses test this claim as it is related to terrorism against airports and airlines. Hypothesis 1: Terrorist attacks on airports will have a relationship with the elements of routine activity theory. Hypothesis 2: Terrorist attacks on aircrafts will have a relationship with the elements of routine activity theory.

LaFree and Birbeck (1991) tested situational characteristics and compared the situations in which common crimes occurred in two countries. The authors argued because motives for the crime differed in the two countries, then the situational characteristics surrounding the crimes should be different between countries and there should be similar characteristics within countries (LaFree & Birbeck, 1991). Ultimately, the authors found different types of crimes, committed for different reasons, had different situational characteristics (LaFree & Birbeck, 1991). Coercive crimes, such as muggings and armed robberies, are less likely to be situationally clustered than the noncoercive crimes which are less violent (LaFree & Birback, 1991). Instrumental crimes, a crime which emphasizes both material goals and anonymity, are more likely to be grouped by situational characteristics than character crimes which are about the recognition of the offender (LaFree & Birbeck, 1991). These characteristics can be used to predict crime types (LaFree & Birbeck, 1991). Based on findings of LaFree and Birbeck (1991) Hypothesis 3 argues: the significant elements of routine activity theory will differ for attacks against airports and aircrafts because there are differences in the target types.

CHAPTER THREE: METHODOLOGY

Chapter 1 defined and analyzed patterns in terrorism as it is used in this dissertation. Chapter 2 discussed situational crime prevention, particularly the environmental theories of routine activity theory, crime pattern theory, and rational choice theory. The literature in this chapter identified environmental characteristics of terrorism against airports based on the components of the situational crime prevention framework. Chapter 3 describes the methodology of the study. This dissertation uses aspects of situational crime prevention, specifically in terms of Cohen and Felson's (1979) routine activity theory, to determine the most likely characteristics of an attack targeting an airport or aircraft. The background of the data, the coding of the independent and dependent variables, and the analysis plan are described.

Data

The data for this study come from the Global Terrorism Database (GTD) developed by the National Consortium for the Study of Terrorism and Responses to Terrorism (START, 2015). This data covers the years 1970-2014; however, the data from 1993 are missing (START, 2015; LaFree & Dugan, 2007). Much of the earlier data in the databases comes from the Pinkerton Global Intelligence Service (PGIS), the Center for Terrorism and Intelligence Studies (CETIS), and the Institute for the Study of Violent Groups (ISVG) (LaFree & Dugan, 2007). The data from 1993 was lost when PGIS

moved offices and has not been recovered (LaFree & Dugan, 2007; START, 2015). The GTD is an open-source database and is primarily comprised of information from media and news articles, existing data sets and secondary source materials (START, 2015). Current data collection strategies, starting in 2012, utilize both automated and manual techniques (START, 2015). Open source news articles from all over the world are filtered through software to refine the results to the relevant articles (START, 2015). The articles are then manually reviewed to identify events which meet the inclusion criteria and are then coded according to the GTD codebook (START, 2015).

The database is made up of event-level data and includes both incidents where terrorist attacks occurred and where the attacks were stopped (LaFree & Dugan, 2007). An event is defined as "a change in status (or a transition from one qualitative state to another) within some specific interval of time" (Powers &Xie, 2000, p.148). In this case, each event is a terrorist attack against an airport or aircraft. When events are non-repeatable, the event becomes binary where it is coded as 1 if an event occurs and if no event occurred it is a 0 (Powers & Xie, 2000). Because the GTD is an open-source database, it is reliant on media coverage of terrorist events and may create bias towards more newsworthy terrorist events (LaFree & Dugan, 2007). This may also create a bias towards attacks that were successfully implemented versus those that were thwarted (LaFree & Dugan, 2007). For the purposes of this study, a bias towards less successful types of attacks is not a problem since the goal is to identify what elements of an attack are most likely to occur in order to develop a prevention plan. Also, while the GTD is well represented geographically, attacks that occur in countries with restricted media, such as North Korea, may be able to keep terrorist events from becoming known to the

database (LaFree & Dugan, 2007). This could potentially create a sample that is biased towards more developed and democratic countries, since they are more likely to report on attacks than non-democracies or less developed states which potentially have stronger control over the media or simply have less media outlets to report on incidents. Potentially, this bias could limit the generalizability of the sample. However, this seems unlikely since, as descriptive statistics will reveal, democratic developed countries are not overrepresented in the sample.

While the GTD covers many different types of terrorism, routine activity theory argues different types of crime should be examined independently of one another, this means that different types of terrorism should be examined independently from one another (Felson, 2008). For this study, only terrorist incidents which had a target type of airports or airlines were included (START, 2015). Since the September 11th, 2001 terrorist attacks, aviation security has dramatically increased both in the United States and abroad (Homeland Security, 2015; ICAO, n.d.). Because of these changes in security protocol at an international level, this dissertation includes only attacks that occurred against an airport or airline in 2002 or later. The total number of cases in the study is 244 from 44 different countries.

The GTD defines a terrorist incident as "the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation" (START, 2015, p. 8). For an event to be included in the GTD there are three attributes that must be met: 1) the event must be intentional and thus occurred based on a conscious calculation, 2) the event must include violence or the immediate threat of violence, this is inclusive of violence against property

and people; 3) the offenders of the event must be sub-national actors, therefore there are no acts of state terrorism in the database (START, 2015). In addition to the three criteria just mentioned, an event must include at least two of the three following conditions to be in the GTD (START, 2015). First, the "act must be aimed at attaining a political, economic, religious, or social goal" (START, 2015, p. 9). These goals must exceed simply wanting to make a profit (START, 2015). Second, there "must be evidence of an intention to coerce, intimidate, or convey some other message to a larger audience (or audiences) than the immediate victims" (START, 2015, p. 9). Essentially, the goal of the attack should be to inspire terror beyond the victims who were the targets of the physical attack (START, 2015). Third, the "action must be outside the context of legitimate warfare activities" (START, 2015, p. 9). This can include actions in a conflict setting which violates international humanitarian law, particularly when those actions deliberately target civilians or non-combatants (START, 2015).

Measures

This study will look at two dependent variables which focus on the target of the terrorist attack. One dependent variable is if an attack targeted an airport and the other is if an attack was against an aircraft. The independent variables used in this study are primarily elements of routine activity theory related to opportunity in attacks against airports and airlines.

Dependent measures – suitable target.

The dependent measures of this study are whether an attack occurred against an airport or an aircraft. In the GTD, these measures are part of a categorical variable of target subtypes. Situational crime prevention and routine activities are both crime

specific and focus on the situational aspects of the crime (Clarke, 2008; Felson, 2008), so it is theoretically important to distinguish between attacks targeting airports and aircrafts because. The suitableness of a target changes based on the elements of VIVA and EVIL DONE, which have been previously discussed (Clarke & Newman, 2006; Felson, 2008). Considerable situational differences exist in attacking an airport versus an aircraft. Airports and aircrafts are susceptible to different types of attacks and subject to different types of guardianship because one is a structure and the other a method of transportation. It is important to study these targets separately so the patterns in attacks can be found and from there appropriate opportunity reduction solutions can be identified. While security at an airport may help to increase the effort of attacking an aircraft, situational measures that are effective in an airport are not always possible if an attack were to occur on an aircraft. Also, it is possible that an aircraft can be attacked when it is mobile. Routine activities theory states a motivated offender, lack of capable guardianship, and a suitable target must come together in time and space for a crime to occur (Cohen & Felson, 1979). However, this dissertation does not focus on whether the elements of routine activity theory predict crime. Rather, this dissertation focuses on how the other elements of the routine activity equation vary based on the target of the attack. This focused approach is appropriate because it will lead to more specific prevention measures.

The first dependent variable in this study was whether an airport was targeted in an attack. This is coded as a 1 if an airport was the target and as a 0 if it was not the target. The second dependent variable was whether the target of the attack was an aircraft, either stationary or in flight. This is coded as a 1 if an aircraft was targeted and 0 if it was not the target.

Independent measures.

Lack of capable guardianship measures.

An important proxy for lack of capable guardianship is the successful completion of an attack. If the attacks against airports and aircrafts are not successful at a statistically significant level then it indicates that there are already enough opportunity reduction measures in place to prevent damage from these types of attacks. Success is a dichotomous variable; the success of the attack is measured by the tangible effects of the attack and not by the larger goals of the terrorists (START, 2015). If an attack took place instead of being thwarted, it was considered a success, coded as 1 (START, 2015). Alternatively, if an attack was not a success, it was coded as 0. How an attack is successful varies based upon the type of attack that took place (START, 2015). For example, an attack is a success if a bomb planted in a building explodes, even if the bomb does not cause damage (START, 2015). If multiple attacks took place, the success is based on the most serious type of attack (START, 2015). As previously mentioned, the GTD is an open source database that relies upon media sources and therefore is a bias towards successful attacks because they are more likely to come to the attention of the media (LaFree & Dugan, 2007). Although there is a bias towards successful attacks, unsuccessful attacks still account for 16.8 percent of the sample used in this study. Since this dissertation is examining how to prevent or reduce terrorist attacks, the attacks that are successful are more important than the attacks which are unsuccessful in determining how to reduce damage.

The type of attack implemented is an indicator of perceived guardianship. Opportunity reduction efforts should be directed towards preventing the types of attacks

most likely to occur against a specific target. Three types of attack are included in this analysis, attacks which are facilitated by: explosives, incendiary devices, and firearms. The type of attack implemented is a proxy measure of perceived lack of capable guardianship. If a certain type of attack is significantly related to a target then it indicates that the terrorists determined there was opportunity for that type of attack to be successful. In terms of prevention, it is important to determine which types of attacks need to be guarded against.

All three types of attacks, explosives, incendiary devices, and firearms, are dichotomous variables. The explosives variable is coded as 1 if a grenade, mine, mail bomb, pressure trigger, projectile, remote device, suicide bomb, time fuse, vehicle, dynamite or TNT, sticky bomb, unknown or other explosive device is used (START, 2015). Incendiary is coded as a 1 if arson or fire, flame thrower, gasoline or alcohol is used to facilitate the attack (START, 2015). Firearms is coded as a 1 if an automatic or semi-automatic weapon, handgun, rifle, shotgun, unknown gun, or other type of gun is used in an attack (START, 2015). These three variables were pulled from the categorical weapon subtype variable in the GTD database (START, 2015).

Motivated offender measures.

Because the motivated offender is assumed in routine activity theory (Cohen & Felson, 1979) and terrorists are by definition motivated offenders, this element is not required to test the theory. However, it is important in terms of prevention to know if the terrorists are extremely motivated and require higher levels of guardianship. Particularly, it is imperative to know if the perpetrator committed, or intended to commit, suicide in the implementation of the attack. This is important because it not only shows the

offender was highly motivated but when the perpetrator is willing to commit suicide to implement an attack a higher level of guardianship is required to prevent this type of attack. Suicide is coded as a 1 if there is evidence that the offender did not intend to survive the attack and 0 if there is no evidence that suicide was intended (START, 2015). In addition to suicide, another offender related variable is whether or not the terrorist event can be defined as international terrorism. International terrorist organizations are likely to have different motivations from domestic terrorist groups. Also, it is important to determine if attacks against airports or aircrafts are more likely to be committed by international terrorists rather than domestic because each group would require different opportunity reduction solutions. For example, aviation security personnel should be trained to recognize forged identification from other countries. International terrorism is coded as 1 if the attack was logistically international, committed by a perpetrator of a different nationality from the target, or the location of the attack is different from the nationality of the targets (START, 2015). If these conditions are not met, and therefore the attack was domestic, then international terrorism is coded as 0 (START, 2015).

Control measures.

Several control measures are used in this study. Since this dissertation is a first step in examining opportunity for terrorism against airports and aircrafts, some exploratory measures are included in the analysis. Particularly, this study tests to see if there are specific times when terrorist attacks are more likely to occur. One measure the time aspect is the year of attack. As previously discussed, aviation security increased after the September 11th, 2001 attacks (Homeland Security, 2015; ICAO, n.d.), it is likely that security may become lax the more time that passes since attacks. Years is a

continuous variable and ranges from 2002 to 2014 (START, 2015). In addition to years, another variable which may be important to opportunity is the day of the week the attack occurred. Based on summaries of the terrorist events and the timing of several notable attacks such as 9/11 and the attack on the Brussels airport, Tuesday was chosen as an exploratory variable for the day of the week. Tuesday is a dichotomous variable where 1 indicates the attack took place on a Tuesday while 0 indicates the attack took place on another day of the week.

Finally, regional control variables will be incorporated in alternative models. If no regions are significant then the results of the original models can be generalized to airports and aircrafts in every region of the world. However, if a region is significant then it indicates there is some opportunity for terrorism against airports and aircrafts occurring in that region which is not present elsewhere. These are categorical variables which classify each incident by the region in which the attack took place: 1) South America, 2) Southeast Asia, 3) South Asia, 4) Middle East and North Africa, 5) Sub-Saharan Africa (START, 2015). Only regions which are at least 4 percent of the sample are included in the analysis.

Analysis Plan

The analysis plan will be completed in four steps. In step one, the descriptive statistics for dependent and independent measures are outlined. Descriptive statistics describe the distribution of the data (Moore & McCabe, 2003). Specifically, the descriptive statistics show the shape, center, and spread of the data (Moore & McCabe, 2003). These statistics will include the mean, maximum, minimum, and standard deviation where appropriate. The mean is the average, or center, of a distribution (Moore

& McCabe, 2003, p. 38). The maximum and minimum are respectively the highest and lowest scores in a data distribution (Moore & McCabe, 2003). Standard deviation is the square root of the variance (Moore & McCabe, 2003). Essentially, the standard deviation looks at the spread of the data; it does this by measuring how far the observations are from the mean (Moore & McCabe, 2003, p. 48). The standard deviation can only be interpreted for continuous variable year. The rest of the variables are dichotomous and, therefore, are non-normal.

In step two, the relationships between the bivariate statistics will be described through tetrachoric correlations. This is appropriate because of the dichotomous nature of the data and a quantitative measure is being used to conceptualize a qualitative phenomenon (Vaswani, 1950). A tetrachoric correlation gives a product-moment estimation of transformed variables (Vaswani, 1950, p. 269). With tetrachoric correlations there is an assumption the joint distribution of the bivariate measures will be normal (Vaswani, 1950). Although the normality of the distribution cannot be verified (Vaswani, 1950). Bivariate statistics are the first look at the relationships between the measures and provide insight on how variables will interact in step three. Also, bivariate statistics are the first step in diagnosing multicollinearity (Berry & Feldman, 1985; Fox, 1991). If a correlation coefficient is abnormally high then the two variables might be measuring the same concept and thus causing multicollinearity (Berry & Feldman, 1985; Fox, 1991).

Step three, multivariate statistics, consists of two logistic regression models. The first model will use attacks at airports as the dependent variable and the second model will examine attacks targeting aircrafts. Logistic regression, or logit, is the logarithm of

the odds of success over failure (Powers & Xie, 2000, p.49). Because the dependent measures are dichotomous, it is not appropriate to use multiple regression models such as Ordinary Least Squares which assumes a continuous dependent variable (Grimm & Yarnold, 2000). Instead, logistic regression will be used since it is specifically designed to handle the dichotomous distribution of the dependent variable and is a relatively flexible model (Grimm & Yarnold, 2000). Logit transforms the data so that the parameters are unbounded but the predicted values fall between 0 and 1 (Powers & Xie, 2000, p. 49). In addition to the dichotomous dependent variable, logistic regression is designed so that the independent variables may be nominal, ordinal, ratio, or interval (Grimm & Yarnold, 2000). This flexibility is ideal for the measures used in this study.

For Hypothesis 1, terrorist attacks on airports will have a relationship with the elements of routine activity theory, logistic regression will indicate which of the previously described proxies for the elements of routine activity theory are most likely or unlikely to occur during an attack at an airport. Logistic regression is appropriate because event-level data is a binary indicator of whether an attack did or did not occur at an airport. The significant variables will guide what situational crime prevention techniques are appropriate for attacks targeting airports. For example; if explosives are found to be significant then measures such as bomb detection dogs should be implemented.

Related to the first hypothesis, Hypothesis 2: terrorist attacks on aircrafts will have a relationship with the elements of routine activity theory, is also based on binary event-level data which is appropriate for the model. Logistic regression will indicate which of the previously described proxies for the elements of routine activity theory are

most likely or unlikely to occur during an attack on an aircraft. Significance shows patterns in attacks that are generalizable across the sample. The situational crime prevention solutions suggested by these results will be useful for airports worldwide.

Hypothesis 3, the significant elements of routine activity theory will differ for attacks against airports and aircrafts because there are differences in the target types, will be supported if different variables are significant based on the dependent variable. This would support the situational crime prevention principle that opportunity reduction techniques must be crime specific. Different targets present different opportunities for terrorism, it is important that situational crime prevention techniques focus on reducing specific opportunities.

In step four, alternative models will be tested which control for region. This will show if specific regions are more susceptible to having their airports and aircrafts as the target of the attack. The region may mediate the effect of some of the routine activity variables on the target type. This would suggest opportunities for terrorism against airports and aircrafts vary by region. In the next chapter, the results of the analysis are discussed.

CHAPTER FOUR: RESULTS

Chapter 1 defined and typologized terrorism, as well as examined patterns of terrorism as it relates to this dissertation. Chapter 2 discussed situational crime prevention and its associated theories in terms of the literature on terrorism against airports and aircrafts. Chapter 3 described the data, measures, methods of analysis that will be utilized in this dissertation. This chapter describes the expected results of the study in four steps.

Step 1

The first step in the analysis is the presentation of descriptive statistics. Statistics used in this step of the study are the mean, minimum, maximum, standard deviation, skewness and kurtosis. These statistics are used to determine the shape, or normality, of each variable. Since the variables airports, aircrafts, suicide, success, firearms, incendiary, explosives, international terrorism, Tuesday, South America, Southeast Asia, South Asia, Middle East and North Africa, Sub-Saharan Africa, are dichotomous in nature, the standard deviation, skewness, and kurtosis cannot be interpreted. While these variables are not conducive for linearity, the use of logistic regression in Step 3 accounts for the lack of linearity and normality (Powers & Xie, 2000). For these variables, the mean is interpreted.

Table 1.

Descriptive Statistics

Measures	Mean	SD	Minimum	Maximum
Airport	.762	-	0	1
Aircraft	.196	-	0	1
Suicide	.090	-	0	1
International Terrorism	.441	-	0	1
Success	.830	-	0	1
Firearms	.163	-	0	1
Explosives	.758	-	0	1
Incendiary	.016	-	0	1
Year	2009.860	3.786	2002	2014
Tuesday	.147	-	0	1
South America	.049	-	0	1
Southeast Asia	.041	-	0	1
South Asia	.344	-	0	1
Middle East & North Africa	.250	-	0	1
Sub-Saharan Africa	.209	-	0	1

Table 1 shows that 76 percent of attacks in the sample target an airport and 19% of attacks target aircrafts. This dissertation finds that 83 percent of attacks are successful, indicating that the average attack is successful and guardianship is lacking. Explosives are used in 75 percent of attacks while incendiary devices and firearms are expected to be implemented in 16 percent of attacks each. The type of attack implemented has an impact on the type of guardianship measures that should be applied. Offender-related variables include suicide and international terrorism. Only 9 percent of attacks utilize suicide as a tactic. International terrorism accounts for 44 percent. Essentially, this means that in 44 percent of attacks the offender was of a different nationality of the victims or the target location. To include the time component of situational crime

prevention, the analysis finds 14 percent of the attacks occurred on a Tuesday. To be included in the study a region must comprise at least 4 percent of the sample: 5 percent of attacks occur in South America, 4 percent in Southeast Asia, 34 percent in South Asia, 25 percent in the Middle East and North Africa, and 21 percent in Sub-Saharan Africa.

Year is another control variable related to time and it is continuous, thus all of the descriptive statistics mentioned can be interpreted. The minimum year is 2002 and the maximum is 2014. The average year in the sample is expected to be 2009 with a standard deviation of 3.786 years. This variable is expected to be normally distributed with no skewness or kurtosis. The next step examines the relationship between variables.

Step 2

The second step is bivariate statistics; this is the first indicator that there is a statistical relationship between two variables. Since categorical data is used in this study, it is appropriate to use tetrachoric correlations (Vaswani, 1950). These correlations give a product-moment estimation of transformed variables (Vaswani, 1950). While the normality of the distribution cannot be corroborated, it is assumed (Vaswani, 1950). Since tetrachoric correlations are only appropriate to use with dichotomous data, so Pearson correlations are presented for the continuous variable year. SPSS was used to create the bivariate statistics by means of TETRA-COM, a syntax based program which estimates the tetrachoric correlation (Lorenzo-Seva & Ferrando, 2012).

Table 2.

Bivariate Correlations

Measures	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
1. Airport	--														
2. Aircraft	-.985	--													
3. Suicide	.355*	-.316	--												
4. International Terrorism	-.647	.608*	.337*	--											
5. Success	.451*	-.403	.029*	-.399	--										
6. Firearms	-.354	.321*	-.668	.291*	.234*	--									
7. Explosives	.601*	-.552	.475*	-.354	.013*	-.952	--								
8. Incendiary	-.216	.306*	.456*	.065*	-.047	-.022	-.587	--							
9. Tuesday	-.343	.201*	.210*	.301*	.194*	-.116	.157*	.016*	--						
10. South America	-.117	.036*	-.392	-.676	-.244	-.025	-.005	.256*	.019*	--					
11. Southeast Asia	.071*	-.011	.162*	-.253	-.187	-.267	.035*	.753*	.183*	.016*	--				
12. South Asia	.532*	-.465	.322*	-.368	.356*	-.631	.565*	-.280	.279*	-.615	-.498	--			
13. Middle East/North Africa	-.286	.198*	-.004	.475*	-.063	.271*	-.239	.081*	.021*	-.313	-.166	-.755	--		
14. Sub-Saharan Africa	.009*	.024*	-.532	-.042	.250*	.564*	-.379	-.196	-.334	-.552	-.425	-.921	-.705	--	
15. Year	.239*	-.225*	.012	-.138	.050	-.001	.167*	-.175*	-.021	-.042	-.102	-.049	.194*	.032	--

Note: *p<.05; Variables 1-14 are tetrachoric correlations; Variable 15 (Year) are Pearson correlations

As seen in Table 2, significant relationships are found between the theoretical proxies of target, motivated offender, capable guardianship, and the control variables measuring time and region. The target type of airport is has a significant, positive, relationships with suicide, success, explosives, Southeast Asia, South Asia, Sub-Saharan Africa, and year. Attacks being successful and using explosives as the method of attack is in line with the literature (Ross & Stohl, 2014). Year having a positive relationship with airports makes sense because immediately following the 9/11 attacks, airport security drastically increased. There would be less opportunity to attack airports in the direct aftermath of the attacks, but as time passed guardianship on this target would decrease from the hyper-vigilance present ensuing from the 9/11 attacks. South Asia may have a relationship with airports because it includes Afghanistan, which is involved in an international conflict instigated by the 9/11 attacks. This is the first indicator that Hypothesis 1, terrorist attacks on airports, has a relationship with the elements of routine activity theory, may be supported.

Attacks against aircrafts have a significant, positive, relationship with international terrorism, firearms, incendiary devices, Tuesday, South America, Middle East and North Africa, and Sub-Saharan Africa. Firearms are a more effective type of attack to use on an aircraft, rather than explosives, if the offender does not plan on dying in the attack. International terrorism is expected to be significant on aircrafts because it is easy to target victims of specific nationality rather than just attacking an airport where victims are more likely to be random. Attacks against aircrafts are expected to have a significant, negative, relationship with success and explosives. Aircrafts as targets are less likely to be successful because they are an enclosed environment which presents

more risk to offenders getting caught. If an attack is attempted from outside of the aircraft, it is likely the terrorist may miss their target or are unable to get close enough to the aircraft to complete the attack. Explosives have a negative relationship with attacks against aircrafts because it is an enclosed space and the explosives would be likely to harm the offenders in the course of the attack. There is not much opportunity for passengers to leave aircrafts once they have boarded, so it would be difficult for a terrorist to plant an explosive and deplane. Also, offenders must pass through airport security to board the plane, and it may be easier to smuggle other types of weapons through security. Aircrafts have a significant, negative, relationship with year, indicating that aircrafts were more likely to get attacked during the early years of the sample. Hypothesis 2, terrorist attacks on aircrafts has a relationship with the elements of routine activity theory, finds initial support at this stage. Hypothesis 3, the significant elements of routine activity theory differs for attacks against airports and aircrafts because there are differences in the target types, is also initially supported at this preliminary step. This is particularly illustrated by the use of explosives and international terrorism.

Bivariate relationships are important to examine because they can indicate whether multicollinearity may be an issue in the bivariate analysis (Berry & Feldman, 1985). Multicollinearity is when two variables are measuring the same concept (Berry & Feldman, 1985). The existence of multicollinearity in the multivariate analysis inflates standard errors and can create biased coefficients (Berry & Feldman, 1985). Table 2 shows that for the majority of relationships, multicollinearity is not an issue. Multicollinearity appears to be present in the relationship between airports and aircrafts; however, this is not an issue because they are both dependent variables and are not in the

same models. Several of the region variables are highly correlated but again, they are not simultaneously present in the same models so multicollinearity is not a problem. The relationship between firearms and explosives is highly correlated and may be a cause for concern. This is to be expected because they are both types of attacks and measure similar but distinct concepts. The next step tests the entire model.

Step 3

The third step in the analysis is multivariate statistics, specifically logistic regression. As seen in Table 3, attacks against airports have significant relationships with suicide, success, explosives, international terrorism, and Tuesday. The relationships with suicide, success, and explosives are positive. If a suicide tactic is employed (B = 2.656, odds ratio = 14.245), an attack is more likely to target an airport. The odds of an attack occurring at an airport being successful is 7.055 times that of an unsuccessful attack (B = 1.954, odds ratio = 7.055). Explosives being utilized in an attack on an airport target is 17.509 times more likely than any other attack type (B = 2.863, odds ratio = 17.509). These findings indicate that attacks targeting airports are likely to be successful as well as incorporate suicide tactics and explosive devices. Offenders appear to be highly motivated. Prevention measures will need to take into account the likelihood that potential terrorists will not be deterred by methods which would lead to their capture. Guardianship appears to be lacking based on the significance of success and explosives. Prevention and reduction tactics should also be focused on the detection of explosives.

Table 3.
Logistic Regression – DV = Airport

Measure	**B**	**SE**	**Exp(B)**
Suicide	2.656**	1.119	14.245
International Terrorism	-2.139**	.633	.118
Success	1.954*	.841	7.055
Firearms	1.136	1.169	3.114
Explosives	2.863**	1.110	17.509
Incendiary	-.437	1.813	.646
Year	.092	.081	1.097
Tuesday	-2.221**	.783	.108
Constant	-186.883	163.440	.000
-2 Log Likelihood	78.583		
Cox and Snell R^2	.399		
Nagelkerke R^2	.567		

Note: **p< .01; *p.05

Alternatively, international terrorism (B = -2.139, odds ratio = .118) has a negative relationship with attacks on airports. This may be because it is difficult to specifically target nationalities during an attack and it is less likely that offenders will travel very far out of their awareness space to commit an attack. Domestic terrorist groups being significantly more likely to attack airports may indicate a familiarity with the target. Contrary to expectations, attacks on airports are less likely to occur on Tuesdays (B = -2.221, odds ratio = .108). This may be because fewer people tend to fly on that day. Although the reason is not clear, the significant relationship between the target of airports and Tuesday does indicate that terrorist attacks are related to time. Based on these findings Hypothesis 1 is partially supported.

To test goodness-of-fit, the Cox and Snell R^2 and the Nagelkerke R^2 are utilized. It should be noted that some researchers have argued that goodness-of-fit tests are not powerful when based on samples with less than 400 cases (Norusis, 2003). Since the sample in this study is 244, this limitation on goodness-of-fit should be noted. Also,

model summary figures for logistic regression are typically smaller than what is found in linear regression and are not comparable (Norusis, 2003). Based on the Cox and Snell R^2 and the Nagelkerke R^2, the airport model has a relatively good fit. The Cox and Snell R^2 indicates about 40% of an attack targeting an airport is explained by the model. This statistic is based on the log likelihood and takes the sample size into account although it can never reach 1 (Norusis, 2003). The Nagelkerke R^2 adjusts the Cox and Snell R^2 so that a maximum value of 1 can be achieved (Norusis, 2003). According to the Nagelkerke R^2, the model explains 56.7 percent of the factors in a terrorist attack targeting an airport.

Additionally, multicollinearity is diagnosed by testing the tolerance (Mansfield & Helms, 1982; O'Brien, 2007). The presence of multicollinearity is indicated by tolerance values below .20 (Menard, 1995; Neter, Wasserman & Kutner, 1989). The model targeting airports show tolerance values ranging from .338 to .942. Based on these statistics, multicollinearity is not an issue in the model.

Table 4.
Logistic Regression – DV = Aircraft

Measure	**B**	**SE**	**Exp(B)**
Suicide	-1.661	1.013	.190
International Terrorism	1.826**	.631	6.210
Success	-1.541*	.785	.214
Firearms	-1.544	1.110	.213
Explosives	-2.888**	1.041	.056
Incendiary	-.063	1.773	.939
Year	-.074	.076	.929
Tuesday	1.100	.735	3.004
Constant	150.355	152.458	.000
-2 Log Likelihood	83.051		
Cox and Snell R^2	.317		
Nagelkerke R^2	.468		

Note: **p< .01; *p.05

Table 4 demonstrates attacks against aircrafts have significant relationships with success, explosives, and international terrorism. Interestingly, the relationships with the guardianship proxies of success and explosives are negative. The odds of an attack being unsuccessful against an aircraft is .214 times more likely than a successful attack (B = -1.541, odds ratio = .214). Explosives (B = -2.888, odds ratio = .056) are .056 times less likely to be used in an attack on an aircraft. This indicates attacks against aircrafts are unlikely to be successful and it is not likely that explosives will be used in an attack. Since an aircraft is a confined space with little room to maneuver, it makes a successful attack less likely. As previously mentioned, explosives are less likely to be used in an aircraft attack because there is little opportunity to implement this type of attack without the offender endangering themselves.

Similar to attacks on airports, an offender-related variable is significant. However, unlike attacks on airports, attacks targeting aircrafts are likely to be perpetrated by international terrorist organizations. The odds of an international terrorist organization attacking an aircraft is 6.210 times more likely than a domestic terrorist organization (B = 1.826, odds ratio = 6.210). International terrorism may be more likely to occur when an aircraft is targeted because it is easier to identify the nationality of the target and it may be a more symbolic target for international terrorists. Hypothesis 2 is partially supported by this model. Although the relationship with the guardianship proxies is negative, the relationships with success and explosives are still significant. This indicates that guardianship measures are important; however, there does not seem to be a lack of capable guardianship present in attacks against aircrafts.

The goodness-of-fit statistics indicate that the aircraft model fits modestly well. The Cox and Snell R^2 shows that 31.7% of an attack taking place against an aircraft is explained by the model. The Nagelkerke R^2, a measure which adjusts the Cox and Snell R^2 so that a score of 1 is achievable, indicates the model explains 46.8% of attacks against aircrafts. The tolerance values demonstrate that multicollinearity is not an issue in this model: the tolerance values range from .338 to .942.

The analysis also finds support for Hypothesis 3. The different directions in the relationships of success, explosives, and international terrorism between the two models indicate that different situational characteristics are in play based on the target type. Since success is has a negative relationship with attacks against aircrafts, it may indicate that guardianship is higher on aircrafts than in airports. Therefore, aircrafts may have less need for opportunity reduction solutions than airports. Explosives are highly likely to be used in an attack against an airport while they are significantly unlikely to be used in an attack against an aircraft. Based on these results, prevention techniques should be very different for the two types of targets. Additionally, the types of offenders are different between targets. Attacks against airports are likely to be perpetrated by domestic terrorist groups willing to use suicide tactics, while attacks against aircrafts tend to be committed by international terrorist organizations and do not have a relationship with suicide. Another interesting finding is the significant, negative, relationship of Tuesday with attacks against airports. While the reason behind this relationship is not entirely clear, attacks against aircrafts do not demonstrate the same association with time. The next step tests if situational characteristics are likely to vary by region.

Step 4

The fourth and final step is to test alternative models. Five alternative models are tested in this dissertation. Each of these models includes a region which comprises at least 4 percent of the sample: South America, Southeast Asia, South Asia, Middle East and North Africa, Sub-Saharan Africa. A region being significant in these models indicates the situational characteristics of attacks at these airports may differ from the rest of the world and should be more thoroughly examined.

Table 5.
Logistic Regression – South America - DV = Airport

Measure	**B**	**SE**	**Exp(B)**
Suicide	2.688*	1.130	14.702
International Terrorism	-2.620**	.748	.073
Success	1.744*	.832	5.721
Firearms	1.114	1.221	3.048
Explosives	2.822**	1.171	16.807
Incendiary	-.722	1.857	.486
Year	.072	.082	1.075
Tuesday	-2.270**	.806	.103
South America	-1.656	1.045	.191
Constant	-145.539	163.979	.000
-2 Log Likelihood	76.127		
Cox and Snell R^2	.412		
Nagelkerke R^2	.586		

Note: **p< .01; *p.05

Table 5 shows the initial airport target model with the addition of the region of South America as a control variable. South America is not significant, indicating that airports in this region do not drastically differ from airports in the rest of the world. The variables in the main airport target do not change in significance. Attacks involving a suicide tactic are still significantly likely to occur at an airport (B = 2.688, odds ratio = 14.702). A domestic terrorist attack against an airport is still more likely to occur than

international terrorist attack (B = -2.620, odds ratio = .073). A successful attack at an airport in South America is 5.721 times more likely than an unsuccessful attack (B = 1.744, odds ratio = 5.721). The odds of an explosives based attack occurring at an airport slightly decrease from 17.509 to 16.807; however, the variable is still significant (B = 2.811, odds ratio = 16.807). Attacks on airports in South America are less likely to occur on a Tuesday (B = -2.270, odds ratio = .103). The goodness-of-fit statistics for South America (Cox and Snell R^2 = .412, Nagelkerke R^2 = .586) are marginally better than the main airport target model (Cox and Snell R^2 = .399, Nagelkerke R^2 = .567).

Table 6.
Logistic Regression – Southeast Asia - DV = Airport

Measure	**B**	**SE**	**Exp(B)**
Suicide	2.647*	1.126	14.113
International Terrorism	-2.099**	.646	.123
Success	1.980*	.852	7.243
Firearms	1.109	1.169	3.032
Explosives	2.832*	1.112	16.980
Incendiary	-.641	1.954	.527
Year	.097	.084	1.102
Tuesday	-2.230**	.782	.108
Southeast Asia	.405	1.454	1.499
Constant	-197.302	168.198	.000
-2 Log Likelihood	78.502		
Cox and Snell R^2	.399		
Nagelkerke R^2	.567		

Note: **p< .01; *p.05

As displayed in Table 6, airports in Southeast Asia are not significantly different from airports in other regions of the world. The variables significant in the main airport target model retain significance with the inclusion of the Southeast Asia control variable. A suicide attack is 14.113 times more likely to occur at an airport than an attack that does not include a suicide tactic (B = 2.647, odds ratio = 14.113). The odds of a domestic

terrorist attack occurring at an airport is .123 times more likely to occur than an international terrorist attack (B = -2.099, odds ratio = .123). An attack being successful at an airport in Southeast Asia is 7.243 times more likely than an attack being unsuccessful (B = 1.980, odds ratio = 7.243). An attack method using explosives is still significantly more likely to occur than an attack utilizing a different method (B = 2.832, odds ratio = 16.980). Finally, an attack occurring at an airport on a Tuesday is still less likely than other days of the week (B = -2.230, odds ratio = .108). The goodness-of-fit statistics for Southeast Asia model do not differ from the main airport target model (Cox and Snell R^2 = .399, Nagelkerke R^2 = .567).

Table 7.
Logistic Regression – South Asia - DV = Airport

Measure	**B**	**SE**	**Exp(B)**
Suicide	2.968*	1.219	19.456
International Terrorism	-2.118**	.664	.120
Success	1.832*	.852	6.245
Firearms	1.650	1.302	5.205
Explosives	3.085*	1.261	21.857
Incendiary	-.076	1.910	.927
Year	.066	.084	1.068
Tuesday	-3.429**	1.100	.032
South Asia	2.384*	1.058	10.850
Constant	-133.707	169.428	.000
-2 Log Likelihood	71.806		
Cox and Snell R^2	.435		
Nagelkerke R^2	.617		

Note: **p< .01; *p.05

Presented in Table 7, South Asia is the only region that is significant when airports are targeted. The odds of an attack occurring at an airport in South Asia is 10.850 times more likely than an attack occurring at an airport in the rest of the world (B = 2.384, odds ratio = 10.850). This is likely because Afghanistan is located in this

region; the conflict that occurred in the wake of 9/11 created an environment where airports became a prominent target for terrorists. Because the country was in the midst of a war, terrorists also had greater access to weapons, such as projectile missiles, than terrorists might have in other areas of the world. This finding indicates, while airports do not necessarily vary by regions, airports in conflict areas may have different situational characteristics than their counterparts.

The significant variables from the main airport target model do not differ with the inclusion of South Asia in the model. However, several variables, suicide and explosives, which were significant at the $p < .01$ level are now at the $p = .05$ level. Suicide tactics (B = 2.968, odds ratio = 19.456) are 19.456 times more likely to be implemented at an attack on an airport in South Asia than non-suicide tactics. Airports in South Asia are still more likely to experience domestic, as opposed to international, terrorism (B = -2.118, odds ratio = .120). Attacks on airports are 6.245 time more likely to be successful than unsuccessful (B = 1.832, odds ratio = 6.245). The odds of explosives being used as the method of attack at an airport in South Asia is 21.857 times more likely than another type of attack (B = 3.085, odds ratio = 21.857). Attacks on airports are .032 times less likely to occur on a Tuesday (B = -3.429, odds ratio = 032). The Cox and Snell $R^2 = .435$ and Nagelkerke $R^2 = .617$, suggest this model does have a better fit than the main airport target model. Since the South Asia region is significant, this result is not surprising.

Table 8.
Logistic Regression – Middle East and North Africa - DV = Airport

Measure	B	SE	Exp(B)
Suicide	2.582*	1.118	13.222
International Terrorism	-2.003**	.657	.135
Success	1.939*	.843	6.949
Firearms	1.150	1.176	3.158
Explosives	2.851*	1.118	17.301
Incendiary	-.476	1.821	.621
Year	.112	.086	1.118
Tuesday	-2.283**	.792	.102
Middle East & North Africa	-.672	.920	.511
Constant	-226.341	173.543	.000
-2 Log Likelihood	78.041		
Cox and Snell R^2	.402		
Nagelkerke R^2	.571		

Note: **p< .01; *p.05

The regional control variable of the Middle East and North Africa can be found in Table 8 and is not statistically significant. Although the significance level decreases for explosives and suicide, the variables do not change is significance or direction from the main airport target model. Suicide tactics (B = 2.582, odds ratio = 13.222) are 13.222 times more likely to be used in an attack on an airport than non-suicide tactics. Domestic terrorism is .135 times more likely to occur at an airport than international terrorism (B = -2.003, odds ratio = .135). Successfully implemented attacks are significantly more likely to occur than unsuccessful attacks on airports (B = 1.939, odds ratio = 6.949). The odds of explosives being used in an attack on airports are 17.301 times more likely than another attack type (B = 2.851, odds ratio = 17.301). Terrorist attacks on airports are significantly less likely to occur on a Tuesday (B = -2.283, odds ratio = .102). The goodness-of-fit statistics for this model are only marginally better than the original airport target model (Cox and Snell R^2 = .402, Nagelkerke R^2 = .571).

Table 9.
Logistic Regression – Sub-Saharan Africa - DV = Airport

Measure	**B**	**SE**	**Exp(B)**
Suicide	2.696*	1.116	14.820
International Terrorism	-2.168**	.640	.114
Success	1.898*	.838	6.672
Firearms	1.050	1.185	2.859
Explosives	2.926**	1.127	18.646
Incendiary	-.294	1.833	.745
Year	.088	.081	1.092
Tuesday	-2.151**	.793	.116
Sub-Saharan Africa	.435	.739	1.544
Constant	-179.050	163.700	.000
-2 Log Likelihood	78.231		
Cox and Snell R^2	.401		
Nagelkerke R^2	.570		

Note: **p< .01; *p.05

Table 9 presents the results of the airport target model run with the regional control variable Sub-Saharan Africa. The Sub-Saharan African region is not significant, indicating that airports do no meaningfully differ from their counterparts in other areas of the world. None of the variables which were previously significant in the main airport target model lose significance completely or change direction. Suicide tactics are still likely to be used during attacks at airports despite the regional control variable (B = 2.696, odds ratio = 14.820). Domestic terrorism is significantly more likely to occur at airports in Sub-Saharan Africa than international terrorism (B = -2.168, odds ratio = .114). The odds of an attack being successfully implemented are 6.672 times more likely than an unsuccessful implementation (B = 1.898, odds ratio = 6.672). Attacks using explosives are significantly more likely to occur at airports than attacks using a different method (B = 2.926, odds ratio = 18.646). As with the other airport target models, attacks are significantly less likely to occur on a Tuesday (B = -2.151, odds ratio

= .116). The Sub-Saharan Africa control model does not meaningfully vary in goodness-of-fit from the airport target model (Cox and Snell R^2 = .401, Nagelkerke R^2 = .570).

Table 10.
Logistic Regression – South America - DV = Aircraft

Measure	**B**	**SE**	**Exp(B)**
Suicide	-1.669	1.016	.188
International Terrorism	2.043**	.710	7.717
Success	-1.448	.784	.235
Firearms	-1.518	1.120	.219
Explosives	-2.839**	1.055	.059
Incendiary	.081	1.796	1.084
Year	-.065	.076	.937
Tuesday	1.096	.738	2.991
South America	.861	1.100	2.367
Constant	131.488	153.788	.000
-2 Log Likelihood	82.472		
Cox and Snell R^2	.321		
Nagelkerke R^2	.474		

Note: **p< .01; *p.05

Displayed in Table 10 are the results for the aircraft target model, including the regional control variable South America. Because the variable South America is not significant, attacks on aircrafts in this area are not considerably different from attacks on aircrafts in other regions. When South America is included as a control variable, successful attacks are no longer statistically significant. International terrorism (B = 2.043, odds ratio = 7.717) is 7.717 times more likely to occur than domestic terrorism in an attack on an aircraft. Explosives (B = -2.839, odds ratio = .059) are significantly less likely to be used during an attack on an aircraft than other attack types. The goodness-of-fit statistics for the South American control model for aircraft attacks (Cox and Snell R^2 = .321, Nagelkerke R^2 = .474) is only marginally different from the main aircraft target model (Cox and Snell R^2 = .317, Nagelkerke R^2 = .468).

Table 11.
Logistic Regression – Southeast Asia - DV = Aircraft

Measure	**B**	**SE**	**Exp(B)**
Suicide	-1.660	1.014	.190
International Terrorism	1.823**	.650	6.192
Success	-1.543*	.789	.214
Firearms	-1.543	1.114	.214
Explosives	-2.886**	1.046	.056
Incendiary	-.050	1.915	.951
Year	-.074	.077	.928
Tuesday	1.101	.736	3.007
Southeast Asia	-.026	1.421	.975
Constant	150.925	155.722	.000
-2 Log Likelihood	83.051		
Cox and Snell R^2	.317		
Nagelkerke R^2	.468		

Note: **p< .01; *p.05

Table 11 shows that attacks on aircrafts are not significantly different in Southeast Asia from other regions of the world. None of the variables in the Southeast Asia model vary in significance or direction from the main aircraft target model. The odds of international terrorism occurring is 6.192 times more likely than domestic terrorism (B = 1.823, odds ratio = 6.192). Attacks against aircrafts are significantly less likely to be successfully implemented (B = -1.543, odds ratio = .214). Explosives (B = -2.886, odds ratio = .056) as a method of attack are less likely to be utilized against an aircraft than other forms of violence. The Cox and Snell R^2 and the Nagelkerke R^2 suggest for the Southeast Asia model explains 31.7 percent and 46.8 percent of attacks against aircrafts, in that order.

Table 12.
Logistic Regression – South Asia - DV = Aircraft

Measure	**B**	**SE**	**Exp(B)**
Suicide	-1.617	1.022	.198
International Terrorism	1.722**	.638	5.595
Success	-1.396	.782	.248
Firearms	-1.732	1.150	.177
Explosives	-2.862**	1.072	.057
Incendiary	-.295	1.797	.744
Year	-.065	.076	.937
Tuesday	1.402	.813	4.064
South Asia	-.945	.811	.389
Constant	131.579	152.515	.000
-2 Log Likelihood	81.600		
Cox and Snell R^2	.326		
Nagelkerke R^2	.482		

Note: **p< .01; *p.05

As displayed in Table 12, attacks targeting aircrafts in South Asia are not significantly different from the same type of attack in other areas of the world. The biggest difference between the South Asia control model and the main aircraft target model is success is no longer significant. International terrorist organizations are significantly more likely to attack aircrafts than domestic terrorist organizations (B = 1.722, odds ratio = 5.595). The odds of an attack using explosives is .057 times less likely than another type of attack (B = -2.862, odds ratio = .057). Goodness-of-fit statistics do not differ radically from the main aircraft target model (Cox and Snell R^2 = .326, Nagelkerke R^2 = .482).

Table 13.
Logistic Regression – Middle East and North Africa - DV = Aircraft

Measure	**B**	**SE**	**Exp(B)**
Suicide	-1.693	1.024	.184
International Terrorism	1.875**	.662	6.520
Success	-1.546*	.787	.213
Firearms	-1.557	1.110	.211
Explosives	-2.902**	1.041	.055
Incendiary	-.082	1.773	.922
Year	-.069	.079	.933
Tuesday	1.089	.735	2.970
Middle East and North Africa	-.204	.834	.816
Constant	139.895	158.314	.000
-2 Log Likelihood	82.991		
Cox and Snell R^2	.317		
Nagelkerke R^2	.469		

Note: **p< .01; *p.05

Table 13 presents the aircraft target model controlling for the Middle East and North Africa region. The variables in this model do not change in significance or direction with the inclusion of not significant Middle East and North Africa variable. The odds of international terrorism occurring against an aircraft is 6.520 times more likely than domestic terrorism (B = 1.875, odds ratio = 6.520). Attacks against aircrafts in the Middle East and North Africa are significantly less likely to be successfully implemented (B = -1.546, odds ratio = .213). Explosives as a type of attack (B = -2.902, odds ratio = .055) are also less likely to be implemented during an attack on an aircraft. The Cox and Snell R^2 and the Nagelkerke R^2 suggests the model explains 31.7 percent and 46.9 percent of attacks against aircrafts respectively.

Table 14.
Logistic Regression – Sub-Saharan Africa - DV = Aircraft

Measure	**B**	**SE**	**Exp(B)**
Suicide	-1.687	1.014	.185
International Terrorism	1.841**	.633	6.300
Success	-1.520*	.784	.219
Firearms	-1.490	1.126	.225
Explosives	-2.918**	1.052	.054
Incendiary	-.129	1.787	.879
Year	-.072	.076	.931
Tuesday	1.064	.742	2.897
Sub-Saharan Africa	-.223	.709	.800
Constant	146.020	152.908	.000
-2 Log Likelihood	82.951		
Cox and Snell R^2	.318		
Nagelkerke R^2	.469		

Note: **p< .01; *p.05

The final model to include a regional control variable is found in Table 14. This model shows that aircraft attacks in Sub-Saharan Africa are not significantly different from attacks that occur elsewhere in the world. Variables in this control model do not change significance or direction from the main aircraft target model. The odds of an international terrorist organization attacking an aircraft is 6.300 times more likely than a domestic terrorist organization (B = 1.841, odds ratio = 6.300). Attacks against aircrafts are less likely to be successful (B = -1.520, odds ratio = .219). Explosives are less likely to be used than other methods of attack when the target is an aircraft (B = -2.918, odds ratio = .054). The goodness-of-fit statistics are not radically altered from the main model, Cox and Snell R^2 is .318 and Nagelkerke R^2 is .469.

The goodness-of-fit statistics overall do not radically change from the main aircraft and regional models. There is no region which has a significant relationship with aircraft. South Asia was the only region which had a relationship with terrorist attacks

against airports. Based on these findings, it is unlikely that the situational characteristics of terrorist attacks against airports and aircrafts will vary across region unless there are extreme environmental factors, such as a war, which distinguish their airports and aircrafts from those found elsewhere in the world. Regions involved in conflicts are likely to have more access to weapons such as explosives and may have more active terrorist organizations if their desired targets are in their awareness space. Except in these extreme circumstances it appears the main models are generalizable for airports and aircrafts across the world. The next chapter discusses the potential policy implications of the expected results.

CHAPTER FIVE: DISCUSSION

Chapter 1 examined patterns of terrorism and established a definition and typology to be used in this dissertation. Chapter 2 discussed situational crime prevention and its associated theories of routine activity theory, rational choice theory and crime pattern theory in terms of the literature on terrorism against airports and aircrafts. Chapter 3 described the data, measures, methods of analysis used in this study. Chapter 4 described the expected results of the analysis. This chapter reviews possible policy recommendations, in the form of opportunity reduction solutions, based on the expected results of the analysis. Also, future research is discussed.

Opportunity Reduction Solutions

Based on the results of the analysis, situational crime prevention, and routine activity theory, opportunity for terrorism targeting airports and aircrafts can be reduced by increasing the capable guardianship measures. Hypothesis 1: terrorist attacks on airports will have a relationship with the elements of routine activity theory, is expected to be at least partially supported. Offender related variables of suicide and international terrorism are significant. Terrorists targeting airports are likely to belong to domestic terrorist groups and will incorporate suicide tactics in their attack. Guardianship-related variables of success and explosives have a positive relationship with attacks targeting

airports. The significance of success clearly demonstrates a lack of capable guardianship at airports.

Based on the findings, a profile of the typical attack targeting an airport can be constructed. Terrorist attacks against airports are likely to be perpetrated by domestic terrorist organizations, which implement suicide tactics and explosives during an attack and are less likely to strike on a Tuesday. Attacks are successful and therefore opportunities to commit terrorism are present which can be reduced. Explosives are likely to be used during an attack on airport because they are relatively easy to use and can be employed by any number of offenders (Ross & Stohl, 2014). The expected significance of suicide would suggest that offenders are likely to not care about being caught or killed during an attack; thus, the level of capable guardianship will have to be higher to reduce the damage from an attack since an offender is not as likely to be deterred by the risk of getting caught.

Hypothesis 2, terrorist attacks on aircrafts will have a relationship with the elements of routine activity theory, finds some support. International terrorism has a positive, significant relationship with attacks against aircrafts. This is likely because aircrafts are highly symbolic targets and are also mobile, which can bring an international target into a terrorist's awareness space. Success and explosives have significant, negative relationships with attacks targeting aircrafts. Success being significant and negative is particularly important because it implies that aircrafts have a higher level of guardianship than airports.

Hypothesis 3, the significant elements of routine activity theory will differ for attacks against airports and aircrafts because there are differences in the target types, is

supported. This is particularly important because the expected results indicate opportunity reduction solutions should be directed toward airports and not aircrafts. Concentrating on methods which reduce the likelihood of explosions will be much more effective for attacks against airports than attacks against aircrafts. Another key difference is that airports are more likely to be attacked by domestic terrorist groups rather than the international groups, which are significantly more likely to attack aircrafts. Related to this is the interesting finding that suicide tactics are more likely to be used by terrorists attacking airports rather than aircrafts, which this study has established tends to be domestic groups. This finding tends to be counter to many main stream media ideas of who perpetrates terrorist attacks at airports (Jenkins & Godges, 2011). It is also notable that terrorist attacks against airports had a significant, negative, relationship with Tuesdays. Attacks against aircrafts did not find a significant relationship with time.

The results show bombings or other explosives are the most likely method of attack at an airport. The literature offers some opportunity reduction solutions aimed toward preventing this specific type of attack. One method suggested by situational crime prevention is to use place managers (Clarke, 2008). The use of place managers is to both discourage terrorists from planting explosives as well as to have more eyes to spot suspicious activity. A popular method to increase guardianship by using place managers in airports or aircrafts is the use of Closed Circuit Television Cameras (CCTV). Research has shown the effectiveness of CCTV depends upon how it is used (Farrington, Gill, Waples, & Argomaniz, 2007; Keval & Sasse, 2010; McLean, Worden, Kim, 2013). Law enforcement must be constantly monitoring CCTV in order to be able to respond in time to stop a terrorist attack in an airport (Keval & Sasse, 2010). Also, the number of screens

a single operator monitors will impact the success of CCTV in preventing terrorism (Stedmon, Harris, & Wilson, 2011). If an operator is monitoring too many cameras, then it is more likely something will be missed (Stedmon, Harris, & Wilson, 2011). The amount of space covered by the cameras will also make a difference (Stedmon, Harris, & Wilson, 2011). If there are large gaps in the CCTV coverage, then there will be more opportunity for a terrorist to move through the airport or plant an explosive.

Another common guardianship measure used in airports, which also relies on place managers, is asking passengers to report suspicious activity (Clarke & Newman, 2006). However, Clarke and Newman (2006) argue the general public cannot be relied upon to report suspicious activity. Much more reliance should be placed on airport and airline employees to notice and report suspicious activity; the general public might be alert to look out for suspicious activity but are still less likely to report an unattended bag (Clarke & Newman, 2006). An innovative guardianship measure from the United Kingdom that could reduce opportunities for terrorism includes instituting a Plane Watch program (Essex Police, 2013). The Plane Watch program was developed in the United Kingdom by the Essex Police to increase guardianship in airports and reduce opportunities for terrorism (Essex Police, 2013). The idea behind the program is that volunteers who like to watch the planes land and take off would be given special access to the airport, after a background check, and would report any suspicious activity they see to the authorities while participating in their hobby (Essex Police, 2013). The program is free for the participants and has only minimal costs for the airport (Essex Police, 2013). It is unclear how effective this program is since it has not been evaluated, but it is a low cost solution to increase guardianship. Whether the level of guardianship that has been

increased is sufficient to deter terrorists remains to be seen.

A situational crime prevention measure that increases formal surveillance is the use of profiling. This technique attempts to identify offenders before a crime can be committed. The form of profiling perfected by Israeli aviation security relies on behavior pattern recognition (Seymour, 2005). This technique attempts to determine if an individual is lying or attempting subterfuge (Seymour, 2005). Characteristics profilers look for in behavior pattern recognition include excessive sweating, flushing of the skin, lack of eye contact, bulging veins, or chapped lips (Seymour, 2005). Seymour (2005) argues that profiling must be conducted by humans and software such as the Computer Assisted Passenger Prescreening System (CAPPS) should not be relied upon. Other authors also caution that care is to be used when profiling for suspicious behavior (Epstein, 2013; Fulwood, 2013). There is a great deal of disagreement about whether profiling actually works and there is a great danger in racially profiling rather than behaviorally profiling (Seymour, 2005; Epstein, 2013; Fulwood, 2013). As previously mentioned, Israel has had success in the use of behavioral pattern recognition (Seymour, 2005). Other obstacles to profiling include the practicality behind trying to screen a massive number of people in a small time frame (Kydd, 2011). Even when rational profiling schemes are created, the ability for them to be practically implemented is lacking (Kydd, 2011). Ultimately, while profiling can increase formal surveillance and reduce the opportunity for terrorism, it should be used with caution (Epstein, 2013; Fulwood, 2013).

Current opportunity reduction measures include explosive detection systems (EDS) and explosive trace detection (ETD) systems (Committee on Assessment of

Security Technologies for Transportation National Materials Advisory Board Division on Engineering and Physical Sciences [National Research Council], 2007). At the 438 commercial airports in the United States, there are more than 1,100 EDS and 6,000 ETD systems deployed (National Research Council, 2007). These systems were rapidly distributed after 9/11 and as a result, they are stand-alone detection systems which only interact with the direct operator (National Research Council, 2007). This type of system at security checkpoints has high false-alarm rates, slows lines at checkpoints, and creates excessive demands on the individual operators (National Research Council, 2007). The Committee on Assessment of Security Technologies for Transportation National Materials Advisory Board Division on Engineering and Physical Sciences (2007) argues that only through data fusion can these systems adequately detect explosives and other threats. Data fusion is the combination of data from multiple detection systems which can be used to find patterns and make more-informed decisions (National Research Council, 2007). This type of data integration can identify patterns of weakness in airport security which would otherwise be exploited (National Research Council, 2007).

In addition to weaknesses within the security screening process, perimeter security and the entrances of terminals have been neglected (Kaufmann, 2013). Crime Prevention Through Environmental Design (CPTED) is an ideal method for securing the airport terminal and security perimeter (Jeffery, 1971). Although the primary areas of concern have been commercial airports and aircrafts, the use of general aviation in terrorism should also be considered (Syzliowicz, 2004). The less secured small public or private airports and aircrafts also need to be taken into consideration because a plane of any size can be turned into a weapon; the security needs of these types of airports can be

different from larger airports and thus should be treated differently (Syzliowicz, 2004). To control access to the facility, an airport can regulate the control of foot traffic through the use of shrubbery or a well-designed road and parking system (Hook, 2013). This is particularly effective for smaller airports and can help to reduce opportunity for attacks against the airport using simple methods (Hook, 2013). Another way to control access to airports is to install motion sensitive lights on entrances that are less used (Hook, 2013). The motion activated light can temporarily blind an intruder but will also draw the attention of airport workers and bystanders (Hook, 2013).

Once inside the airport, CPTED can be used to increase guardianship over the entrances (Hook, 2008). This can be done by securing a natural line of sight of the entrance for airport employees (Hook, 2008). By placing either a receptionist or the check-in desks within view of the front doors, employees will be immediately aware if something, or someone, suspicious enters (Hook, 2008). Also, to reduce the damage caused by explosions placed in trash cans, airports should invest in bomb resistant trash receptacles (American Innovations, 2010). These trash receptacles look and act like normal trash cans, but when a bomb is placed inside, instead of exploding, the receptacle will funnel the blast upward to minimize the damage caused by the bomb (American Innovations, 2010).

In addition to techniques which can be implemented to reduce opportunities for terrorism against airports and aircrafts, current policies implemented at these targets must also be evaluated for potential terrorist opportunities. For example; in the United States, opportunity for terrorism exists via the Transportation Security Administration's pre-check program. This program is designed to allow select travelers departing from U.S.

airports on specific airlines to move through security with minimal inspection (Transportation Security Administration [TSA], n.d.). A traveler which participates in the TSA pre-check program receives a Known Traveler Number (KTN) and will have an indicator on their boarding pass (TSA, n.d.). Members of this program do not have to remove their shoes, laptops, liquids and gels, belts, or light jackets when going through the security screening process (TSA, n.d.). To become a member, an individual simply needs to complete the application, provide identification and fingerprints at an enrollment center, and pay the $85 fee (TSA, n.d.). U.S. citizens, U.S. nationals, and lawful permanent residents are eligible for the program (TSA, n.d.).

An applicant may be rejected if they provide false or incomplete information on their application, have violated transportation security rules, or have a disqualifying criminal offense or other factors (TSA, n.d.). Factors which may disqualify an applicant from the program includes information from Interpol or another international source, being listed on a government watch list, foreign or domestic imprisonment exceeding one year, or other information deemed relevant by the TSA (TSA, n.d.). Although a thorough background check is conducted, if an applicant has not been previously convicted of a crime or suspected of terrorist activity, then there is little that would prohibit him or her from becoming members of the program. This program creates opportunity for terrorist attacks against airports and aircrafts. Terrorist organizations need only to recruit members who have no previous criminal offenses or extremist ties to smuggle in banned weapons. While both the passenger and the carryon luggage still receive minimal screening, as demonstrated by the tests conducted by the Department of Homeland

Security (Bradner & Marsh, 2015), it is still possible TSA will miss the contraband weapons.

Recommended plan to reduce opportunity at airports.

Based on the findings of this study and the opportunity reduction solutions offered in the literature and practice, a targeted plan to reduce the opportunity for terrorism at airports can be created. Because the findings of this study suggest attacks against aircrafts are unlikely to be successful, and thus do not show a lack of capable guardianship, it is not necessary at this time to create a comprehensive prevention plan. However, future research should investigate further to see which situational characteristics are found in these types of attacks which may not have been captured by this study. On the other hand, a clear profile for attacks against airports is created based on this study and centers around the need to prevent an attack based on explosives.

From the opportunity reduction solutions found in practice and the literature, two programs stand out as being the most helpful when designing a targeted harm reduction strategy. The first step is to increase human guardianship by implementing a large scale version of the Plane Watch program (Essex Police, 2013). Through this program, willing participants would be given access to airports, after a thorough background check, to engage in their hobby of watching the planes take off and land (Essex Police, 2013). However, these participants would be given some training on how to spot suspicious behavior and how to report this behavior to the proper authorities (Essex Police, 2013). This would go a long way to increasing human guardianship, and would do so in a cost-effective manner, because these participants would feel they have a duty to report suspicious activity since they have been allowed the privilege to engage in their hobby.

While Clarke and Newman (2006) found the general public are not likely to report suspicious activity, participants of the Plane Watch program will be more aware than the general public based on their training and familiarity with what is and is not normal behavior in an airport. These participants will be less likely to dismiss their suspicions and because they voluntarily chose to be part of the program, will feel invested enough to make reports of suspicious behavior. This program, if implemented on large scale, could drastically, and cost-effectively, increase human guardianship in airports and thus increase the likelihood of identifying potential explosive terrorist attacks.

Technological guardianship at airports can also be radically increased, if not as cheaply, with the implementation of data fusion programs. As previously discussed, through data fusion EDS and ETD systems will be linked and can create a database from which it can find patterns in the smuggling of explosives (National Research Council, 2007). By gathering and storing this type of information algorithms can be created which identifies potential explosive threats which individual human operators may have otherwise missed (National Research Council, 2007). The data fusion method is particularly useful because while it increases technological guardianship and the overall efficiency of the security process, it does not detract from human guardianship. A human operator is still required to oversee the scanning of each passenger, the data fusion system merely creates a faster and more reliable method of determining potential threats. If the human operator believes that a potential threat exists which the data fusion system does not recognize, the human guardian will still have the opportunity to investigate the

potential threat. This system will dramatically increase the scrutiny passengers are given in the search for explosive devices.

While not directly tested in this dissertation, it should be mentioned the outside of airports also need to be monitored for the threat of explosive devices. Both the data fusion system and the Plane Watch program will increase guardianship at airports but they will be most useful at security checkpoints and beyond. As seen with the 2016 Brussels attack, airports are extremely vulnerable from the outside and before the security checkpoint. Human guardianship needs to be increased in these areas. This may be in the form of specifically placing volunteers of the Plane Watch program in the non-secure areas of the airport for a certain amount of time as part of their participation in the program. Alternatively, aviation security officials may choose to monitor these areas through dedicated CCTV surveillance or security personnel whose jobs are to monitor the perimeter and unsecure areas of the airport. Unless the design of airports change so every person who enters is immediately passed through security, human guardianship should be considerably increased in these areas.

Future Research

While this dissertation is a first step in examining terrorism targeting airports and aircrafts in terms of situational crime prevention, there are many avenues of research that have yet to be explored. The situational variables included in this study were relatively general. Future research should explore more specific situational characteristics. For example; this dissertation expects to find explosives have a significant relationship with attacks against airports; future research should investigate what types of explosives are most likely to be used. This differentiation is important because opportunity reduction

measures which are effective against a bomb that is planted may not be as effective against a projectile explosive. In addition to differentiation based on the type of weapons used in an attack, future research should focus on how aviation security regulations vary by country. Particularly, this research should examine countries whose airports and aircrafts are most frequently targeted by terrorists and determine if their current prevention measures are significantly different from countries whose airports and aircrafts experience less terrorist attacks.

Also, as previously mentioned, while this study makes it clear that attacks against airports differ from attacks against aircrafts, it is not clearly defined what comprises an attack on an aircraft. The findings show that attacks on aircrafts are unlikely to be successful and also not likely to include explosives as the method of attack. However, while helpful, these findings do not indicate what actually occurs during an attack. Future research should include a qualitative component which can thoroughly investigate the circumstances of these attacks. Additionally, further exploration of the relationship of time and terrorist attacks. Although it is not entirely clear why, Tuesday has a significant, negative relationship with airports. Future research should further investigate this relationship and other time-related variables such as the time of day an attack took place or if terrorist attacks are more likely to occur at certain times of the year.

Another area for future research is the inclusion of conflict as a variable. Airports or aircrafts located in countries which are involved in conflicts may make them more likely to become targets of terrorism. The GTD can be cross referenced with the Correlates of War database to determine if countries experiencing war or Militarized Interstate Disputes are more likely to encounter acts of terrorism against airports and

aircrafts. Terrorists in countries that are experiencing conflict may also have access to different types of weaponry than offenders in conflict-free states. The type of weaponry employed will impact the level of guardianship needed to reduce opportunity.

Limitations

As previously mentioned in Chapter 3, a limitation of the data is the potential overrepresentation of successful attacks in the sample (LaFree & Dugan, 2007). Successful attacks are much more likely to be covered by the media than unsuccessful attacks (LaFree & Dugan, 2007). To prevent terrorists from inspiring fear in the population, it is likely governments will attempt to keep attacks which were successfully thwarted from the media's attention. Since the second model is expected to show that aircrafts have a negative relationship with success, it seems unlikely that sample bias had a major effect on the models. Also related to the success variable, a limitation exists in how success is measured. Because success is measured as the implementation of a terrorist attack, rather than whether the terrorists achieved their goals, it is impossible to assess if guardianship measures reduced the damage which might have otherwise occurred in an attack.

Another limitation which has been discussed is the bias towards countries with an active and free press (LaFree & Dugan, 2007). The GTD being an open source database means that attacks are more likely to be reported from countries that have media outlets which will report on terrorist events and are relatively free from government oversight (Lafree & Dugan, 2007). While this creates a sample bias, the amount of terrorist events going unreported is unknown. It is possible that states that are repressive enough to curtail the media have enough control on the population that terrorist attacks are made

less likely. For example, while terrorist attacks are unlikely to be reported from North Korea, the government retains enough control on the population that it is unlikely there are many terrorist events occurring in that state.

Although it is unavoidable due to the descriptive quality of situational data, the dichotomous nature of the majority of the independent variables is also a limitation. Related to this is the fact that the analysis uses cross-sectional data rather than longitudinal. Due to the dissertation focusing on specific targets and because terrorism is a relatively rare event, longitudinal data would not be appropriate for this study. Opportunity against a particular target could not be studied over time because there are too few attacks to examine this change. Additionally, the independent measures used in the analysis are not descriptive enough to provide additional information in a longitudinal study.

Conclusion

In conclusion, the current study is a first preliminary test of situational crime prevention and routine activity theory of terrorist attacks against airports and aircrafts. This is a first attempt to find the most likely characteristics of an attack against airports and aircrafts and develop opportunity reduction solutions based on these results. The most valuable finding from this analysis is that different situational characteristics are significant for distinct targets. Opportunity prevention and reduction solutions must be uniquely tailored to the target. For example; this study found it is crucial to focus prevention techniques at airports on explosive detection but attacks against aircrafts do not share this necessity. By tailoring the prevention measures to the most likely methods of attack, not only should the chances of successful prevention increase, but resources

should be utilized in a more cost-efficient manner. While this dissertation is a preliminary step, it furthers both the situational crime prevention and terrorism literature. Future research should continue to study terrorism within the context of situational crime prevention at a variety of targets to aid in the development of a more safe a secure society that is free of terror.

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8/10-5/12: M.A., Political Science. University of Kentucky, Lexington, KY.

8/05-5/09: B.A., Political Science. Hanover College, Hanover, IN.

Awards

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Works in Progress

Andreescu, V., Block, M.M., & French, A. T. Homicides and News Coverage in Louisville, KY.

Block, M.M. Residential Burglary: A Case Study of Louisville, Kentucky.

Block, M.M., & Swartz, K. (target submission of July 2016). The Impact of Opportunity on Adolescent Drug Use.

Block, M.M., & Swartz, K. (target submission of August 2016). Impact of Gender and

Opportunity on Adolescent Drug Use.

Block, M.M, Vito, G.F., Higgins, G.E., Freeman, P., & Blumenschein, K. (target submission June 2016). Strengths and Weaknesses of Prescription Drug Monitoring Programs: A Focus Group Assessment of Law Enforcement Officers.

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Papers Presented

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Teaching Experience

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