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A Quasi-Experimental Analysis Of School-Based Situational Crime Prevention Measures

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ABSTRACT

In recent years, there has been an expansion of situational crime prevention (SCP) measures in K-12 schools, including physical controls, law enforcement personnel, and security policies that are designed to prevent crime by modifying the situational features of school environments. Although SCP measures are now increasingly commonplace in schools, there is inadequate research demonstrating the need for SCP measures and their impacts on school crime. In particular, there is contradictory and inconclusive evidence of their effectiveness and research has largely been limited to examining aggregate outcomes through the use non-experimental, correlational designs. This dissertation aims to address these gaps in the literature by analyzing a nationally representative, cross-sectional sample of 2,648 schools to explore whether school-based SCP measures causes changes in the incidence of seven measures of school crime and whether the effects of SCP measures differ by the type of crime. A quasi-experimental, propensity-score weighting approach is used to reduce the threat of selection bias resulting from the lack of random assignment in observational data and therefore allow for stronger causal inferences than prior studies. Findings indicate that many SCP measures were observed to have no impact regardless of the crime outcome. However, some SCP measures were reported to have deterrent effects but these effects vary by the type of crime being targeted. Furthermore, several of the measures were found to consistently increase the incidence of crime, suggestive of detection or crime-inducing effects. Explanations for these results and implications for school policy and practice are discussed.

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List of Abbreviations

ATE ..... Average Treatment Effect in the Population

ATET ..... Average Treatment Effect on the Treated

ATT ..... Average Treatment Effect on the Treated

CIA ..... Conditional Independence Assumption

CCD ..... Common Core of Data

FTE ..... Full-Time Equivalent

IES ..... Institute of Education Sciences

IPTW ..... Inverse-Probability of Treatment Weighting

IPW ..... Inverse-Probability Weighting

IPWRA ..... Inverse-Probability Weighting with Regression Adjustment

LEP ..... Limited English Proficiency

MTF ..... Monitoring the Future

NASY ..... National Annenberg Survey of Youth

NCES ..... National Center for Education Statistics

NCVS ..... National Crime Victimization Survey

NHES-SSD ..... National Household and Education Survey, School Safety and Discipline

PSU ..... Primary Sampling Unit

RA ..... Regression Adjustment

SCP ..... Situational Crime Prevention

SCS ..... School Crime Supplement

SRO ..... School Resource Officer

SSOCS ..... School Survey on Crime and Safety

SUTVA ..... Stable Unit Treatment Value Assumption

U.S. ..... United States

YRBSS ..... Youth Risk Behavior Surveillance System

CHAPTER 1

INTRODUCTION

School crime has been experiencing a steady decline for years. According to the most recent statistics, between 1992 and 2014 the total victimization rate (including theft and violent victimization) at K-12 schools declined 82 percent, from 181 victimizations per 1,000 students in 1992 to 33 victimizations per 1,000 students in 2014 (Zhang, Musu-Gillette, & Oudekerk, 2016). Between 1995 and 2013, the percentage of students ages 12-18 who reported being victimized at school during the previous 6 months decreased overall (from 10 to 3 percent), as did the percentages of students who reported theft (from 7 to 2 percent), violent victimization (from 3 to 1 percent), and serious violent victimization. Moreover, the percentage of students who reported being threatened or injured with a weapon on school property has decreased over the last decade, from 9 percent in 2003 to 7 percent in 2013 and the percentage of students in grades 9-12 who reported that illegal drugs were made available to them on school property decreased from 32 percent in 1995 to 22 percent in 2013 (Zhang et al., 2016).

Although statistics suggest that schools are becoming safer, local school districts have increasingly implemented various situational crime prevention (SCP) techniques in response to school crime that are designed to modify situational features of the school environment. These include physical controls (e.g. metal detectors, locked doors, security cameras), personnel-based measures (e.g., school police officers), and school policies (e.g., dress code, bookbag bans, badge requirements). According to the most recent report

from the National Center for Education Statistics, from 1999-2000 to 2013-14 the percentage of public schools reporting the use of security cameras increased from 19 percent to 75 percent. Similarly, the percentage of public schools reporting that they controlled access to school buildings increased from 75 percent to 93 percent during this time (Zhang et al., 2016). Most students nationally now report the use of specific security measures, practices, and policies in their schools, including visitor sign-in requirements, hallway supervisors, security cameras, locked school access, security guards/officers, uniform policies, book bag bans, and locker checks (Carlton, 2017; Zhang et al., 2016). For the 2013-14 school year, nearly all students ages 12-18 reported that their schools had a written code of student conduct and a requirement that visitors sign in (96 percent each). Approximately 90 percent of students reported the presence of school staff (other than security guards or assigned police officers) or other adults supervising the hallway, and 77 percent reported the presence of one or more security cameras to monitor the school. About 76 percent of students ages 12-18 reported observing locked entrance or exit doors during the day in 2013, representing an increase from 38 percent in 1999 (Zhang et al., 2016). Similar trends in school safety and security measures have also been reported in specific states, such as Alabama (Stevenson, 2011), Massachusetts (Rich-Shea, 2010), North Carolina (Barnes, 2008), and Texas (Cheuprakobkit & Bartsch, 2005).

1.1 Statement of the Problem

In order to justify the increasing use of school-based situational crime prevention measures, research should examine the effects of these measures on outcomes of school safety. Research on this subject is critical because there is an inadequate amount of

research demonstrating the need for many SCP techniques, as well as their impact on a variety of school crimes. Furthermore, some studies suggest that practices such as using metal detectors, security staff, and video surveillance are associated with a decrease in students' feelings and perceptions of safety (e.g., Booren & Handy, 2009; Perumean-Chaney & Sutton, 2013).

While the increased securitization of schools has been followed by numerous studies examining the impacts of a variety of school-based SCP techniques on outcomes of school crime and safety, the current state of research on the effectiveness of school safety and security interventions focused on reducing school crime and disorder remains relatively sparse and inconclusive. Limited research exists on how school safety policies, personnel, and measures impact actual school safety outcomes, with many studies tending to focus on perceived safety, particularly for structural school safety measures such as metal detectors, security personnel, and surveillance cameras (e.g., Brown, 2006; Chrusciel, Wolfe, Hansen, Rojek, & Kaminski, 2015; Garcia, 2003; Gastic, 2011; Mayer & Leone, 1999). Furthermore, research on actual school crime outcomes have yet to examine the effects of these techniques by specific offense types, such as fights involving a weapon, thefts, drug possession, and vandalism. Previous research has been limited to composite crime measures (e.g., violent crime, property crime) (e.g., O'Neill & McGloin, 2007; Jennings, Khey, Maskaly, & Donner, 2011; Maskaly, Donner, Lanterman, & Jennings, 2011). However, these measures do not provide a sufficient level of detail for examination of the effects of SCP techniques for specific offenses. It is possible that the effects of situational crime prevention measures may be different for certain types of school crime outcomes. For example, the effects of using metal detectors or sweeps for

contraband may have different effects for crimes involving a weapon and crimes that do not. Therefore, the examination of school SCP techniques on disaggregated crime outcomes would likely produce more nuanced findings and improve the targeting of SCP techniques in schools.

Several methodological issues also plague the existing state of research on situational crime prevention and school crime. The literature on both perceived and actual effectiveness of safety measures reveals mixed and inconclusive findings. Although some studies have found evidence of effectiveness for certain measures, many studies have found null and opposite effects. Studies reporting significant findings consistent with theoretical perspectives are unable to determine whether situational crime prevention techniques caused a decline in crime or whether a decline in crime preceded the implementation of SCP techniques (e.g., Crawford & Burns, 2015, 2016; Jennings et al., 2011; Maskaly et al., 2011). Studies reporting opposite effects are unable to determine whether the use of school-based SCP techniques are more likely to increase the detection of crimes therefore increasing the number of crimes recorded, or whether schools with more crime are more likely to implement security measures (e.g., Lesneskie & Block, 2016; O'Neill & McGloin, 2007). Furthermore, most studies use observational data but do not construct a counterfactual inference. Therefore, they are unable to account for confounding factors such as school-level poverty or the location of the school that are known to affect both the implementation of SCP measures (Carlton, 2017) and the incidence of school crime (Cook, Gottfredson, & Na, 2010). These issues may be attributed to the reliance of many studies on correlational designs, particularly at the school-level (e.g., Jennings et al., 2011; Maskaly et al., 2011; O'Neill & McGloin, 2007).

This limitation indicates the need for future studies to utilize longitudinal, quasi-experimental, or experimental research designs to establish temporal ordering and causation (Na & Gottfredson, 2011; Reingle et al., 2016).

1.2 Purpose and Significance of the Study

The purpose of this study is to examine the effects of school-based situational crime prevention measures on multiple measures of school crime in a nationally representative sample of schools. Specifically, this research will: (1) examine data on the incidence of specific types of school crime in a sample of public elementary and secondary schools, (2) measure the quantitative impact of school-based SCP measures on the incidence of crime using a quasi-experimental non-equivalent control group design, and (3) examine whether the effects of situational crime prevention techniques differ by type of crime.

Results of this study will be relevant for school personnel, parents and students. In addition, this research product would be particularly useful to school policymakers and administrators wanting to adopt evidence-based practices and improve the effectiveness of crime prevention policies as well as target specific forms of school crime and violence. The insight garnered from this study is important for a more complete body of research regarding the use of SCP in schools. This study will serve as a basis for future studies regarding more in-depth aspects of the effects of SCP techniques in schools.

CHAPTER 2

REVIEW OF THE LITERATURE AND RELATED RESEARCH

The National Center for Education Statistics defines school crime as "any criminal activity that is committed on school property" (Zhang et al., 2016, p. 214). However, no standardized definition of the term exists. According to McCord, Widom, Bamba, and Crowell (2000), definitions of school crime vary and can differ in terms of the types of crimes, location, time, and perpetrator or victim. For instance, the definition of school crime can range from considering any threat or theft as a crime to considering only violent attacks that are reported to the police as crimes. School violence specifically has been defined as acts of aggression and violence occurring on school grounds, while traveling to and from school, or during school-sponsored events (Greene, 2005). Definitions of school crime may also differ depending on whether crimes committed against children on their way to school or on school playgrounds are considered acts of school crime in addition to crimes committed within school buildings. Furthermore, studies have incorporated definitions which include only crimes during school hours, as well as crimes occurring before and after school (e.g., Na & Gottfredson, 2011). The term may also refer to crimes committed by or against school students and personnel, although some definitions may include any victim on school property (McCord et al., 2000).

There have been attempts to develop standardized definitions of school crime. For instance, the Crime, Violence, and Discipline Task Force created by the National Forum on Education Statistics in 1995 recommended that school crime be inclusive of: incidents

that occur on school grounds, on school transportation, or at off-campus school-sponsored events; incidents involving alcohol, drugs, or weapons; incidents involving a gang; hate-crime motivated incidents; and all incidents reported to law enforcement agencies (McCord et al., 2000; Minogue, Kingery, & Murphy, 1999). Definitions and measures of school crime have also tended to focus on crimes occurring at primary and secondary educational institutions and on school-aged youth in those institutions as perpetrators and/or victims, although teachers are also threatened by crime in schools (Cook et al., 2010). For instance, the School Crime Supplement (SCS) to the National Crime Victimization Survey (NCVS) sponsored by the Bureau of Justice Statistics and National Center for Education Statistics surveys students ages 12 to 18 enrolled in public and private schools during the school year. This measure of school crime focuses on youth in middle and high schools. In addition, the School Survey on Crime and Safety (SSOCS) gathers information from public school principals about crimes occurring during school hours and consists of a sample of public elementary, middle, and high schools. Another nationally representative sample is the Youth Risk Behavior Surveillance System (YRBSS) which consists of students enrolled in grades 9 through 12 in public and private schools (Cook et al., 2010; Zhang et al., 2016). In a systematic review of the school crime literature, Cook et al. (2010) identified studies examining samples of primary and secondary schools or school-aged youth in those schools. In sum, although school crime has no standard definition, definitions and measures of school crime have largely focused on institutions of primary and secondary education (i.e., K-12 education) and school-aged youth in those institutions.

The literature on school crime has drawn upon several major theoretical perspectives to explain the incidence and prevention of school crime at both the macro- and micro-levels, including social disorganization, general strain theory, control theories, theories rooted in the classical school of criminology, including deterrence, rational choice, situational crime prevention, routine activity, and lifestyle-exposure theories. The empirical research on school crime causation, prevention, and control has been largely informed by these theories. In addition, policy implications have been developed from these criminological theories to guide efforts for preventing and reducing school crime and research has examined the effects of these policies and practices on school crime and victimization outcomes. Some studies claim to directly test the ability of these theories to explain school crime while others do not claim to be complete test of a theory but rather examine how relevant indicators identified by a theory are correlated with school crime and victimization.

2.1 Social Structural and Social Process Correlates of School Crime

Although a thorough discussion of theories of school crime is beyond the scope of this study, it is useful to begin with a review of the key correlates of school crime identified by major theoretical perspectives. Much of the school crime literature examines social structure and social process explanations, including characteristics of schools such as enrollment size, demographic characteristics of students, school organizational structure, school culture, discipline management, and school programming to reduce violence (e.g., Bryk & Driscoll, 1988; Cook et al., 2010; Felson, Liska, South, & McNulty, 1994; Gottfredson & Gottfredson, 1985; Lesneskie & Block, 2016; Nickerson & Martens, 2008; Payne, Gottfredson, & Gottfredson, 2003; Stewart, 2003; Weishew &

Peng, 1993; Welsh, Greene, & Jenkins, 1999). Studies have recognized a number of these variables as being associated with school crime and they are often used as independent control variables in studies of school-based SCP measures.

School Structure Characteristics

Low economic status is strongly correlated with school crime. Violence is higher in schools with higher percentages of disadvantaged students (i.e., composite percentage of students in single-parent families, percent of minorities, and percent students receiving free lunch) (Weishew & Peng, 1993), and school-level SES (i.e., proportion of students receiving free lunch) is significantly associated with weapon carrying in schools (Wilcox & Clayton, 2001). Moreover, community poverty is significantly related to teacher victimization rates (Gottfredson & Gottfredson, 1985) and school disorder (Welsh et al., 1999, Welsh, Stokes, & Greene, 2000), and schools in areas of concentrated poverty have higher levels of both student delinquency and teacher victimization (Gottfredson, Gottfredson, Payne, & Gottfredson, 2005).

The racial/ethnic composition of schools is also related to school crime outcomes. Violence is higher in schools in which students are assigned to achieve a desired ethnic composition (Weishew & Peng, 1993) and schools with higher levels of ethnic heterogeneity have higher levels of school crime and disruption, and violent crime (Jennings et al., 2011; Nickerson & Martens, 2008). In addition, racial heterogeneity predicts the level of student victimization rates (Gottfredson & Gottfredson, 1985). In contrast, Eitle and Eitle (2004) reported that schools composed of greater percentages of advantaged students (i.e., white) rather than disadvantaged students (i.e., non-white) had higher rates of substance offenses.

Studies have also examined how measures of student transience are correlated with crime outcomes in school. Student mobility has been found to be positively correlated with crime rates. Chen (2008) found that student transience or mobility (as measured by the number of transfers in and transfers out of school) was significantly positively correlated with the number of criminal incidents in schools in a national sample. Similarly, Eitle and Eitle (2004) reported that the school dropout rate was positively associated with substance incident rates in public middle and high schools in Florida.

In sum, research examining indicators such as measures of low economic status, ethnic heterogeneity, and student transiency have found that they are significantly positively related to school crime (Chen, 2008; Gottfredson et al., 1985, 2005; Welsh et al., 1999). These findings are consistent with the key tenets of social disorganization theory, which holds that social structural factors including poverty, residential mobility, ethnic heterogeneity, and family disruption leads to social disorganization, or the inability of a community's residents to exercise informal social control, which in turn leads to crime (Frailing & Harper, 2013; Sampson, 2011).

School Culture

A development of social disorganization theory is collective efficacy, which refers to the ability of residents of a neighborhood to maintain order by exercising informal social control when needed. Collective efficacy reduces crime by improving the ability of residents to exercise informal social control (Sampson et al., 1997). This ability to exercise informal social control is rooted in mutual trust and support among residents of neighborhoods. Collective efficacy is built on social bonds among individuals and

families and used when necessary to maintain order in the neighborhood. Collective efficacy serves to mediate concentrated disadvantage in neighborhoods, comprised of poverty, race, and age characteristics and family disruption, therefore reducing crime (Sampson, Raudenbush, & Earls, 1997). Therefore, when collective efficacy is high, crime will be low and vice versa. In contrast to social disorganization theory, collective efficacy theory relaxes the traditional disorganization assumption that the ideal contextual setting for social control is necessarily one that is characterized by dense, intimate, and strong neighborhood ties. While collective efficacy may depend on some level of working trust and social interaction, institutional mechanisms may be sufficient. Moreover, a neighborhood's efficacy exists relative to specific tasks and is embedded in conditions of mutual trust and social cohesion (Sampson, 2011).

Research has examined the role of informal social control in explaining school crime (Welsh et al., 1999). For instance, Payne et al. (2003) examined the relationship between school communal organization (i.e., collective efficacy) and school disorder and found that schools that were more communally organized, as measured by having supportive and collaborative relations and common goals and norms, experienced lower levels of student delinquency, a measure that included the number of violent crimes committed by the student during the school year such as hitting other students and teachers. Moreover, increased parental involvement (e.g., parental volunteering and participation in subject area events) in schools has been reported to be associated with less violence (Lesneskie & Block, 2016) and school-related assaults (Granberg-Rademacker, Bumgarner, & Johnson, 2007). In addition, schools that partnered with community parental groups were reported to have experienced less violence compared to

schools that did not (Lesneskie & Block, 2016). These findings may suggest that greater parental involvement in schools increases the ability of schools to exercise informal social control and thus increase collective efficacy. Conversely, the inability of schools to control minor infractions such as disciplinary problems has been shown to be indicative of a crime-prone environment, suggesting that school disorder is a precursor to school crime (Miller, as cited in Neiman, Murphy, Thomas, & Hansen, 2015). This finding is also consistent with the propositions of broken windows theory, which argues that the inability to exercise formal and informal social control over minor incidents such as disorder leads to more serious crime (Frailing & Harper, 2013; Sampson, 2011).

Other aspects of school culture, such as attitudes, beliefs, and behaviors of students, and students' affective bonds such as student attachment to school and communal social organization have been reported to be associated with school crime (e.g., Jenkins, 1997; Payne, 2008; Welsh et al., 1999). Jenkins (1997) examined components of the school social bond, including commitment and attachment to school, school involvement and belief in school rules and found that certain elements of the school social bond have more impact than others in controlling for school delinquency, as measured by indexes of school crime, school misconduct, and school nonattendance. Commitment to school and belief in the fairness and consistent enforcement of school rules were the most important predictors of school crime. This finding is consistent with prior research indicating that academic values were strongly negatively correlated with values regarding violence at the aggregate level, and that students who were committed to academics were less likely to engage in delinquency (Felson et al., 1994). In examining how individual-level predictors of social control theory were associated with school

disorder, Welsh et al. (1999) found that school effort was the strongest predictor although belief in rules and having positive peer associations also negatively predicted student misconduct. In another study, Welsh (2001) reported that school involvement, positive peer associations, and belief in school rules predicted offending and misconduct in school more strongly than other types of school disorder, to include victimization. These results were also consistent with previous findings that dimensions of school bonding (e.g., attachment, commitment) are related to school disorder (Gottfredson & Gottfredson, 1985), student misconduct (Jenkins, 1997), and delinquency (Payne, 2008).

Concerning the relationship between elements of the social bond and student victimization, Gottfredson and Gottfredson (1985) found that students with strong bonds of commitment to school were likely to experience less victimization. Tillyer, Fisher, and Wilcox (2011) reported that attachment to school and peers served as protective factors against violent victimization at school. In contrast, Wynne and Joo (2011) found that younger students who participated in extracurricular activities were found to be more likely to experience criminal types of victimization at school, possibly due to a greater likelihood of hazing. This finding is consistent with research which has found that involvement in school activities is positively related to victimization (Burrow & Apel, 2008; Welsh, 2001; Wilcox, Tillyer & Fisher, 2009), possibly since students are more exposed to motivated offenders. In sum, while there has been strong support found for commitment to school and belief in the clarity and fairness of rules as protective factors to victimization, there is much weaker evidence for involvement in school activities (Tillyer et al., 2011), which has been reported to be positively associated with victimization (Burrow & Apel, 2008; Welsh, 2001; Wilcox et al., 2009). Findings from

these studies are largely consistent with the predictions of social control theory, which argues that strong bonds to social institutions and entities, such as families, school, and other individuals serve to restrain people from committing crime, and that conversely when these bonds are weak or broken, individuals are freer to commit criminal acts (Hirschi, 1969).

Social control theory implicates the school and suggests the involvement of children in prosocial programs run by or in conjunction with schools to prevent crime and delinquency. Research on social control theory has also examined the effectiveness of practices designed to strengthen elements of the social bond. For instance, in an evaluation of the Social Development Model (SDM) intended to strengthen bonds to family and to school as well as facilitate the learning of prosocial skills and attitudes, researchers compared participants to non-participants at ages 10 and 18, finding mixed support for the model (Hawkins, Catalano, Kosterman, Abbott, & Hill, 1999). Those who participated in SDM performed better in school and were more attached to the school than those who did not. In addition, the treatment group had less self-reported violence and less heavy drinking, although no difference was found between participants and non-participants on arrests, self-reported nonviolent delinquency, drinking and drug use. However, further research on SDM has reported evidence of effectiveness across different populations, suggesting the utility of the model in strengthening bonds and reducing involvement in delinquency in school (Sullivan & Hirschfield, 2011).

Research on the relationship between student behaviors and school crime is focused on the impacts of self-control, or the extent to which people are susceptible to momentary enticements or temptations (Gottfredson & Hirschi, 1990). Studies by

Augustine, Wilcox, Ousey, and Clayton (2002) and Wilcox et al. (2009) found a strong positive relationship between low self-control and violent and property crime victimization. Consistent with these findings, Tillyer et al. (2011) also reported that impulsivity significantly increased the risk of violent victimization among seventh grade students. These findings may indicate that students with low self-control are seen by offenders as more suitable victims due to their impulsivity, which is seen as antagonistic (Tillyer et al., 2011). Findings from these studies are supportive of the tenets of self-control theory, which holds that people with a high level of self-control can hold off or delay tempting situations while those with low self-control are more likely to give into temptations, and that low self-control in conjunction with criminal opportunity is necessary for crime to occur (Gottfredson & Hirschi, 1990).

Psychosocial, Psychoeducational, and Peer-led Programs

Many studies have examined the effects of various school-based psychosocial, psychoeducational, and peer-led programs focused on violence prevention, such as mentoring, tutoring, and counseling, behavioral modification and instructional methods, prevention curriculums, and classroom interventions (Barnes, Leite, & Smith, 2015; Boxer & Dubow, 2002; Durant, Treiber, Getts, McCloud, Linder, & Woods, 1996; Espelage, Low, Polanin, & Brown, 2013; Farrell, Mayer, & White, 2001; Grossman, Neckerman, Koepsell, Liu, Asher, & Rivara, 1997; Swearer, Espelage, Vaillancourt, & Hymel, 2010; Wilson et al., 2001). A study by Durant et al. (1996) found that male students in two middle schools receiving either a violence prevention curriculum or a conflict resolution curriculum reported significant decreases in their self-reported use of violence in hypothetical conflict situations, frequency of the use of violence and

frequency of physical fights in past 30 days, and that the conflict resolution approach was more successful in reducing the frequency of more severe physical fights requiring medical treatment. Similarly, Grossman et al. (1997) reported that physically aggressive behavior decreased significantly more and neutral or prosocial behavior increased significantly more among children receiving a commonly used violence prevention curriculum, Second Step, compared with children in the control group not receiving the treatment, with most effects persisting 6 months later.

Other studies of violence prevention programming have shown more mixed results. A study by Farrell et al. (2001) examining the effects of a seventh-grade violence prevention program emphasizing conflict resolution, Responding in Positive and Peaceful Ways (RIPP-7), reported that students who participated in the program had fewer disciplinary code violations for violent offenses during the following school year compared to students in the control group (Farrell et al., 2001). However, significant main effects were not found on self-report measures of physical aggression. Although a study by Espelage et al. (2013) found that intervention schools with the Second Step: Student Success Through Prevention Middle School Program classroom intervention were 42% less likely to self-report physical aggression (fighting) than students in control schools, no significant intervention effects were found for verbal/relational bully perpetration and sexual violence. Research has also found that peer mediation and peer counseling programs are ineffective at reducing aggressive behavior (Gottfredson, 2001; Greene, 2005).

When individual components of violence prevention programs are examined, several components are found to be significantly related to aggression and violence

outcomes, yet recent studies also have found conflicting evidence and opposite effects (Barnes et al., 2015). Barnes et al. (2015) analyzed schoolwide violence prevention programs using data from the School Survey on Crime and Safety and found mostly null and opposite effects. Providing students with prevention or behavioral curriculum, instruction, or training was not related to aggression and violence outcomes. Moreover, the effects of offering counseling, social work, psychological, or therapeutic activity for students, and programs to promote sense of community/social integration were also reported to be null (Barnes et al., 2015).

Some individual components of violence programs have been found to have opposite effects. For instance, Granberg-Rademacker et al. (2007) found that the use of school counselors was associated with increased deaths and sexual attacks. Barnes et al. (2015) reported that involvement in resolving student conduct problems was related to higher rates of reported violent incidents, suggesting involving students in resolving conduct problems likely resulted in students being more comfortable in reporting violent acts. Moreover, providing recreational, enrichment, or leisure activities for students was related to higher frequencies of reported student bullying, suggesting that these activities provide more opportunities for student bullying. Only one component, individual attention, mentoring, tutoring, and/or coaching to students by students or adults was significantly related to lower frequencies of student bullying (Barnes et al., 2015). In sum, violence prevention programs have demonstrated evidence of effectiveness, although research has also found mixed evidence regarding different outcomes (Greene, 2005; Wilson et al., 2001). Moreover, while there is strong evidence for the effectiveness

of certain violence prevention programs, the evidence is weaker when individual components and all types of violence outcomes are examined.

Research on psychosocial, psychoeducational, and peer-led programs is consistent with the implications of General Strain Theory, which holds that there are three major types or sources of strain: the inability to achieve positively valued goals, the removal of positively valued stimuli, and the presentation of negatively valued stimuli (Agnew, 1992, 2001). Hundreds of individual strains may fall under these categories. These strains together lead to negative emotions, particularly anger, which leads to criminal coping (Agnew, 1992). Anger is the central negative emotion because it reduces the ability to engage in effective problem solving, reduces awareness of and concern for costs of crime, creates a desire for revenge, fosters the belief that crime is justified, and energizes the individual for action (Agnew, 2001). In sum, psychoeducational, psychosocial, and peer-led programs are focused on the idea that school crime will be reduced by reducing strain; the events or conditions disliked by individuals (Agnew, 1992).

Some studies have examined the impacts of key variables identified by GST on school crime. For instance, Brezina, Piquero, and Mazerolle (2001) examined the effect of anger, commitment to school, academic goals, and approval of aggression on aggressive/disruptive behaviors using data from a national sample of public high schools. Student anger was associated with school-level differences in student-to-student aggression (i.e., frequency with which students report fights with other students), controlling for social disorganization and subcultural deviance variables, including race, family stability, residential mobility, SES, and size of school. However, student anger was not associated with a general measure of aggressive/disruptive behavior that also

included aggression toward teachers (i.e., arguing with teachers) and therefore exhibited only a behavior-specific effect (Brezina et al., 2001).

School Discipline Management

Studies examining factors related to authoritative discipline has consistently demonstrated convincing evidence of the ability of these factors to explain crime and victimization in school (Gerlinger & Wo, 2016; Gottfredson et al., 2005; Welsh, 2000, 2001). Many school violence practices are rooted in the concept of authoritative school discipline, based on the combination of structure and support in schools. Structure refers to the consistent and fair enforcement of school rules while support refers to the care and attention provided by adults (Gerlinger & Wo, 2016). Research on authoritative discipline has found that schools with more structure and support (i.e., experiences of fair and consistently enforced rules and perceptions of staff as caring and helpful) have less student victimization and bullying (Gregory, Cornell, Fan, Sheras, Shih, & Huang, 2010).

Studies examining school structure have reported that students who perceive that school rules are strictly enforced are much less likely to experience victimization (Wynne & Joo, 2011), and that schools where students believed that discipline was fair had less misbehavior, including physical conflicts (Weishew & Peng, 1993). Similarly, schools in which students perceived greater fairness of rules, authority figures (e.g., principals), and rule enforcement (i.e., equal punishment for every student) had less delinquent behavior and less student victimization (Gottfredson et al., 2005) and that students who have strong beliefs that school officials fairly and efficiently enforced discipline are likely to experience less victimization (Gottfredson & Gottfredson, 1985). Reis, Trockel, and Mulhall (2007) found that schools that were perceived as inclusive of students in policy

and rules reported lower rates of aggressive behavior (i.e., a composite variable comprised of the frequency of hitting others, being mean to others, and getting into a fight). Welsh (2000) reported that respect for students and fairness of rules were highly relevant in explaining student offending and misconduct.

The perception of injustice of school rules by students is associated with increased victimization. For instance, Schreck, Miller, and Gibson (2003) found that the belief that school rules were unfair was positively associated with student victimization, suggesting that students who believed in the injustice of school rules were less inclined to seek the help of school authorities. In addition, schools in which the rules are not perceived by students as fair had higher levels of teacher victimization, consistent with findings from individual-level victimization research (Gottfredson & Gottfredson, 1985). Furthermore, students are likely to reject values of the school if they do not believe in the legitimacy of the disciplinary actions or feel teachers are not respectful of students (Stewart, 2003). These findings may suggest that students who do not perceive that school authorities are being fair or respectful towards students are less likely to believe there are reasons to obey authorities or seek their help.

Several studies have examined the effects of both school security measures and authoritative school discipline (Gerlinger & Wo, 2016; Mayer & Leon, 1999). For instance, a recent study by Gerlinger and Wo (2016) compared two approaches to school bullying prevention: security measures and a method emphasizing authoritative school discipline (i.e., consistent rules, fairness, and respect) and found that the significant relationship between school security measures and reported physical and verbal bullying disappeared once the authoritative discipline measure was included in the model,

suggesting that the authoritative school discipline strategy was associated with both lower physical and verbal bullying victimization. These findings are consistent with findings from the study by Mayer and Leone (1999), which reported that more disorder was present in school when attempts to secure schools were through physical or personnel-based security measures while schools that emphasized and consistently enforced rules had less school disorder. Ultimately, findings from research on authoritative discipline are largely consistent with the tenets of procedural justice theory, which holds that fairness in the processes of resolving disputes and problems increases the legitimacy of authorities and therefore leads to compliance with the law (Tyler, 1997, 2007).

2.2 Opportunity and School Crime: Routine Activities and Lifestyles

In contrast to criminological theories that focus on how social structures and social processes contribute to crime, routine activity and lifestyle-exposure theories focus on explaining the occurrence of criminal events and why people become victims of crime (Cohen & Felson, 1979; Hindelang, Gottfredson, & Garafalo, 1978). Routine activity and lifestyle theories may be considered as subsets of a more general opportunity model (Cohen et al., as cited in Sampson & Wooldredge, 1987). These theories argue that the non-random convergence of three elements in the same time and space are necessary for crime to occur: a motivated offender, a suitable target, and the absence of capable guardianship (Cohen & Felson, 1979). Routine activity theory holds that the convergence of these factors lead to an increase in crime independent of the structural conditions that motivate individuals to engage in crime, such as poverty and employment (Cohen & Felson, 1979; Sampson & Wooldredge, 1987). A suitable target may be a person, object, or a place that is vulnerable to crime. A capable guardian is a person or thing that

discourages crime from taking place, and can be formal and informal. Capable guardians serve to prevent crime when motivated offenders encounter suitable targets in the same time and place. Crime is therefore more likely when a motivated offender encounters a suitable target in the absence of capable guardianship in the same time and space. Routine activity theory assumes that criminals are motivated and does not focus on the dispositions of motivated offenders or what caused them to become motivated in the first place (Cohen & Felson, 1979).

The lifestyle-exposure theory of victimization holds that variations in lifestyle, or the characteristic way individuals allocate their time between work and leisure activities, can account for variations in rates of personal victimization across various subgroups. Hindelang et al. (1978) argue that variations in lifestyle cause differential probabilities of being in certain places at certain times and encountering others who possess certain characteristics. Since criminal victimization is not randomly distributed across time and space and because potential offenders are not representative of the general population but are instead concentrated in high risk times and places, peoples' lifestyle differences are associated with differences in exposure to high risk situations. The theory holds that some people's lifestyles put them at little to no risk for victimization, and others' lifestyles put them at a great risk for victimization (Maxfield, 1987). In sum, routine activity/lifestyle exposure theories consider the spatial and temporal distributions of crime and the features of everyday life that may constitute opportunities for criminal victimization and provide built-in guidelines for decreasing that risk of victimization.

Research on school crime and victimization has found support for victimization theories including routine activity and lifestyle-exposure theories (Burrow & Apel, 2008;

Schreck et al., 2003; Tillyer et al., 2011). Indicators from these perspectives, such as measures of proximity, exposure to motivated offenders, target suitability, and/or capable guardianship have been found to be correlated with school crime and victimization outcomes. For instance, studies examining school-level indicators of opportunity have found that exposure to crime or crime proximity, including the presence of gangs, drugs, and guns, as well as overall rates of student weapon carrying are positively associated with students' victimization (Burrow & Apel, 2008; Schreck et al., 2003).

Individual-level exposure to crime and motivated offenders increases student risk of victimization. For instance, studies have found that experiences with bullying, participation in extracurricular activities, out-of-school victimization, and having difficulty walking away from a fight have been reported to significantly increase the likelihood of criminal victimization and bullying victimization (DeVoe, Kaffenberger, & Chandler, 2005; Fitzpatrick, 1999; Gerlinger & Wo, 2016; Schreck et al., 2003; Wynne & Joo, 2011). In addition, exposure to offenders in the form of a criminal lifestyle increases risk of victimization at school. Studies also have found that peer associations and committing delinquent acts are positively related to student victimization, indicating that these risky behaviors increase students' exposure to motivated offenders and heighten the likelihood of violent victimization (Schreck et al., 2003; Tillyer et al., 2011; Wilcox et al., 2009). These findings also support the macro-level routine activity thesis that proximity to offenders bring risk.

The role of target suitability has also been examined in the research. Studies indicate that several demographic factors including age and family income are associated with school victimization. Younger students have been reported to be a greater risk for

victimization than older students as their youth may make them more of a suitable target (Augustine et al., 2002; Burrow & Apel, 2008; Gerlinger & Wo, 2016; Welsh, 2001; Wilcox et al., 2009). Wynne and Joo (2011) found that students with a higher household income were more likely to be criminally victimized, consistent with findings from several earlier studies (Burrow & Apel, 2008; Wilcox et al., 2009). This finding suggests that households have more property (i.e., suitable targets) other students might want to steal. Some research has examined the role of self-control, finding a strong, positive effect of low self-control on both violent and property victimization (Augustine et al., 2002; Wilcox et al., 2009), suggesting that students with low self-control are more suitable targets due to their impulsive nature (Tillyer et al., 2011).

Lastly, the concept of capable guardianship has also been examined in the research on school victimization. For instance, Burrow and Apel (2008) reported that students who have long commutes to school are more likely to be at risk for school-based assault, suggesting that these students may spend a greater proportion of commuting time in the absence of guardianship, and traverse high-crime areas that increase victimization risk. Blosnich and Bossarte (2011) found that having adults or staff supervising hallways is associated with a significant reduction in the odds of being physically bullied and having property vandalized, indicating that capable guardianship reduces the risk of victimization. Some research has also examined the role of social control theory in explaining the relationship between guardianship and victimization. Schreck et al. (2003) reported that student belief that school rules were unfair was positively associated with student victimization, arguing that schools that believed in the injustice of school rules were less likely to seek help from school authorities, making them less guarded.

Similarly, several studies have reported strong bonds to school strengthen guardianship and reduce the likelihood of victimization (Anderman & Kimweli, 1997; Burrow & Apel, 2008; Welsh, 2001; Wilcox et al., 2009). In contrast to research on individual-level guardianship, school-level guardianship has shown less effectiveness in lowering students' risk of victimization. Studies have found that school security policies, personnel, and measures are largely ineffective in reducing student victimization risk (Burrow & Apel 2008; Schreck et al., 2003; Wynne & Joo, 2011).

2.3 Theoretical Framework: Situational Crime Prevention

Theories within the deterrence paradigm of criminology start with the assumption that individuals have free will and consider the potential costs of punishment and benefits of committing a crime, acting when the benefits outweigh the costs (Tibbetts, 2011). Classic deterrence theory holds that punishment reduces criminal behavior when it is certain, severe (but proportional to the crime committed), and swift (Beccaria, 1986). Deterrence refers to an instance where an individual considers but refrains from a criminal act due to the fear of punishment and may be general or specific. General deterrence is the notion that punishment deters offending among the general population of all potential offenders; as punishments are more certain and severe, they should lead to lower crime rates in society. Specific deterrence is the notion that punishment will reduce criminal involvement for those who experience punishment; those who have been punished should have a greater fear of punishment and be deterred from crime (Beccaria, 1986). However, general and specific deterrence can operate together and some people may be subject to both types (Stafford & Warr, 1993). Ultimately, not only has deterrence theory influenced the use of crime control policies in the U.S., it has also been

used to justify the use of strict school sanctions for student delinquent and criminal conduct (Cook et al., 2010).

As an extension of deterrence, rational choice theory argues that individuals make rational choices designed to maximize their benefits and minimize their costs (Cornish & Clarke, 1986). Before committing a criminal act, potential offenders make a decision to be involved in crime. They then decide the specific crime to commit by weighing the costs and benefits of doing so, and act when the benefits outweigh the costs. Rational choice theory extends on deterrence theory in that it considers variety of potential costs and benefits of crime. For instance, the costs of crime are not limited to formal sanctions. Factors that are considered may include the amount of effort, time, and skill needed to commit a crime, amount of reward, certainty of punishment, and moral costs (Cornish & Clarke, 1986). However, rational choice theory also differs from deterrence theory in that it does not assume that people act rationally all the time, but may act within a bound or limited rationality. Some individuals may not be perfectly rational when making the decision to commit a specific crime (Cornish & Clarke, 1986). For instance, they may be intoxicated, have low intelligence or have limited time to make a decision. Therefore, they are limited in their ability to act rationally, a concept known as bounded rationality (Simon, 1956, 1991). Rational choice theory also acknowledges that there are background factors that may influence the decision to engage in crime, such as associating with delinquent peers and having low self-control.

The increased securitization of schools is based on the practical implications of deterrence-based theories, particularly situational crime prevention. Situational crime prevention is a framework that draws upon routine activity, lifestyle, and rational choice

theories to elucidate how features of the everyday environment can be manipulated to prevent crime. SCP can be defined as the practice of modifying situations to reduce the opportunity for crime. The focus of this approach is to alter situations so that the costs of committing crime will be perceived by the offender to outweigh the benefits. Modern examples of reducing the opportunities for crime include requiring swipe cards to enter building doors and placing security tags on merchandise in stores (Clarke, 1997). The SCP framework is comprised of twenty-five techniques within five broad categories of techniques (Cornish & Clarke, 2003). These categories include (1) *increasing the effort* needed to complete a crime (target harden, control access to facilities, screen exits, deflect offenders, and control tools/weapons), (2) *increasing the risks* of committing a crime (extend guardianship, assist natural surveillance, reduce anonymity, utilize place managers, and strengthen formal surveillance), (3) *reducing the rewards* of crime (conceal targets, remove targets, identify property, disrupt markets, and deny benefits) (4) *reducing provocations* to crime (reduce frustrations, avoid disputes, reduce emotional arousal, neutralize peer pressure, and discourage imitation), and (5) *removing excuses* for doing crime (set rules, post instructions, alert conscience, assist compliance, and control drugs) (Brantingham, Brantingham, & Taylor, 2005; Cornish & Clarke, 2003).

The framework of SCP provides guidelines for how ordinary individuals can prevent crime. Moreover, SCP offers relatively simple and practical measures that are not concerned with addressing the root causes of crime, such as increasing a person's level of self-control or providing a young person with prosocial peers. In sum, unlike traditional person-centered approaches that attempt to lower individual criminal propensities or

victimization risk, SCP seeks to eliminate situation-specific crime precipitators that create opportunities for illegal activity (Clarke, 1983, 1997).

2.4 Empirical Research on School-based SCP Measures

A large body of research in the school crime literature examines policies and measures based on the theory and practice of situational crime prevention (e.g., Blosnich & Bossarte, 2011; Hankin, Hertz, & Simon, 2011; Jennings et al., 2011; O'Neill & McGloin, 2007; Sevigny & Zhang, 2016). Much of the school crime research on SCP examining measures designed to increase the effort of committing crime have focused on two techniques: controlling access to facilities (e.g., metal detectors, locked doors), and controlling tools and weapons (e.g., book bag bans). Table 2.1 presents studies that examined techniques designed to increase the effort of crime. A wealth of the literature on controlling access to facilities has focused on the effects of metal detectors on both perceived and actual safety outcomes. There is some evidence which suggests that the use of weapon detection systems in general (e.g. metal detectors, surveillance cameras, strict dress code) are associated with less violent incidents (Jennings et al., 2011). However, research examining the effects of metal detectors specifically on violent crime reveal mostly null effects (Ginsberg & Loffredo, 1993; Schreck et al., 2003; Tillyer et al., 2011), and more recent research suggests that there is insufficient data to determine whether they reduce the risk of violent behavior among students and violent victimization among students (Hankin et al., 2011). Specifically, studies have reported that students in schools with metal detector programs were not less likely experience threats or violence compared to students at schools without metal detector programs (Ginsberg & Loffredo, 1993) and there is no association between the use of metal detectors in a student's school

Table 2.1 Summary of studies for SCP category: *Increase the Effort*

Study	Data/Sample	Location	Methods	SCP Measures	Outcome(s)	Relevant Findings
Bachman et al. (2011)	SCS	U.S.	Non-experiment Secondary analysis	Metal detectors	Perceived levels of fear of harm	Increased levels of fear across students of different gender and race groups, and victimization experiences
Brown (2006)	230 high school students	Brownsville, TX	Non-experiment Survey	Book bag policies	Perceptions of crime and safety	Students reported that book bag policies had little impact on the presence of weapons
Cheurprakobkit & Bartsch (2005)	215 principals of middle and high schools	Texas	Non-experiment Survey	Metal detectors	Interpersonal crime	Metal detectors are positively correlated with interpersonal crime
Crawford & Burns (2016)	SSOCS	U.S.	Non-experiment Secondary analysis	Locked doors,	Recorded crime incidents	Locked doors associated with decreased threats of attacks with weapons in predominately white/minority non-high schools.
Garcia (2003)	41 school safety administrators	15 states	Non-experiment Survey	Metal detectors	Perceptions of effectiveness	55% of administrators felt that metal detectors were somewhat or very effective overall
Gastic (2011)	Add Health	U.S.	Non-experiment Secondary analysis	Metal detectors	Students' perceived safety	Students exposed to presence of metal detectors were likely to report feeling less safe at schools
Ginsberg & Loffredo (1993)	Students in public schools	New York City	Non-experiment Survey	Metal detectors	Weapon carrying, threats, violence	Students in schools with metal detector programs were less likely to carry a weapon
Hankin et al. (2011)	7 studies	Various	Literature review	Metal detectors	Various	Insufficient data to determine whether metal detectors reduce the

						risk of violent behavior and violent victimization among students, and metal detectors may detrimentally impact student perceptions of safety
Lesneskie & Block (2016)	SSOCS	U.S.	Non-experiment Secondary analysis	Clear book bags	Violent incidents	Clear book bags associated with increase in violence
O'Neill & McGloin (2007)	SSOCS	U.S.	Non-experiment Secondary analysis	Locked doors, Closed lunch	Violent crime, property crime	Locked doors decreased property crime, closed lunch increased property crime
Perumean-Chaney et al. (2013)	Add Health	U.S.	Non-experiment Secondary analysis Longitudinal	Metal detectors	Student perception of school safety	Associated with a decrease in students' sense of safety
Reingle et al. (2016)	32 studies	Various	Meta-review	Metal detectors Access controls	Various	Metal detectors are inversely associated with perceived school safety
Tillyer et al. (2011)	2,644 seventh grade students nested within 58 schools	Kentucky	Non-experiment Survey	Metal detectors	Victimization, risk perception, fear of violence	Students in schools with metal detectors were less likely to be fearful of serious violence

and that student's risk of physical assault (Schreck et al., 2003). One study found that metal detectors were correlated with more interpersonal crime, a composite measure which includes possession of illegal weapons, assaults, and sexual assaults (Cheurprakobkit & Bartsch, 2005). The crime reducing effect of metal detectors may be more suited to deterring weapon possessions on school grounds. For instance, Ginsberg and Loffredo (1993) found that schools with metal detectors were half as likely to carry a weapon to school as students in schools without metal detectors. The few studies that do find that metal detectors are effective at reducing violent crime focus on perceptions of violence rather than the actual incidence of violence (Brown, 2006; Garcia, 2003).

Much research has examined the effects of metal detectors on perceptions of school safety and fear of crime. Although one study based on a non-nationally representative sample of seventh graders from Kentucky found students in schools with metal detectors were less likely to be fearful of serious violence (Tillyer et al., 2011), other studies indicate that metal detectors decrease perceptions of safety or have a fear-inducing effect (Bachman, Randolph, & Brown, 2011; Gastic, 2011; Perumean-Chaney & Sutton, 2013; Reingle, Jetelina, & Jennings, 2016). For instance, one study reported that metal detectors and the number of visible security measures used in school were found to be associated with a decrease in students' sense of safety (Perumean-Chaney & Sutton, 2013). Bachman et al. (2011) found that the presence of metal detectors increased levels of fear across students of different gender and race groups, and victimization experiences. Gastic (2011) reported that metal detectors are negatively correlated with students' sense of safety at school, controlling for the level of violence at school. More recent evidence also indicates that the use of metal detectors results in a decline of

student perceived safety (Reingle et al., 2016). In sum, research on the effects of metal detectors on violent crime has revealed generally null and opposite effects. These findings suggest that not only are metal detectors ineffective, but that it is likely schools with higher violence are more likely to use metal detectors (Wynne & Joo, 2011).

Another area of research on controlling access to facilities has examined the effects of having locked doors and closing school campus during lunch. Having locked doors in schools has been found to be associated with decreased incidents of property crime, including thefts and vandalism (O'Neill & McGloin, 2007). However, in contrast to what situational crime prevention predicts, closing campus during lunchtime is associated with an increase in property crime (O'Neill & McGloin, 2007). This finding suggests that when more people are together in an enclosed space (i.e., school), the likelihood of property crimes is greater. Furthermore, at least one school characteristic, the number of classroom changes, has been found to be positively associated with property crime (O'Neill & McGloin, 2007). However, when distinguishing the racial composition and grade levels of schools, the effects of certain SCP tactics has shown evidence of effectiveness. For instance, a recent study by Crawford and Burns (2016) found that access controlled doors were correlated with decreased incidents of threats of attacks with weapons in both predominately white and minority schools, though not including high-schools.

Research on the effects of tactics intended to control tools/weapons have focused policies that ban book bags or require the use of clear book bags, as well as requiring sweeps for contraband. Brown (2006) found that book bag policies had little impact on the presence of weapons, with almost half of students reporting that they had seen

students carrying knives in school. Similarly, research indicates that the use clear book bags are ineffective in preventing violent or property crime (O'Neill & McGloin, 2007), or are associated with greater violence than schools that have not implemented such methods (Lesneskie & Block, 2016). Though there is minimal research on the effectiveness of contraband sweeps, a recent study by Crawford and Burns (2016) found that this tactic was associated with decreased incidents of threats and attacks, although only for non-predominately white high schools.

Table 2.2 presents studies which included SCP techniques designed to increase the risks of committing crime. Studies in this category have focused on three techniques: strengthening formal surveillance (e.g., school resource officers, security cameras), reducing anonymity (e.g., ID badges, uniforms), and extending guardianship (e.g., having adults in hallways). Research on security cameras has generally examined their effect on violence. For instance, Granberg-Rademacker et al. (2007) reported that the use of surveillance cameras to monitor the school is associated with a decrease in the number of school deaths, sexual attacks, and instances of weapon possession in school grounds. However, they also found a positive relationship between the presence of security cameras and assaults, suggesting that cameras are a not effective means for deterring assaults. The effectiveness of security cameras may depend on the composition and grade levels of a school. For instance, recent research by Crawford and Burns (2016) found that cameras were associated with a decrease in the number of threats and attacks with a weapon in schools which were predominately minority non-high schools. However, security cameras were associated with increased numbers of threats and attacks with weapons in minority high schools and predominately white non-high schools. Students in

Table 2.2 Summary of Studies for SCP Category: *Increase the Risks*

Study	Data/Sample	Location	Methods	SCP Measures	Outcome(s)	Relevant Findings
Bachman et al. (2011)	SCS	U.S.	Non-experiment Secondary analysis	Security guards	Perceived levels of fear of harm	Increased levels of fear for white students but not for African American students
Barnes (2008)	High schools	North Carolina	Quasi-experiment	SRO	Reported crimes	No significant findings
Blosnich & Bossarte (2011)	2007 SCS	U.S.	Non-experiment Secondary analysis	Adults in hallways, security guards	Peer victimization	Adults in hallways reduced odds of victimization
Brown (2006)	128 high school students	Brownsville, TX	Non-experiment Survey	Police officers, security officers	Perceptions of crime and safety	Students perceived that police and security personnel helped keep schools safe
Cheurprakobkit & Bartsch (2005)	215 principals of middle and high schools	Texas	Non-experiment Survey	Uniforms	Interpersonal crime	Decreased drug crimes
Crawford & Burns (2016)	SSOCS	U.S.	Non-experiment Secondary analysis	SROs, armed security, cameras, contraband sweeps	Violent incidents	Presence of armed security associated with increases in most violence measures in minority schools, security cameras increased most measures of violence but negatively associated with threats of attacks with weapons in minority other grade schools. Contraband sweeps decreased incidents of threats of attacks in non-predominately white high schools
Fisher & Hennessey (2016)	7 studies (high schools)	Various	Random effects meta-analysis	SRO	Exclusionary discipline	Presence of SROs is associated with higher rates of exclusionary discipline
Gastic (2011)	Add Health	U.S.	Non-experiment Secondary analysis	Security guards	Students' perceived safety	Students exposed to presence of security guards were likely to report feeling less safe at schools

Granberg-Rademacker et al. (2007)	SSOCS	U.S.	Non-experiment Secondary analysis	Cameras, School uniforms	Sexual attacks, weapon possession, assaults	Surveillance cameras are associated with a decrease in sexual attacks and weapon possessions, but associated with an increase in assaults. Uniforms decreased sexual attacks and weapon possessions
Jennings et al. (2011)	SSOCS	U.S.	Non-experiment Secondary analysis	SROs, security officers	Serious violent incidents	Number and placement of SROs associated with lower incidence of serious school violence
Johnson (1999)	9 high schools	Birmingham, AL	Non-experiment Survey Longitudinal	SRO	Violence, disciplinary infractions	Decreased school violence and suspensions
Lesneskie & Block (2016)	SSOCS	U.S.	Non-experiment Secondary analysis	SRO	Violent incidents	Presence of SROs increased violence,
Link (2010)	40 school districts	Missouri	Case-control matched	SRO	Disciplinary incidents	No significant findings
Maskaly et al. (2011)	SSOCS	U.S.	Non-experiment Secondary analysis	SROs, private security	Serious violent incidents	School crime was higher in security guard-only schools, and higher in SRO-only schools where officers had mid-level force capabilities
Mayer & Leone (1999)	SCS	U.S.	Non-experiment Survey	Physical and personnel based measures	Students' perceptions of disorder	Increased use of personnel-based security measures were associated with increases in students' perceptions of school disorder
Na & Gottfredson (2011)	SSOCS	U.S.	Non-experiment Secondary analysis Longitudinal	SRO	Crime rate, % crime reported, % harsh discipline	Increased police is associated with greater recording of crimes involving a weapon and drugs, and increased non-serious violent crime reported to law enforcement
Nickerson & Martens (2008)	SSOCS	U.S.	Non-experiment Secondary analysis	Various	Incidents of school crime and disorder	Security/enforcement (e.g., security guards) associated with more incidents

Rich-Shea (2010)	25 high schools	Massachusetts	Quasi-experiment	SRO	Suspensions	Increased exclusionary discipline
Schreck et al. (2003)	NHES-SSD	U.S.	Non-experiment Secondary analysis	Security guards, locker checks, adults in hallways	Overall, violent and theft victimization	Locker checks increased overall and theft victimization
Stevenson (2011)	18 middle and high schools	Alabama	Quasi-experiment Pre-post design	SRO	School incidents	No significant findings
Swartz et al. (2015)	SSOCS	U.S.	Quasi-experiment Propensity scores	SRO	Serious violent incidents	Presence of SRO and execution of place manager duties is associated with an increase in reporting of serious violence
Theriot (2009)	28 middle, high, and alternative schools	Southeastern county	Quasi-experiment Non-equivalent groups	SRO	Arrests (by type)	Increased disorderly conduct (null when controlling for poverty), decreased assault and weapons charges
Wilkerson (2001)	1 high school	Southern Illinois	Non-experiment Longitudinal	SRO	Suspensions for gangs, substance abuse, or violence	No significant findings

predominately minority schools were more likely than students in predominately white schools to encounter more gang crimes at school, and to attend school in an urban area.

Other studies have generally found null and opposite effects. In a study examining the efficacy of situational crime prevention tactics on both property and violent crime in schools, researchers found that security cameras were not significantly associated with the frequency of either measure (O'Neill & McGloin, 2007). Block and Lesneskie (2016) analyzed a more recent version of the same dataset and found that schools which use security cameras have greater violence than schools that have not implemented such methods. Similarly, Crawford and Burns (2016) also found that security cameras are generally associated with increased measures of violence, such as physical attacks and fights.

Some research examining the perceived effectiveness of surveillance measures suggests that there is a discrepancy between the perceptions of safety by students and perceptions of safety by teachers and administrators. Although Bosworth, Ford, and Hernandaz (2011) found that students and faculty perceive cameras that are effective in maintaining perceptions of school safety, other studies have found that students perceive that surveillance devices decrease school safety (Booren & Handy, 2009; Perumean-Chaney & Sutton, 2013). A study by Brown (2006) found that surveillance cameras, as one component of school security, have little impact on the presence of weapons in schools, with almost half of students still reporting seeing knives at school. In sum, existing research on use of surveillance cameras in schools has found minimal evidence that they are an effective measure for reducing actual or perceived school crime, and that

they are perhaps more useful for the detection of crime after it has occurred rather than as a deterrent.

The use of school security personnel to strengthen formal surveillance, such as SROs and security guards on both violent and property crime has produced mixed and conflicting evidence with expected, null, and opposite effects reported (Barnes, 2008; Brown, 2006; Dohy & Banks, 2016; Finn & McDevitt, 2005; Fisher & Hennessy, 2016; Jennings et al., 2011; Johnson, 1999; Na & Gottfredson, 2011; Reingle et al., 2016; Stevenson, 2011; Theriot, 2009). Some studies have found that school security personnel are associated with a reduction in school violence outcomes. For instance, SROs have been found to be associated with a decrease in perceived and actual outcomes of school violence (Jennings et al., 2011; Johnson, 1999; May, Fessel, & Means, 2004; Theriot, 2009). Several school-level studies suggest that SROs might serve as a deterrent to violence. The placement of SROs has been found to be associated with a decrease in the number of assaults (Johnson, 1999), lower arrest rates for assault and weapons charges (Theriot, 2009), and decreased incidents of serious violence, a composite measure of rape, sexual battery, robbery, aggravated assault with a weapon, and threats of aggravated assault (Jennings et al., 2011). In addition, having armed security in schools is associated with a decrease in physical attacks and fights among predominately white schools (not including high schools) (Crawford & Burns, 2016).

However, other studies employing more rigorous designs, such as longitudinal, quasi-experimental, and case-control designs have found null effects of SROs for reported crimes (Barnes, 2008), disciplinary incidents (Link, 2010) and suspensions for gangs, substance use, and violence (Wilkerson, 2001). Studies examining violence

specifically have reported that SROs are not associated with a decrease in non-serious violent incidents (Jennings et al., 2011), and that schools with SROs added did not have less reported serious violent or non-serious violent crimes when examined in a longitudinal design (Na & Gottfredson, 2011). Moreover, SROs have also been found to have little impact on reducing weapon possessions and the presence of drugs in schools (Brown, 2006), and school violence has found to be higher in larger-sized schools and in middle schools relative to elementary schools, regardless of whether SROs or private security guards were utilized (Maskaly et al., 2011).

Some recent research suggests that schools with a school resource officer have higher rates of reported serious violence and those schools with SROs that participate in more place manager duties are also associated with higher rates of reported serious violence (Swartz, Osborne, Dawson-Edwards, & Higgins, 2015). This finding is consistent with research which has found that SROs and law enforcement measures are associated with a higher number of reported weapon offenses, drug offenses (Na & Gottfredson, 2011), a composite of recorded violence (Lesneskie & Block, 2016), and measures of school violence, including serious violent incidents, physical attacks, gun/knife possession, and threats and attacks with a weapon (Crawford & Burns, 2016). Swartz et al. (2015) suggest that SROs are unlikely to be in close proximity to where a school crime will occur, which is necessary in order for them to act as effective place managers. Therefore, they cannot discourage or prevent crime from occurring. Rather they are more reactive than preventative and are notified of crime after it has occurred, at which point they are likely to report the crime, contributing the increased incidence of school crime.

SROs have also been found to increase the number of discipline actions, with some research suggesting that suspensions are higher among schools with SROs (Rich-Shea, 2010). In addition, a meta-analysis by Fisher and Hennessy (2016) reported that the presence of SROs in high schools was associated with roughly one additional exclusionary disciplinary incident per week in a school of 1,500 students. For non-SRO personnel, research indicates that the number of security guards and higher use of force capabilities (i.e., tasers, firearms) is associated with more violent crime in schools (Jennings et al., 2011), and that armed security is associated with greater reports of several measures of violence in minority schools (Crawford & Burns, 2016). Ultimately, findings from these studies suggest that the use of personnel-based security measures is counterproductive and perhaps more likely to increase the detection of crime rather than serve as deterrent to crime, contrary to what deterrence-based theories predict.

Outcomes examined are not limited to only actual incidents of violence but also include perceptions of violence by students and school staff. Survey research examining perceptions of violent offending has also found mixed evidence regarding whether students and staff perceive that security personnel, particularly SROs, are a positive deterrent to acts of violence. One study suggests that principals perceived that the presence of SROs reduced fighting (May et al., 2004). Jackson (2002) reported that SROs could deter blatant criminal activity by preventing assaults as students believed they would be identified if they committed assault. However, personnel-based security measures have been found to be positively associated with students' perceptions of school disorder, including violence (Mayer & Leone, 1999). In sum, research on the

effects of school security personnel on both perceived and actual violence has revealed mixed and inconclusive findings.

Though most research examining the effects of school security personnel focuses on violent crime, studies have also effects on perceived and actual property crime. Property crime outcomes examined typically include incidents of theft, vandalism, and trespassing, as well as composite measures. For instance, the study by May et al. (2004) using data from a survey of school principals found that almost half of principals believed that theft had decreased since an SRO program was implemented. Opposite effects have also been found. One study found that increased use of physical and personnel-based security measures was associated with increases in students' perceptions of school disorder, including property crime (Mayer & Leone, 1999).

Studies employing more rigorous methods and examining actual outcomes have found mostly null effects. For instance, a longitudinal study examining the effects of adding police officers in schools found null effects on property crimes (Na & Gottfredson, 2011). Moreover, a study employing a quasi-experimental, non-equivalent groups design comparing arrest rates for various offenses among schools with SROs and schools without SROs found that schools with SROs did not significantly differ compared to schools without SROs in their rate of arrests for trespassing, theft, and vandalism (Theriot, 2009). Furthermore, research indicates that security guards and law enforcement are associated with more school crime and disruption, including larceny and vandalism incidents (Nickerson & Martens, 2008).

Research indicates that adult supervision of hallways is also mixed. For instance, though Blosnich and Bossarte (2011) reported that having adults in hallways was

associated with a significant reduction in the odds of having property vandalized, Schreck et al. (2003) found that supervision of hallways had no significant effects on overall student victimization, as well as violent or theft victimization. In contrast, odds of theft victimization have been found to increase when schools regularly performed locker checks, suggesting that schools with a greater number of students being victims of theft likely have more locker checks (Schreck et al., 2003).

Some studies have examined the effects of tactics to reduce anonymity, such as requiring the use of ID badges and school uniforms to be worn in school. Although school uniforms have been found to be associated with decreased sexual attacks and weapon possessions (Granberg-Rademacker et al., 2007) and drug crimes (Cheurprakobkit & Bartsch, 2005), a study by O'Neill and McGloin (2007) found that student ID badges and uniforms were not significantly related to a composite measure of violent crime including measures of aggravated assault, robbery, rape, and sexual battery. Similarly, Blosnich and Bossarte (2011) reported that school security measures overall, including the use of ID badges was not associated with decreased reports of low-level violent behaviors related to bullying.

Studies on techniques that extend guardianship are more limited and concern the effects of parental and/or community involvement in school. Studies have reported that parental connectedness to school is associated with lower school violence (Brookmeyer, Fanti, & Henrich, 2006) and that having a formal process to obtain parental inputs is associated with fewer school assaults (Granberg-Rademacker et al., 2007). Recent research has found that partnerships with community parental groups and parental involvement in subject area events and volunteer activities is associated with less school

violence (Lesneskie & Block, 2016). However, opposite effects have also been found. For instance, schools with social service involvement have reported greater amounts of violence (Lesneskie & Block, 2016).

Although the bulk of studies on school-based SCP have focused on techniques to increase the effort and risk of crime, some research has also examined techniques designed to reduce provocations for crime. While sparse, research on the effects of these techniques has focused on measures designed to reduce frustrations/stress and avoid disputes. In a quasi-experimental study, Barnes, Leite, and Smith (2015) examined several individual components for reducing frustrations/stress in schools, and found that only the provision of individual attention, mentoring, tutoring, and/or coaching to students by students or adults was significantly related to lower frequencies of student bullying, as well as verbal abuse of teachers. In contrast, student involvement in resolving conduct problems was related to higher rates of reported violent incidents, suggesting that this practice may have resulted in students feeling more comfortable reporting violent acts. Additionally, student involvement in recreational, enrichment, or leisure activities has been observed to be associated with a greater frequency of student bullying, indicating that these activities were likely unstructured, making it more difficult for teachers to detect bullying (Craig, Pepler, & Atlas, 2000). In sum, research on these techniques has produced mixed findings and limited evidence of their effectiveness in reducing violence.

Lastly, research on the effectiveness of techniques aimed at removing excuses for crime is largely focused on controlling drugs and alcohol through drug testing and dog sniffs for drugs. Table 2.3 presents a summary of relevant studies. Evidence on whether

Table 2.3 Summary of Studies for SCP Category: *Remove Excuses*

Study	Data/Sample	Location	Methods	SCP Measures	Outcome(s)	Relevant Findings
Brown (2006)	128 high school students	Brownsville, TX	Non-experiment Survey	Dog sniffs	Perceptions of crime and safety	Students perceived that drug sniffing dogs reduce drugs in schools
Goldberg et al. (2007)	Single cohort among 11 high schools	Portland, OR	Prospective randomized trial	Random drug and alcohol testing	Drug and alcohol use	No deterrent effects for past-month use during 4 follow-up periods, but reduced past-year drug use in 2 follow-up self-reports
James-Burdumy et al. (2012)	36 high schools and over 4,700 high school students	7 states primarily in South and Midwest	Cluster randomized trial	Mandatory-random student drug testing	Substance use	Students subject to drug testing reported less substance use than comparable students without testing
Sznitman et al. (2012)	943 high school students (NASY)	U.S.	Non-experiment Secondary analysis	Student drug testing	Substance abuse	Associated with lower levels of substance abuse in positive school climates for female students
Sznitman & Romer (2014)	361 high school students (NASY)	U.S.	Non-experiment Secondary analysis Longitudinal	Student drug testing	Substance use	Drug testing was not associated with changes in initiation or escalation of substance use
Terry-McElrath et al. (2013)	Middle and high school students (MTF)	U.S.	Non-experiment Secondary analysis	Student drug testing	Illicit drug use, marijuana use	Lower marijuana use in the presence of drug testing and higher illicit drug use other than marijuana

student drug and/or alcohol testing reduces substance use is also largely mixed and inconclusive as with other SCP techniques (e.g., Goldberg, Elliot, MacKinnon, Moe, Kuehl, Yoon, Taylor, & Williams, 2007). James-Burdumy, Goesling, Deke, and Einspruch (2012) examined the effects of mandatory-random student drug testing in a sample of 36 high schools and 4,700 high school students using a clustered randomized trial and reported that students subjected to drug testing reported less substance use than comparable students without testing. In contrast, a longitudinal study by Sznitman and Romer (2014) found that student drug testing was not associated with changes in the initiation or escalation of substance use in a sample of high school students. Sznitman, Dunlop, Nalkur, Khurana, and Romer (2012) found that the use of drug testing was associated with lower levels of substance use in positive school climates but only for female students. Terry McElrath, O'Malley, and Johnston (2013) reported that drug testing of middle and high school students was associated with lower marijuana use but higher illicit drug use other than marijuana.

In sum, the empirical evidence on the effectiveness of school-based SCP techniques has revealed inconclusive and contradictory findings. Studies have reported varying effects across a variety of techniques on school crime and victimization outcomes. Moreover, after controlling for school risk factors, school characteristics, community context, and individual-level characteristics, studies tend to demonstrate that many SCP measures tend to have null and/or opposite effects (Cook et al., 2010; O'Neill & McGloin, 2007; Schreck et al., 2003; Wynne & Joo, 2011). Some research on school crime and victimization suggests that environment-focused crime prevention in the form of various aspects of school communal organization, including clear, common norms and

collaborative arrangements among students, faculty, and staff is more effective at reducing victimization than SCP in the form of access controls, target hardening, and formal surveillance (Gerlinger & Wo, 2016; Tillyer et al., 2011; Wynne & Joo, 2011).

2.5 Limitations of Previous Research

A weakness across many studies of SCP measures is that they use non-experimental research designs with cross-sectional data which do not satisfy all criteria for causation, such as the temporal ordering of cause and effect and non-spuriousness (e.g., Crawford & Burns, 2015; 2016; Jennings et al., 2011; Lesneskie & Block, 2016; Maskaly et al., 2011; O'Neill & McGloin, 2007). While correlational studies identify a cause and effect, they are missing the structural features of experiments, such as random assignment, pre-tests and control groups where a counterfactual inference can be constructed. Therefore, they cannot eliminate or reduce the threat of selection bias, where other factors correlate with both the implementation of SCP measures and school crime. With only cross-sectional data available, studies cannot determine at which point during the school year that SCP measures were introduced. For instance, some studies report that SCP measures reduce crime, yet it is possible that crime was decreasing prior to the implementation of the SCP measures. Likewise, they are unable to determine whether some SCP measures detect more crime than they deter or whether they are implemented as a response to high levels of crime. In sum, studies cannot support strong causal inferences and conclusions from these studies are limited to statements of association.

A limited number of studies have used stronger designs such as quasi-experiments or randomized experiments. However, these studies tend to focus on the effects of a particular SCP measure on specific outcomes (e.g., James-Burdumy et al., 2012; Swartz

et al., 2015). Other studies examine SCP measures on outcomes that are limited to a few highly aggregate measures of school crime, which obscures their effects on individual crime types (e.g., Lesneskie & Block, 2016; O'Neill & McGloin, 2007).

2.6 The Present Study

The present study examines the impacts of a number of situational crime prevention techniques in schools on several measures of crime using a nationally representative sample of public schools. This study is guided by two main research questions: 1) Does the implementation of SCP techniques have an impact on school crime? and 2) Does the effect of SCP techniques vary by the type of school crime? While the broader empirical research on opportunity theory and situational crime prevention is promising, previous research on the effects of SCP techniques in schools is largely contradictory with many studies being limited by the use of correlational designs. The design used for this study will be a quasi-experiment (non-equivalent groups) with propensity score analysis for equating groups based on observed variables likely correlated with the treatment and outcome variables. This method is ideal for reducing threats to internal validity, such as selection bias, and therefore allows for strong causal inferences to be made. Second, studies have been largely limited to examinations of aggregated school crime outcomes. However, the effects of SCP techniques might be different depending on the specific crime type examined because some are more suited towards deterring certain types of crimes (e.g., theft, drug possession, weapon possession). Therefore, by understanding the effects of SCP techniques by type of crime, this study will produce more nuanced findings to improve the targeting of school-based SCP techniques.

CHAPTER 3

METHODOLOGY

3.1 DATA AND SAMPLE

The present study analyzes restricted-use survey data from the SSOCS:2010, a nationally representative survey developed by NCES to collect crime and safety data from principals and administrators of public schools in the United States for the 2009-2010 school year. Data collected from the survey are used to provide nationwide cross-sectional and subgroup estimates of crime, discipline, disorder, programs, and policies in U.S. public primary and secondary schools (Neiman et al., 2015). The sampling frame for the SSOCS:2010 was created from the 2007-08 Common Core of Data (CCD) Public Elementary/Secondary School Universe data file, which includes information about schools and school districts, including name, address, and phone number, descriptive information about students and staff; and fiscal data including revenues and current expenditures (Neiman et al., 2015). Excluded from the SSOCS:2010 sampling frame are schools in the U.S. outlying areas and Puerto Rico, overseas Department of Defense schools, newly closed schools, Bureau of Indian Education schools, special education schools, vocational schools, alternative schools, ungraded schools, and schools with a grade of kindergarten or lower (Neiman et al., 2015).

Stratification and Sample Selection

Stratification is used to ensure that selected subgroups of interest are adequately represented in the sample for analysis and improves sampling precision by allowing a

more optimal allocation of the sample to the strata (Neiman et al., 2015). For the SSOCS:2010, schools were selected according to a stratified sampling design consisting of 64 strata defined by crossing grade levels (*primary, middle, high, combined*), enrollment size *(<300, 300-499, 500-999, 1,000+*), and locale (*city, suburb, town, rural*). These variables are related to school crime and therefore create meaningful strata for the survey (Neiman et al., 2015). The initial goal of the SSOCS:2010 was to collect data from at least 2,550 schools. Because the majority of school violence is reported in middle and high schools, a larger proportion of the desired sample schools was allocated to middle and high schools. Sampling weights were established to account for this oversampling. The final sampling weight (*FINALWGT*) is the number of schools in the population that each observation represents. Middle and high schools received lower weights. Once final sample sizes were determined for each of the 64 strata, the schools within each stratum were sorted by census region and percent White enrollment. Within each stratum, a simple random systematic sample was drawn. The initial selected sample consisted of 3,476 schools.

Data Collection

The SSOCS:2010 was conducted as a mailed self-administered questionnaire with telephone follow-up. NCES contacted the school districts of sampled schools that required district approval to participate in the survey four months prior to data collection to allow sufficient time to gain authorization. Approximately one week prior to mailing the questionnaires, an advance letter and brochure was sent to the principals of sampled schools. The questionnaires were sent directly to the principals of the sampled schools including a cover letter describing the importance of the survey with a pre-addressed

return envelope. Schools located within districts in which approval was granted also received inserts informing the principals that their districts had approved participation in SSOCS. After the mailing of the advance letter to schools, letters were sent to the chief state school officers and district superintendents to inform them that schools within their states and districts, respectively, had been selected for SSOCS:2010 and encourage their participation.

The questionnaires were initially mailed out on February 24 and 25, 2010. Three weeks later, a reminder telephone operation began. The first phase of the reminder telephone operation consisted of a follow-up call with the principal or school contact to determine the status of the questionnaire. Two weeks later, a second phase consisting of a follow-up call to principals or school contacts was repeated for schools that had still not returned a questionnaire. The two weeks in between the two phases of the reminder operation allowed time for replacement questionnaires to be sent to schools that did not receive them or had misplaced them, and to give principals time to complete and return the questionnaire. During the reminder operation, the interviewer could complete the SSOCS interview over the phone at the respondent's request. Questionnaires were re-sent to schools that had not received them or that were not reached in either reminder operation. The nonresponse follow-up operation began a little over 2 weeks after the reminder operations ended. During this 4-week operation, interviewers collected data over the telephone and by fax submission. Data collection was originally scheduled to end on May 28, 2010, but was extended until June 11, 2010, to allow additional time to reach nonresponding schools (Neiman et al., 2015).

Of the 3,476 schools initially selected to participate in the SSOCS:2010, 2,648 returned completed surveys resulting in a completion rate of 76.2 percent. However, 49

ineligible schools returned surveys. Ineligible schools included those that had closed, merged with another school at a new location, changed from a regular public school to an alternative school, or do not provide any classroom instruction. The removal of these ineligible schools from the total initial sample size resulted in an unweighted unit response rate of 77.3 percent. The weighted unit response rate was 80.8 percent (Neiman et al., 2015).

Data Preparation

Analysis of non-response bias was conducted due to the base-weighted unit response rate being less than 85 percent. Base weights are calculated using the ratio of the number of schools available in the sampling frame to the number of schools selected. Based on this analysis, the base weights were adjusted for potential bias in school level, locale, enrollment size, percent White enrollment, and the number of FTE teaching staff (Neiman et al., 2015). Imputation procedures were used to create values for all questionnaire items with missing information. These imputation methods were tailored to the nature of each survey item which resulted in the use of four approaches: aggregate proportions, best match, logical, and clerical (Neiman et al., 2015). The aggregate proportions method involved summing across all schools within an imputation class, defined by instructional size and enrollment size category. A best match method was used for categorical variables and some continuous variables, where a recipient received data from a perfect donor that matched on all the variables that were used to define the imputation class. The logical method involved deducing a response from the pattern of responses to subsequent items. The clerical method involved imputing values from the Common Core of Data (CCD) frame, a census system that collects data on all schools.

3.2 MEASURES

Dependent Measures

The following seven count variables are used as dependent variables: 1) violent crimes with a weapon, 2) physical attacks without a weapon, 3) threats of physical attack without a weapon, 4) drug/alcohol offenses, 5) weapon possession, 6) theft/larceny, and 7) vandalism. Several of these variables are composite variables of measures included in the dataset because the frequency of certain crimes was minimal and because the crime types were closely related. For instance, *violent crimes with a weapon* is a composite of robbery, physical attacks or fights, and threats of physical attack or fight where a weapon was involved in the commission of the offense. *Drug/alcohol offenses* is a composite of three variables, distribution/possession/use of illegal drugs, distribution/possession/use of alcohol, and inappropriate distribution/possession/use of prescription drugs. *Weapon possession* includes the possession of a firearm or explosive device, as well as possession of a knife or sharp object. All measures consist of a raw count. These measures reflect events that were recorded by the school and not only events reported to police. Therefore, they are likely to be more inclusive than official records would be (O'Neill & McGloin, 2007).

Independent Measures

Data on individual SCP measures were collected in the SSOCS:2010 in the sections on school practices and programs and school security staff using "yes/no" questions asking whether each was practiced by the school. Table 3.1 classifies each one of the items according to one of the broad categories of SCP and one of the twenty-five techniques. These measures include: access controlled/locked doors; grounds have

locked/monitored gates; students pass through metal detectors, have random metal detector checks on students; practice to close campus for lunch; practice random dog sniffs for drugs; random sweeps for contraband not including dog sniffs; require drug testing for athletes; require drug testing for students in extra-curricular activities; require drug testing for any students; require students to wear uniforms; practice to enforce a strict dress code; provide school lockers to students; require clear book bags or ban book bags; require students to wear badge or photo ID; security camera(s) monitor the school; limit access to social networking sites; prohibit use of cell phones and text messaging devices; and presence of security staff (i.e., security guards, security personnel, or law enforcement officers present at the school at least once a week).

Covariates

The covariates in this study are informed by measures examined in the areas of school crime research identified in the literature review that have been found to be related to school crime: a) school structure characteristics, b) school culture, c) school discipline management, and d) psychosocial, and psychoeducational, and peer-led programs. Table 3.2 provides a list of the covariates used in this study and their operationalizations. Measures of school structure characteristics capture characteristics such as school size, poverty, ethnic heterogeneity, and student transiency. *Enrollment size* is an ordinal variable indicating the number of students enrolled. *Grade levels* indicates whether the school was a primary, middle, high, or combined school. *Locale* indicates whether the school is in a city, suburb, town, or rural area. Because the attributes of these three variables form the sampling strata, they also serve as important design variables. *Percent white* is the percentage of students who are white, measured as a

Table 3.1 School-based situational crime prevention measures.

SCP category and variable	SCP technique	SSOCS item operationalization
Increase the Effort		
Locked doors	Control access to facilities	Control access to school buildings during school hours
Locked gates	Control access to facilities	Control access to school grounds during school hours
Metal detectors	Control access to facilities	Require students to pass through metal detectors each day
Random metal detector checks	Control tools/weapons	Perform one or more random metal detector checks on students
Closed lunch	Control access to facilities	Close the campus for most or all students during lunch
Lockers	Harden targets	Provide school lockers to students
Book bag bans	Control tools/weapons	Require clear book bags or ban book bags on school grounds
Increase the Risks		
Contraband sweeps	Strengthen formal surveillance	Perform one or more sweeps for contraband (e.g., drugs or weapons), but not including dog sniffs
Uniforms	Reduce anonymity	Require students to wear uniforms
Threat reporting system	Extend guardianship	Provide a structured anonymous threat reporting system (e.g., online submission, telephone hotline, or written submission via drop box)
Student badges	Reduce anonymity	Require students to wear badges or picture IDs
Security cameras	Strengthen formal surveillance	Use one or more security cameras to monitor the school
Security staff	Strengthen formal surveillance	Any security guards, security personnel, or sworn law enforcement officers present at the school at least once a week
Reduce Provocations		
Limit social networking	Neutralize peer pressure	Limit access to social networking websites (e.g., Facebook, MySpace, Twitter) from school computers
Remove Excuses		
Dress code	Set rules	Enforce a strict dress code
Dog sniffs	Control drugs and alcohol	Use one or more random dog sniffs to check for drugs
Drug testing (athletes)	Control drugs and alcohol	Require drug testing for athletes
Drug testing (extracurricular)	Control drugs and alcohol	Require drug testing for students in extra-curricular activities other than athletics
Drug testing (other students)	Control drugs and alcohol	Require drug testing for any other students
Prohibit phones	Set rules	Prohibit use of cell phones and text messaging devices during school hours

dichotomous variable indicating whether a school had more than 50 percent of its students white. *Percent free lunch* is the percentage of students eligible for free or reduced-priced lunch. *Percent male* is the percentage of students who are male. *Percent LEP* is the percentage of students who are Limited English Proficient. *Crime where school located* is an ordinal variable measuring whether the school was perceived to be in area with a low, moderate, or high level of crime. *Transfers to school* is a count of the total number of students transferred to school after the start of the school year. Conversely, *transfers from school* is a count of the total number of students transferred from the school after the start of the school year. Lastly, *school disorder* is an index of the average of the scores of nine items that measure how often disciplinary problems occur at the school based on a likert scale. These measures include student 1) racial/ethnic tensions, 2) student bullying, 3) student sexual harassment, 4) student harassment based on sexual orientation, 5) widespread disorder in classrooms, 6) student verbal abuse of teachers, 7) student acts of disrespect for teachers other than verbal abuse, 8) gang activities, and 9) cult or extremist group activities. These measures were originally coded with 1 being "happens daily" and 5 being "never happens." To create the composite variable, these variables were first recoded with 0 being "never happens" and 4 being "happens daily." The internal consistency of the items was reasonably strong with an alpha coefficient of .80.

Five covariates capture aspects of the school culture, such as parent and community involvement in school and commitment of the student body to academics. *Parent participation* is an index of the average of the scores of four items measuring the percentage of students that had at least one parent participating in school events during

the school year. These events include 1) open house or back-to-school night, 2) regularly scheduled parent-teacher conferences, 3) special subject-area events, 4) volunteered at school or served on a committee. These variables were originally coded on a likert scale from 1 to 4, with 1 being "0-25%", and 4 being "76-100%." In addition, a score of 5 meant that the school did not offer the event. This score was recoded into 0 for the purposes of creating the index. The internal consistency of the scale items was reasonable with an alpha coefficient of .73. *Community involvement* is an index of the average of the scores of eight items indicating whether particular outside groups were involved in school efforts to promote safe, disciplined, and drug-free schools, where a higher score indicates that more groups were involved. These groups include 1) parent groups, 2) social service agencies, 3) juvenile justice agencies, 4) law enforcement agencies, 5) mental health agencies, 6) civic organizations/service clubs, 7) private corporations, and 8) religious organizations. The variables were recoded so that a score of 0 indicates "no" and a score of 1 indicates "yes." The alpha coefficient of the items was reported to be .75. *Percent below 15th* is a measure of the estimate of the percent of students who are below the 15th percentile on standardized tests. *Percent college* measures the estimate of the percent of students who are likely to go to college after high school. Lastly, *percent academic* measures the estimate of the percent of students who consider academic achievement to be important. These three items ranged from 0 to 100 percent.

Four covariates are used to measure the presence of authoritative school discipline. First, the extent to which parents were involved in school discipline was measured by three dichotomous variables indicating whether or not the school did each of the following to involve or help parents: 1) have a formal process to obtain parental input

on policies related to school crime or discipline (*parent input*), 2) provide training or technical assistance to parents in dealing with students' problem behavior (*parent training*), and 3) have a program that involves parents at school helping to maintain school discipline (*parent involvement*). Second, *teacher training* is an index of the average scores of three items indicating whether school staff received training in 1) classroom management for teachers, 2) school-wide discipline policies and practices related to violence, and 3) school-wide discipline policies and practices related to alcohol and/or drug use. These variables were also recoded with 0 indicating "no" and 1 indicating "yes" where higher scores indicate that teachers had more training on school discipline. The alpha coefficient of these items was acceptable with a score of .64.

The presence of psychosocial, psychoeducational and/or peer-led programs at school is measured by an 8-item index, *programming*. This index is the average of the sum of the scores of eight items indicating whether a school had formal programs intended to prevent or reduce violence that included certain components (recoded 0 for "no", 1 for "yes"). These include 1) prevention curriculum, instruction, or training for students, 2) behavioral or behavior modification intervention for students, 3) counseling, social work, psychological, or therapeutic activity for students, 4) individual attention/mentoring/tutoring/coaching of students by students, 5) individual attention/mentoring/tutoring/coaching of students by adults, 6) recreational, enrichment, or leisure activities for students, 7) student involvement in resolving student conduct problems, and 8) programs to promote sense of community/social integration among students. Higher scores reflect that the school had more components present. The internal consistency of the items was acceptable with an alpha coefficient of .68.

Table 3.2 Covariate definitions.

Covariate Description	Variable Name	Operationalization
Enrollment size	SIZECAT	<300, 300-499, 500-999, or 1,000+ (used to create strata)
Grade levels	GRADECAT	Primary, middle, high or combined school (used to create strata)
Locale	LOCALECAT	City, suburb, town, or rural (used to create strata)
Percent white	WHITE50	Percentage of students who are white (0=50% or less, 1=more than 50%)
Percent free lunch	C524	Percentage of students eligible for free/reduced priced lunch
Percent LEP	C526	Percentage of students that are Limited English Proficient
Percent male	C530	Percentage students who are male
Crime where school located	C562CAT	School located in area with a high, moderate, or low level of crime
Transfers in	C570	Number of students transferred to school after the start of the school year
Transfers out	C572	Number of students transferred from school after the start of the school year
School disorder	C388C	Index of the average of the scores of nine items measuring how often disciplinary problems occur at the school based on a likert scale 1) racial/ethnic tensions, 2) student bullying, 3) student sexual harassment, 4) student harassment based on sexual orientation, 5) widespread disorder in classrooms, 6) student verbal abuse of teachers, 7) student acts of disrespect for teachers other than verbal abuse, 8) gang activities, 9) cult or extremist group activities (0=never happens to 4=happens daily) (α = .80)
Parent participation	C203C	Index of the average of the scores of four items (0=did not offer to 4=76-100%) measuring the percentage of students that had at least one parent participating in school events during the school year on a likert scale: 1) open house or back-to-school night, 2) regularly scheduled parent-teacher conferences, 3) special subject-area events, 4) volunteering at school or serving on a committee (α = .73)
Community involvement	C219C	Index of the average of the scores of eight items (0=no, 1=yes) indicating whether outside groups were involved in efforts to promote safe, disciplined, and drug-free schools: 1) parent groups, 2) social service agencies, 3) juvenile justice agencies, 4) law enforcement agencies, 5) mental health agencies, 6) civic organizations/service clubs, 7) private corporations, 8) religious organizations (α = .75)

Percent below 15th	C532	Percentage of students below the 15th percentile on standardized tests
Percent college	C534	Percentage of students likely to go to college after high school
Percent academic	C536	Percentage of students who consider academic achievement to be very important
Parent input	C190	School has a formal process to obtain parental input on policies related to school crime or discipline (0=no, 1=yes)
Parent training	C192	School provides training or technical assistance to parents in dealing with students' problem behavior (0=no, 1=yes)
Parent involvement	C194	School has a program that involves parents at school helping to maintain school discipline (0=no, 1=yes)
Teacher training	C269C	Index of the average of the scores of three items (0=no, 1=yes) indicating whether school staff received training in 1) classroom management for teachers, 2) school-wide discipline policies and practices related to violence, 3) school-wide discipline policies related to alcohol and/or drug use (α = .64)
Programming	C187C	Index of the average of the scores of eight items (0=no, 1=yes) indicating whether a school had formal programs intended to prevent or reduce violence that included the following components: 1) prevention curriculum, instruction or training for students, 2) behavioral or behavior modification intervention for students, 3) counseling, social work, psychological, or therapeutic activity for students, 4) individual attention/mentoring/tutoring/coaching of students by students, 5) individual attention/mentoring/tutoring/coaching of students by adults, 6) recreational, enrichment, or leisure activities for students, 7) student involvement in resolving student conduct problems, 8) promoting a sense of community/social integration among students (α = .68)

3.3 Analytic Strategy

This study uses a quasi-experimental non-equivalent control group design. This is methodologically the strongest design suitable for this study because SCP measures are not randomly assigned (i.e., schools select which measures to implement) nor can the measures be manipulated due to the use of secondary data. In addition, the SSOCS:2010 data are collected at a single time point so it cannot be determined at what point in time during the school year the SCP measures were introduced. These issues would prohibit the use of a randomized experiment or a stronger quasi-experimental design, such as a regression discontinuity design or an interrupted time-series design.

Observational studies lack the use of random assignment of units to experimental and control groups and therefore introduce the threat of selection bias, where differences between experimental and control groups are associated with changes in the independent and dependent variables. Because SCP techniques are not randomly assigned to schools, there is potential for selection bias due to covariates that correlate with both the probability of implementation of an SCP technique and school crime outcomes. Therefore, the estimation of the effects of SCP techniques will be biased if the effects of these covariates are not controlled in the analysis method. As such, propensity score analysis will be used to reduce selection biases (i.e., differences between groups associated with the treatment and outcome). The use of propensity scores can address the threat of selection bias and allow for causal inferences to be made (Rosenbaum & Rubin, 1985). Treatment and comparison schools will be weighted on their propensity scores: the conditional probability of receiving treatment given the observed pre-treatment variables. The goal is to compare schools with similar propensities that did and did not

have each of the SCP measures. This method reduces selection bias due to the lack of random assignment by equating groups on observed covariates likely to be related to the treatment and outcomes, thus allowing for strong causal inferences to be made from cross-sectional data.

In order to make causal inferences in observational studies using propensity scores, several assumptions must be met (Apel & Sweeten, 2009; DuGoff, Schuler, & Stuart, 2014; Heinrich, Maffioli, & Vazquez, 2010; Pan & Bai, 2015; Rosenbaum & Rubin, 1983). The first is the conditional independence assumption (CIA), which states that treatment status and potential outcomes are independent given the observed covariates. This assumes that the set of observed pre-treatment covariates includes variables that affect both the treatment status and outcome (i.e., there are no unobserved confounders). This key assumption cannot be tested (Pan & Bai, 2015; Shadish, 2013). If important variables are omitted in estimation of propensity scores, the assumption would be violated and may contribute to bias in the results. Therefore, knowledge of the selection process is essential (Heinrich et al., 2010).

The second is known as common support, which states that there is overlap in the range of propensity scores across treatment and control groups. For each treatment unit there must be a comparison unit with a similar propensity score. All units must have a positive probability of receiving the treatment (i.e., propensity score). Common support can be subjectively assessed by examining the distribution of propensity scores across treatment and comparison groups. When the conditional independence and common support assumptions are satisfied, the treatment assignment is said to be strongly ignorable (Rosenbaum & Rubin, 1983).

Another assumption that must be met to make causal inferences using propensity scores is the stable unit treatment value assumption (SUTVA). This assumption holds that the treatment assignment of one subject does not affect the outcome of another subject, or no interference between units (Berk, 2005; Pan & Bai, 2015; Rosenbaum, 2007). There are several problems that can occur when SUTVA is violated (Berk, 2005). First, there is a potential response to the treatment or control condition that can vary depending on which other subjects are assigned to which conditions. Second, a policy problem is that it cannot be determined which of the large number of treatments will be implemented. The possibility of interference between units would pose a threat to the internal validity of the results in experimental and quasi-experimental designs (Baird, Bohren, McIntosh, Ozler, 2012). Although this assumption is not always attainable in practice, between-group contamination can be reduced by improving designs and thus ensure that this assumption can be satisfied (Stuart, as cited in Pan & Bai, 2015).

There are several considerations that make it appropriate and worthwhile to employ propensity score analysis for this study. Propensity score analysis is said to be "data hungry" and require a large sample size, although there is little guidance on a specific size (Heinrich et al., 2010; Shadish, 2013). However, some research suggests that a sample size of 1,500 reduces the probability that the propensity score analysis will get farther away from the correct effect size estimate to 0 percent (Luellen, as cited in Shadish, 2013). Because the sample size in this study is 2,648, it is a sufficiently large enough sample size to minimize the possibility of bias in the effect estimate.

Another consideration is the use of archival data (e.g., secondary data), which raises several issues. For instance, Shadish (2013) argues that researchers cannot gather

new measures to remedy omissions of selection constructs, and can do little to improve the reliability of covariates. However, the SSOCS has gone through a number of revisions since it was initially developed and most recent available dataset (SSOCS:2010) contains numerous measures of constructs from major criminological traditions, including social disorganization, strain, and control theories. It also includes measures of constructs identified by theories such as broken windows, collective efficacy, and procedural justice. It is therefore unlikely there would be any significant measures of important constructs that are correlated with outcomes that are not already captured by the dataset.

Estimation of Propensity Scores

All analyses were performed using Stata/MP 14.2 (StataCorp, 2015b). The first step in the propensity score analysis is to perform a regression analysis with the independent variable (i.e., treatment) as the dependent variable and the covariates as the independent variables (Caliendo & Koepeinig, 2008; Garrido, Kelley, Paris, Roza, Meier, Morrison, & Aldridge, 2014). For this study, a series of logistic regressions were performed with each SCP measure as the dependent variable that is predicted by the covariates to obtain propensity scores for all schools. Logistic regressions were used because of the dichotomous nature of the SCP variables. The command *pscore* (Becker & Ichino, 2002) was used to obtain propensity scores.

Applying Propensity Score Methods to Complex Survey Design

The SSOCS has a complex survey design and therefore propensity score analysis should be combined with survey weighting to achieve unbiased treatment effect estimates that are generalizable to the survey target population. Sampling weights, strata, and

clustering should be incorporated with propensity score methods when feasible to make inferences about the target population and to obtain accurate variance estimates (DuGoff et al., 2014). For instance, it has been recommended that the sampling weight is incorporated into propensity score methods at two stages: 1) when estimating the propensity score and 2) when using the propensity score to estimate the treatment effect. Including the weight may help satisfy the assumption of unconfounded treatment assignment (DuGoff et al., 2014). Ridgeway, Kovalchik, Griffin, and Kabeto (2015) found that when survey design is complex and model misspecification is present, incorporating sampling weights in all stages of propensity score analysis (as weights) will produce more precise treatment effects estimates.

There has been discussion regarding how the survey sampling weight should be included in the estimation of propensity scores, specifically whether the weight variable should be used as a covariate or as a weight (DuGoff et al., 2014; Lenis, Nguyen, Dong, & Stuart, 2017; Ridgeway et al., 2015). DuGoff et al. (2014) suggest that the survey weight should be included as a covariate (i.e., predictor) in the propensity score model. However, they also argue that it is not necessary to incorporate survey weighting in the propensity score model because the goal is not to generalize the propensity score model to the population. Lenis et al. (2017) found that whether the weights were used as a covariate in the estimation of the propensity score model or whether they were incorporated as weights in a weighted regression analysis did not impact the performance of matching estimators. In contrast, Ridgeway et al. (2015) argue that sampling weights should be included in the propensity score model and should be used as a weight rather than a covariate. They compared different methods in estimating the propensity score and

found that only the propensity score models that used sampling weights as weights results in good population covariate balance and treatment effects with the lowest root mean squared errors in different scenarios. Therefore, this study sets the sampling weight variable (*FINALWGT*) as a weight rather than using it as a covariate when estimating the propensity score. The following demonstrates the syntax used to estimate the propensity scores for each school:

$$pscore\ treatment\ covariate1\ covariate2 \ldots covariate\#\ [pweight = FINALWGT]$$
$$pscore(mypscore)\ blockid(myblock)\ logit$$

Although it has been argued strata and cluster indicators should be included in the propensity score model, this may not be feasible when concerns about degrees of freedom prohibit their inclusion, such as when there are a large number of strata and clusters (DuGoff et al., 2014). In the SSOCS dataset, the strata variable is a product of three variables (enrollment size, grade levels, and locale) each with four attributes and thus the large number of strata would impede convergence. In addition, these variables that comprise the strata are already included as covariates and therefore account for the sampling design. If the strata variable is included as a covariate, it would cause a number of strata to be omitted due to collinearity and cause the treatment overlap assumption to be violated which prevents the estimation of treatment effects. In addition, the primary sampling unit (PSU) variable is a unique identifier that has a different value for each school. Therefore, the large number of clusters would prohibit its inclusion in the propensity score models. For these reasons, the strata and cluster variables are excluded from the estimation of propensity scores and estimation of treatment effects.

Choice of Covariates

Variables included in the propensity score model should be related to the outcome, regardless of whether they are related to the treatment (Brookhart, Schneewiess, Rothman, Glynn, Avorn, & Sturmer, 2006; Garrido et al., 2014). Including a variable that is related to the outcome but not the treatment should reduce bias because a variable related to the outcome may also be related to the treatment. However, including a variable that is related to the treatment but not the outcome will decrease precision and will not address bias because they do not address confounding (Garrido et al., 2014). The selection of covariates was therefore informed by criminological theories and findings from school crime research which has found evidence that the selected covariates (Table 3.1) are correlated with school crime or are likely correlated with school crime. However, this study does not attempt to include all variables in the SSOCS:2010 dataset as covariates. It has been argued that in smaller datasets, potentially irrelevant covariates may introduce too much "noise" into the treatment effect estimates and obscure any reduction in bias achieved by their inclusion (Brookhart et al., 2006; Garrido et al., 2014).

Model diagnostics when estimating propensity scores are not the standard model diagnostics for logistic regression (Stuart, 2010). With propensity score estimation, concern is not with the predictive ability or the parameter estimates of the model, but with predicted probabilities and the resulting balance of covariates (Augurzky & Schmidt, as cited in Stuart, 2010). Therefore, standard concerns about the multicollinearity of covariates does not apply (Stuart, 2010).

Assessing Common Support and Initial Balance Diagnostics

After the propensity score has been calculated for each school, the next step was to ensure there is overlap in the range of propensity scores across treatment and

comparison groups ("common support") (Garrido et al., 2014). To make inferences about treatment effects, it is necessary to ensure that each treatment school has a comparison school with a similar propensity score. Common support was first subjectively assessed by examining a graph of propensity scores across treatment and comparison groups (Garrido et al., 2014). The *psgraph* function was used to create distributions of the propensity score across treatment and comparison groups.

After assessing common support, an initial balance check of propensity scores across treatment and comparison groups was then assessed by splitting the sample by blocks of the propensity score (i.e., groups of observations with similar propensity scores) to obtain a rough estimate of the propensity score's distribution (Imbens, 2004). T-tests of the propensity score across treatment and comparison groups were then performed within each block. When the mean propensity score was significantly different in the treatment and comparison groups within a particular block, the block was split into smaller blocks to improve balance. Once the propensity scores have been balanced within blocks across treatment and control groups, a check for balance of individual covariates across treatment and comparison groups within blocks of the propensity score was performed. Within each block, a *t*-test was performed to test whether the means of the covariates are equal across treatment and comparison groups. These diagnostics were performed automatically as part of the *pscore* command. Imbalance in some covariates is expected and it is likely that the initial specification is not balanced (Garrido et al., 2014). Austin (2011) argues that if there remain systematic differences in baseline covariates between treatment and comparison subjects in the sample that has been matched or weighted by the propensity score, then it is an indication that the propensity score model

has not been correctly specified and needs to be respecified. Therefore, this study does not attempt to respecify the propensity score models when there were covariates that were found to not be balanced *prior* to conditioning (e.g., weighting) on the propensity score.

Propensity Score Weighting (Inverse-Probability of Treatment Weighting)

The next step in the propensity score analysis was the choice of the matching or weighting algorithm (Garrido et al., 2014). This step determines how the propensity score is used to compare treatment and comparison groups and involves evaluating tradeoffs between bias and efficiency (Garrido et al., 2014). This study uses propensity score weighting, also known as the Inverse-Probability Treatment Weights (IPTW) algorithm, which is the optimal method for estimating the average treatment effect on the entire sample (Imbens, 2010; Stuart, 2004). The purpose of weighting is to make the groups as similar as possible by penalizing treated (untreated) units with higher (lower) probability of treatment and advantaging the untreated (treated) units with higher (lower) probability of treatment (Cerulli, 2015). Each treatment school receives a weight equal to the inverse of the propensity score, and each comparison school receives a weight equal to the inverse of one minus the propensity score. The weights are then used to form a pseudo-population in which the covariates and treatment assignment are independent of each other, a condition that would be expected under randomization. The weighted groups are not identical to the population that was observed but could have been sampled from a population in which there was no confounding (Thoemmes & Ong, 2016).

To calculate the propensity score weights (IPTWs) for each school, the following syntax was processed for each treatment after using *pscore* to estimate the propensity scores:

$$gen\ w_{ate} = \frac{treatment}{mypscore} + \frac{1 - treatment}{1 - mypscore}$$

In this example, *treatment* is the independent variable (i.e., SCP measure) which takes on a value of 0 or 1 and *mypscore* is the propensity score calculated using the *pscore* command. This formula ensures that each treated school receives a weight equal to the inverse of the propensity score and each untreated school receives a weight equal to the inverse of one minus the propensity score. In contrast to commands that automatically calculate the propensity score weights after estimating propensity scores, the advantage of calculating the propensity score weight using this method is that it allows the propensity score weight to be calculated from a propensity score that was estimated using the sampling weight as a weight rather than a covariate, which some research has shown to reduce covariate imbalance and produce more accurate causal effects estimates (Ridgeway et al., 2015).

Balance of Covariates after Weighting by the Propensity Score

An assessment of whether a propensity score model has been correctly specified occurs after conditioning on the propensity score (Austin, 2011). Rubin (2008) argues that a model should balance the covariates before examining the results for the estimated treatment effects. However, balance analysis must be performed after the estimation of treatment effects in Stata. Therefore, the command *quietly* is used to suppress the results of the treatment-effects estimation. Ridgeway et al. (2015) examine covariate balance analysis after weighting by measuring the population standardized mean differences

weighted by the product of the sampling weight and the propensity score weight. They found that only propensity score models using sampling weights as weights produced consistently good covariate balance. Therefore, this study first generates a weight (*PWGT*) that is the product of the sampling weight and the propensity score weight to incorporate into the treatment-effects estimation command for subsequent balance analysis:

$$gen\ PWGT = FINALWGT * w_{ate}$$

An assessment of how well covariates were balanced across treatment and comparison groups in the weighted samples was made by 1) comparing mean standardized differences and variance ratios and 2) performing a statistical test. Smaller differences in means are better especially for covariates thought to be strongly related to the outcome (Ho, Imai, King, & Stuart, 2010). To examine covariate balance, the command *tebalance summarize* was used after estimating treatment effects that were suppressed (using *teffects ipw*) to obtain mean standardized differences and variance ratios for each covariate in the original and weighted samples for every treatment. The *tebalance* command produces the same results after *teffects ipw* as it does as *teffects ipwra*, because only the IPW component of the estimators that combine regression adjustment and inverse-probability weighting defines a weighted sample that can be used to calculate balance statistics (StataCorp, 2015a). These treatment-effects estimators are discussed in detail in the next section. Following *tebalance summarize*, the overidentification test was used to test whether statistically significant imbalance remains in covariates (i.e., whether the null hypothesis that covariates are balanced could be rejected) (StataCorp, 2015a).

Estimation of the Average Treatment Effects (ATEs)

The last step in the analysis involved estimating and interpreting the treatment effect in the weighted subsamples. Two common treatment effects are the average treatment effect in the population (ATE) and the average treatment effect on the treated (ATT or ATET) (Caliendo et al., 2008; Garrido et al., 2014; Li, 2012). The ATE represents the average effect that would be observed if all subjects in the treated and the control groups received treatment, compared with if no subjects in both groups received treatment (Li, 2012). In contrast, the ATT is the average effect that would be observed if all subjects in the treated group received treatment compared with if none of the subjects in the treated group received treatment (Li, 2012). The ATT focuses explicitly on the effects on those for whom a program is intended (Caliendo et al., 2008).

The ATE is useful for answering policy questions related to universal programs, such as those where every unit in a population participates. However, it would be less useful when researchers and policymakers are interested in explicitly evaluating the impact of an intervention on those who receive the intervention but not on those among whom an intervention was never intended (Wang, Nianogo, & Arah, 2017). If the goal is to estimate the effect of a program for those who it is intended for, then there is little interest in subjects who the program is not intended for and it would be appropriate to estimate the ATT. However, there is no indication that SCP measures are programs that are intended for any specific group of schools that meet certain requirements (e.g., high levels of crime); individual schools have discretion on which measures to implement. As a result, it is likely that some schools for instance have security cameras but have little need for them (e.g., low level of problem outcomes in the school) while other schools that

lack security cameras have greater need for them but do not have the sufficient resources to implement them. It would therefore still be useful to understand the effects if these control schools did receive the treatment. Thus, the ATE is estimated in this study.

Treatment-effects estimators used to estimate causal effects from observational data include regression adjustment (RA), inverse-probability weighting (IPW), and inverse-probability weighting with regression adjustment (IPWRA). The RA estimator uses a model to predict the outcome. It uses a difference in the average predictions for the treated units and the average predictions for the untreated units to estimate the ATE (Drukker, 2014). In contrast, the IPW estimator uses a model to predict the treatment. It estimates the parameters of the treatment model and computes the estimated inverse probability weights. The estimated inverse-probability weights are then used to compute weighted averages of the observed outcomes for each treatment level (StataCorp, 2015a). The contrasts of these weighted averages provide the estimates of the ATEs. Inverse-probability weighting makes use of normalized weights and produces correct analytical standard errors. It is a more robust approach than a standard weighted least squares regression because it considers the variability introduced by the generated weights (Cerulli, 2015).

In contrast to the RA estimator which uses a model for the outcome and the IPW estimator which uses a model for the treatment, the inverse-probability weighted regression-adjustment (IPWRA) estimator uses a model to predict treatment status and a model to predict the outcomes to account for non-random treatment assignment. To estimate treatment effects, IPRWA first estimates parameters of the treatment model and computes inverse-probability weights. IPWRA uses inverse-probability weights when

performing regression adjustment (Drukker, 2014). This involves using the estimated weights to fit weighted regression models of the outcome for each level of the treatment and obtain predicted outcomes that are treatment specific for each observation. The weights do not affect the accuracy of the RA estimator if the treatment model is misspecified but the outcome model is correct. The weights are used to correct the RA estimator if the outcome model is misspecified but the treatment model is correct (Drukker, 2014). The double-robust property means that it allows for two opportunities for obtaining unbiased inference when adjusting for selection effects such as confounding by allowing for different forms of misspecification (Emsley et al., 2008). If either the propensity score model or the outcome regression models are correctly specified, the effect of the treatment on the outcome will be correctly estimated. In sum, using a doubly-robust estimator allows correct estimates to be obtained despite covariate imbalance after weighting.

This study uses the inverse-probability weighting (IPW) estimator rather than the regression adjustment estimator or the doubly-robust estimator for several reasons. First, the RA or IPWRA estimator commands would require the specification of a negative binomial outcome model to predict the outcomes (rather than the default linear model) because the dependent variables are over-dispersed count variables. However, this model is not supported with the RA or IPWRA commands (StataCorp, 2015a). Furthermore, the use of a Poisson model produces iterations that are "not concave," ultimately preventing the estimation of ATEs. The advantage of the IPW estimator is that it uses a model to predict the treatment rather than a model to predict the outcome. It estimates the probability of treatment without any assumptions about the functional form for the

outcome model (Drukker, 2014). The contrasts of the weighted averages of the observed outcomes for each treatment level provide the estimates of the ATEs (StataCorp, 2015a). In addition, a test for covariate balance after weighting indicated that there was no statistically significant imbalance in covariates for all treatments except for one. Balance of covariates indicates that the propensity score model has been correctly specified. Therefore, it was not necessary to use doubly-robust estimators.

Lastly, sampling weights should be incorporated in the final outcome analysis if the goal is to make inferences about the target population. When estimating the population average treatment effect, the weights to be incorporated are the product of the sampling weight and the propensity score weight (DuGoff et al., 2014). Likewise, Ridgeway et al. (2015) recommend that the final outcome model should use weights equal to the product of the propensity score weight and sampling weight and found this method to be the most robust strategy across a range of scenarios. The following provides an example of the syntax used to perform treatment effects estimation using the IPW, where *PWGT* is a product of the sampling weight and propensity score weight:

$$teffects\ ipw\ (outcome)\ (treatment\ covariate1\ covariate2\ \dots\ covariate\#)$$

$$[pweight = PWGT]$$

CHAPTER 4

RESULTS

4.1 DESCRIPTIVE STATISTICS

Sample descriptive statistics for the outcome variables are provided in Table 4.1. The most frequent crime type committed in schools was physical attacks not involving a weapon, with almost 14 incidents on average recorded by schools over the course of the 2009-10 academic year. The next most frequent crime types on average included threats of physical attacks not involving a weapon ($\overline{x}$ = 7.4), theft ($\overline{x}$ = 6.6), drug/alcohol-related ($\overline{x}$ = 5.8) and vandalism ($\overline{x}$ = 3.4). Weapon-related incidents were the most infrequent crimes occurring at schools. On average, there were fewer than two incidents of weapon possessions ($\overline{x}$ = 1.5) and less than one incident of violent crime involving a weapon ($\overline{x}$ = 0.5).

Table 4.1 Sample outcome variable descriptive statistics.

Variables	$\overline{x}$	SD	Range
Violent crimes with a weapon	0.5	3.6	0—100
Physical attacks–no weapon	13.6	30.2	0—962
Threats of physical attacks–no weapon	7.4	16.6	0—305
Theft	6.6	14.0	0—200
Vandalism	3.4	11.0	0—400
Weapon possession	1.5	3.8	0—152
Drug/alcohol	5.8	13.5	0—228

Sample descriptive statistics for the 20 SCP measures are provided in Table 2. SCP techniques that were present in most schools included limiting social networking

(94 percent), locked doors (91 percent), prohibiting phones (89 percent), security cameras (73 percent), closed lunch (72 percent), lockers (69 percent), security staff (63 percent), and dress code (62 percent). Techniques that were rarely implemented in schools included requiring students to pass through metal detectors (2 percent), drug testing for students not involved in athletics or extracurricular activities (5 percent), drug testing for students involved in extracurricular activities (7 percent), book bag bans (8 percent), metal detector checks (8 percent), and drug testing for athletes (10 percent). In sum, SCP measures were implemented to varying degrees in schools.

Table 4.2 Sample descriptive statistics for SCP measures. [a]

Variables	*f*	%
Locked doors	2,410	91
Locked gates	1,210	46
Metal detectors	60	2
Random metal detector checks	220	8
Closed lunch	1,900	72
Dog sniffs	1,040	39
Contraband sweeps	470	18
Drug testing – athletes	260	10
Drug testing – extracurricular	180	7
Drug testing – other	140	5
Uniforms	410	16
Dress code	1,650	62
Lockers	1,840	69
Book bag bans	200	8
Student badges	340	13
Threat reporting system	1,170	44
Security cameras	1,930	73
Limit social networking	2,500	94
Prohibit phones	2,350	89
Security staff	1,680	63

[a] Note: unweighted frequencies are rounded to the nearest 10 per IES restricted-use guidelines

Table 4.3 displays sample descriptive statistics for the covariates. The majority of schools had an enrollment of five hundred or more students. The majority of schools were either high schools (35.8 percent) or middle schools (34.3 percent). One-third of schools were located in a suburb (33.3 percent) while just over one-quarter were located in a city (26.6 percent) or rural area (25.4 percent). Nearly one-third of the schools consisted of a majority of white students (66.2 percent). Nearly half of students in the sample of schools were male (48.9 percent) and were eligible for free lunch (46.7 percent). On average, less than 10 percent of students were identified as having limited English proficiency. Nearly three-quarters of schools were in a low-crime area (74.7 percent) while only 6 percent were in a high crime area. On average, there were nearly 70 students that transferred into school after the start of the school year while slightly over 60 transferred out after the start of the school year.

The index of school disorder was .834, indicating that on average disciplinary problems occurred infrequently in the sample of schools. Schools experienced moderate levels of parent participation ($\overline{x}$ = 2.4) and community involvement ($\overline{x}$ = .536). On average, schools experienced moderate to high levels of commitment to academics with the majority of students believing that academic achievement was important ($\overline{x}$ = 71.2) and being likely to attend college ($\overline{x}$ = 61.9), while on average 13 percent of students were performing below the 15th percentile on standardized tests. On measures related to procedural fairness, slightly over half of the schools have a formal process to obtain parent input on school discipline policies ($\overline{x}$ = 56.3) or provide training or assistance to parents in dealing with problem behaviors ($\overline{x}$ = 53.5). In contrast, less than one-fifth of schools had a program that involves parents at school helping to maintain discipline ($\overline{x}$ =

19.5). On average, schools had moderate to high levels of teacher training ($\overline{x}$ = .650) and violence prevention programming ($\overline{x}$ = .807).

Table 4.3 Sample descriptive statistics for covariates. [a]

Variables	$\overline{x}$/%	*f*	SD	Range
Enrollment size				
< 300	11.5	300		
300 – 499	19.9	530		
500 – 999	38.1	1,010		
1,000 +	30.6	810		
Grade levels				
Primary	25.8	680		
Middle	34.3	910		
High	35.8	950		
Combined	4.0	110		
Locale				
City	26.6	700		
Suburb	33.3	880		
Town	14.8	390		
Rural	25.4	670		
Percent white (>50%)	66.2	1,750		
Percent free lunch	46.7		26.9	0—100
Percent LEP	9.1		15.3	0—100
Percent male	48.9		10.6	0—100
Crime where school located				
Low	74.7	1,980		
Medium	19.4	510		
High	6.0	160		
Transfers in	69.7		141.5	0—3232
Transfers out	62.8		82.6	0—1300
School disorder	.834		.475	0—3.667
Parent participation	2.4		.772	.25—4
Community involvement	.536		.279	0—1
Percent below 15th	12.5		13.4	0—100
Percent college	61.9		24.5	0—100
Percent academic	71.8		21.5	0—100
Parent input	56.3	1,490		
Parent training	53.5	1,420		

Parent involvement	19.5	520		
Teacher training	.650		.353	0—1
Programming	.807		.205	0—1

[a] Note: unweighted frequencies are rounded to the nearest 10 per IES restricted-use guidelines

4.2 Distributions of Propensity Scores

Once a propensity score had been calculated for each school, the assumption of common support was first subjectively assessed by examining the overlap in the range of propensity scores across treatment and comparison groups for each of the SCP measures. The overlap of the distribution of propensity scores across treatment and comparison groups for each SCP measure is displayed in Figures 4.1 to 4.20. In general, there were higher densities of treatment schools that had high propensity scores compared to comparison schools with high propensity scores. Conversely, comparison schools typically had lower propensity scores. The distributions indicate that the extent of the overlaps appear to be satisfactory for most SCP measures. Although common support appears to be violated for a several measures, when average treatment effects were eventually estimated for all SCP measures, the common support violation was found to be violated for only two treatments, *metal detectors*, and *drug testing (extracurricular)*. It was not possible to estimate average treatment effects because for each of these measures there were several schools receiving the treatment that were found to have propensity scores of less than 1.00e-5. Therefore, these measures were excluded from further analysis.

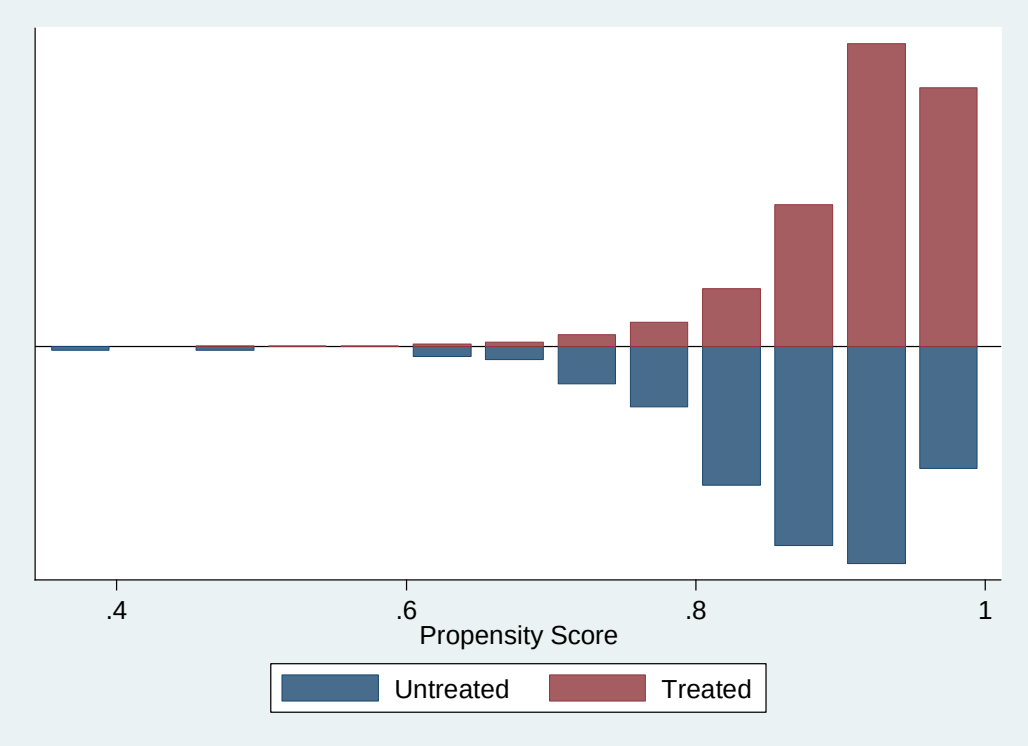

Figure 4.1 Distribution of propensity scores for locked doors.

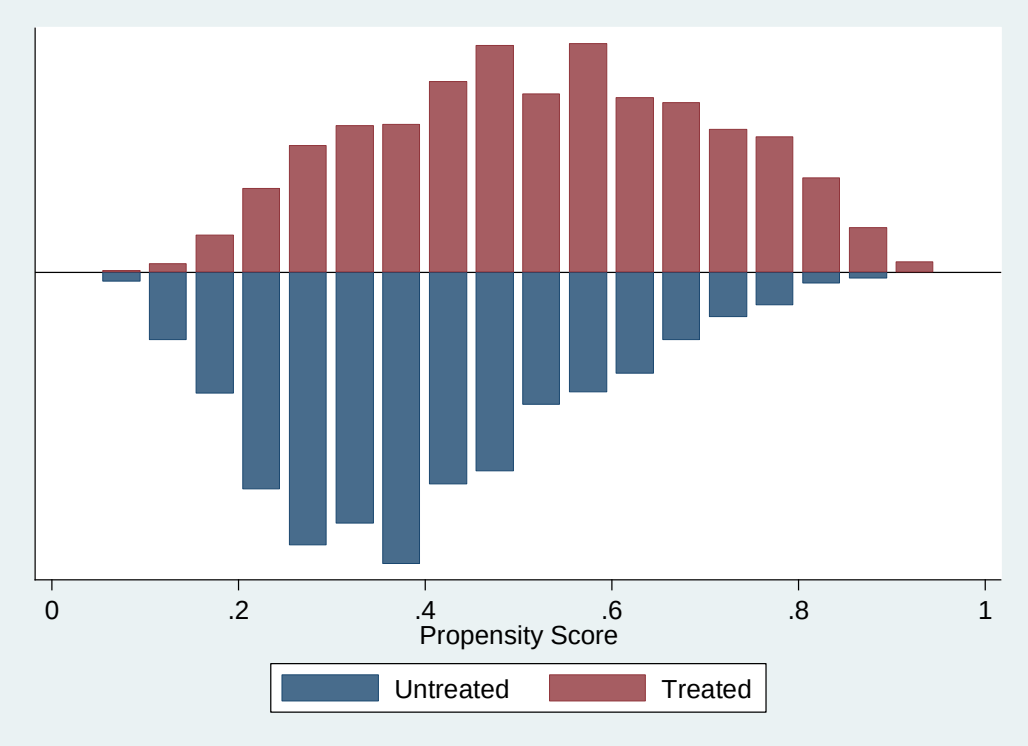

Figure 4.2 Distribution of propensity scores for locked gates.

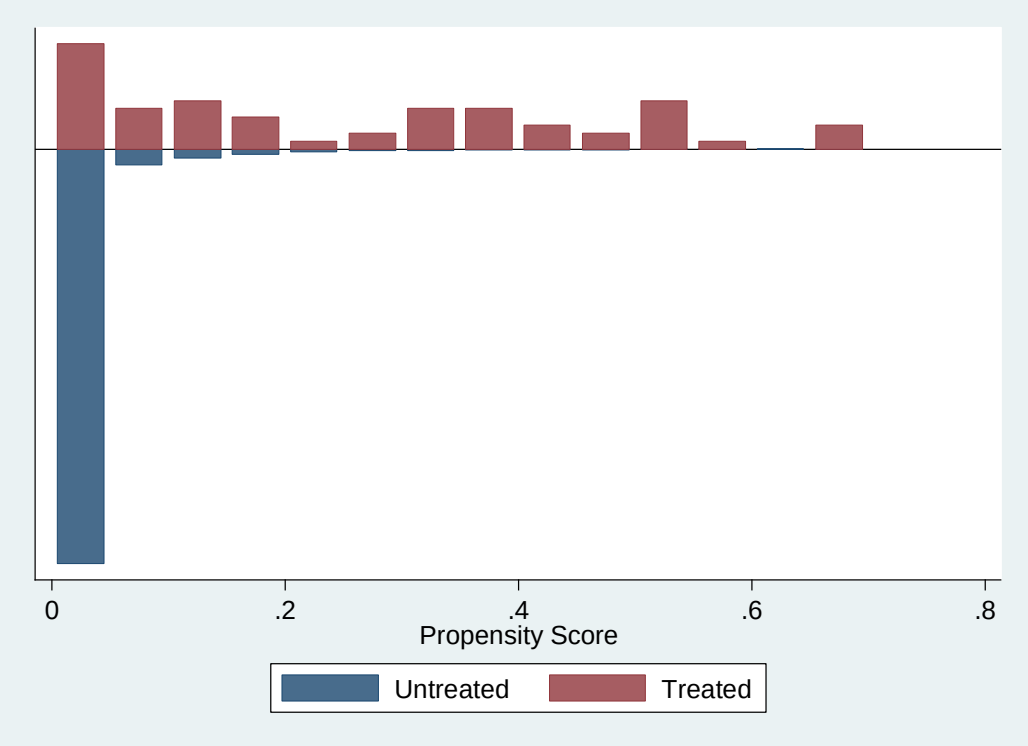

Figure 4.3 Distribution of propensity scores for metal detectors.

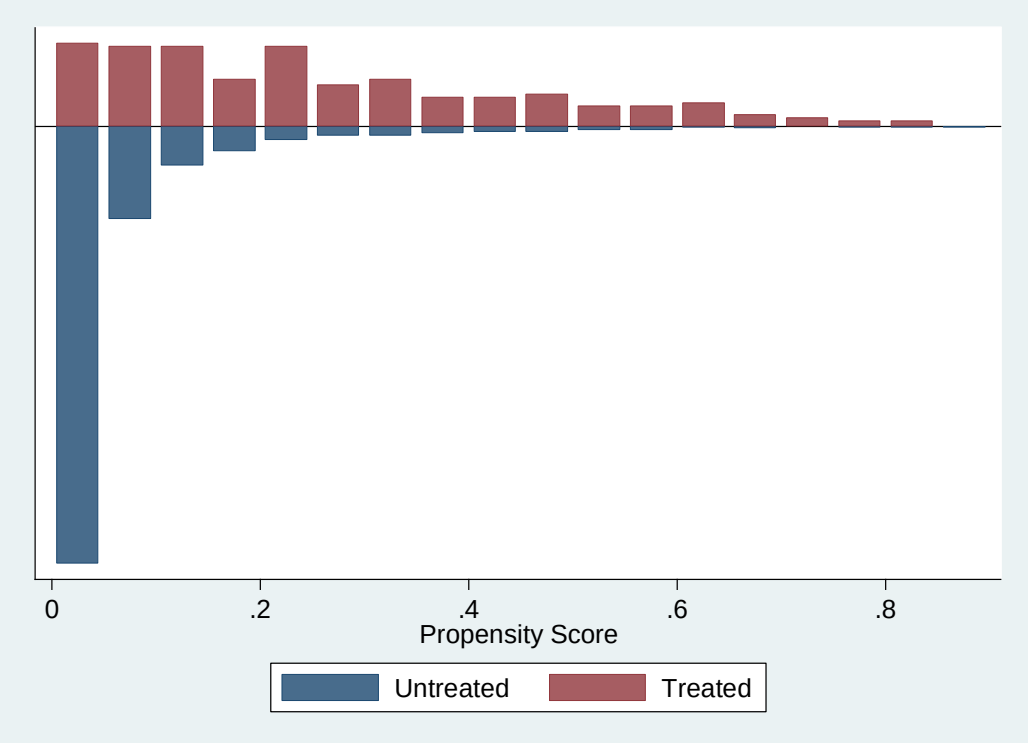

Figure 4.4 Distribution of propensity scores for random metal detector checks.

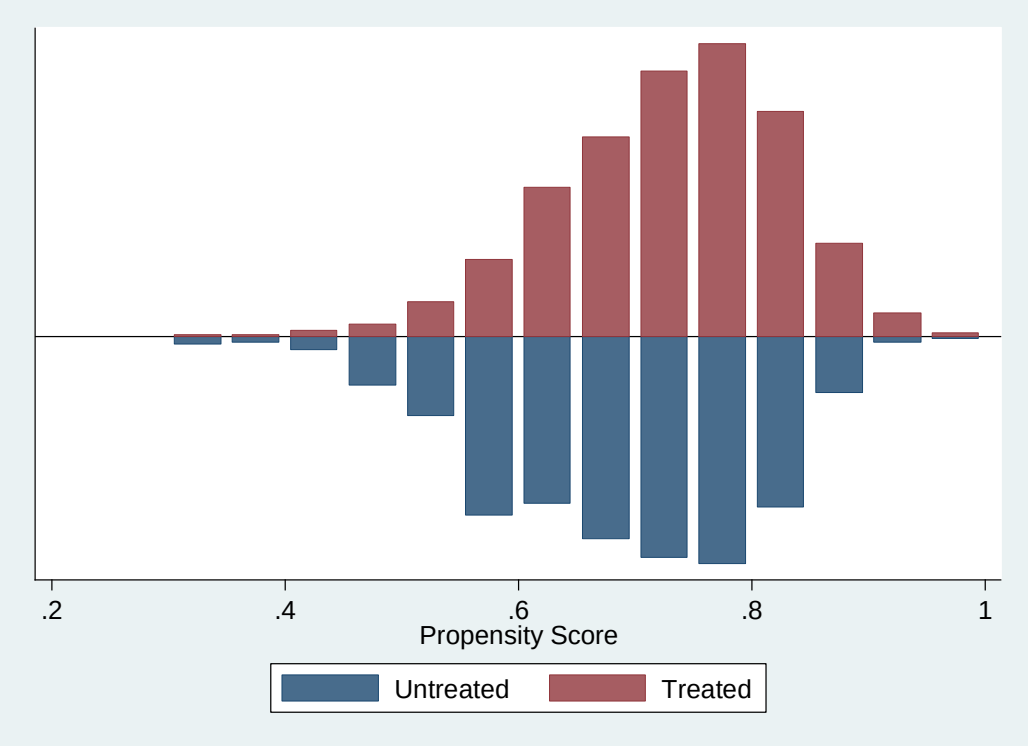

Figure 4.5 Distribution of propensity scores for closed lunch.

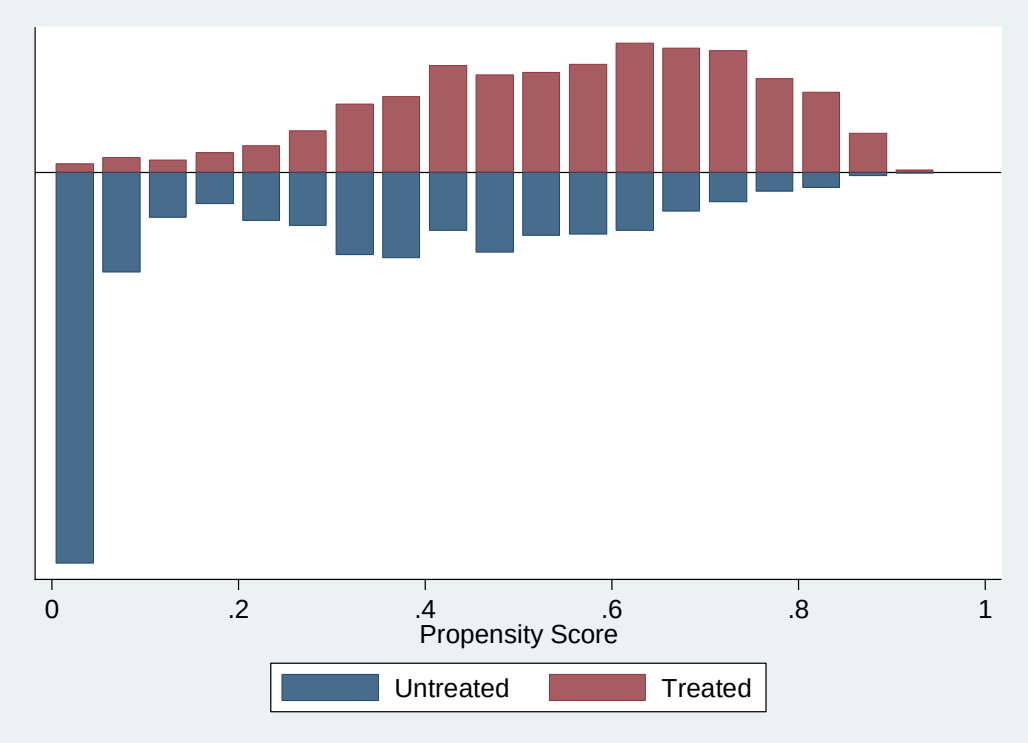

Figure 4.6 Distribution of propensity scores for dog sniffs.

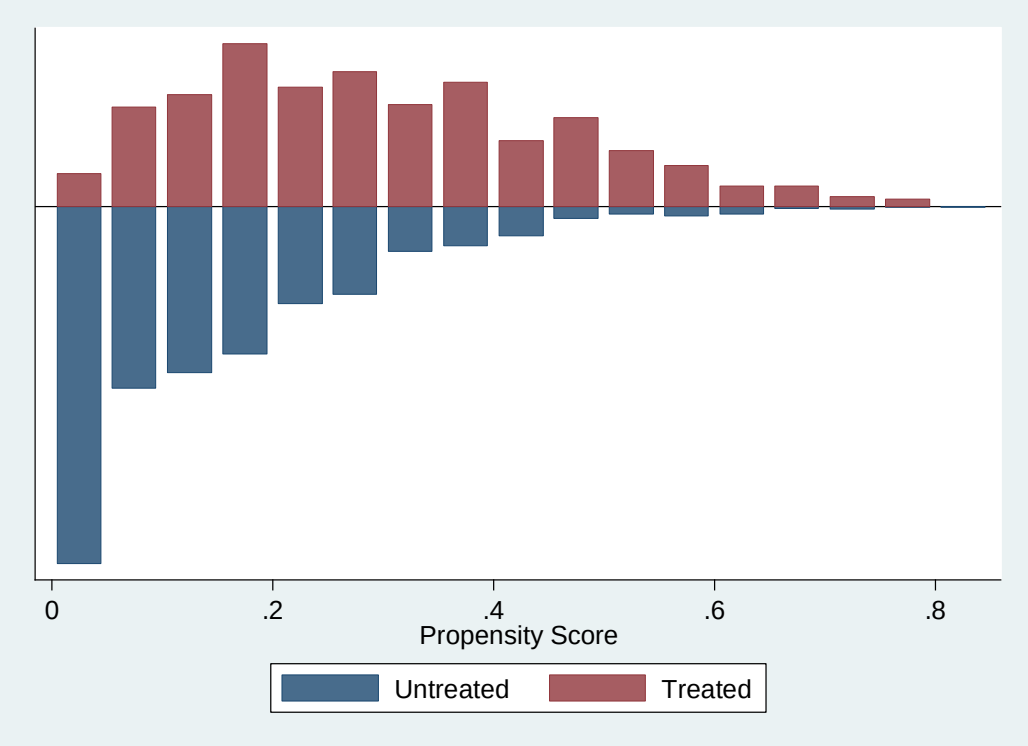

Figure 4.7 Distribution of propensity scores for contraband sweeps.

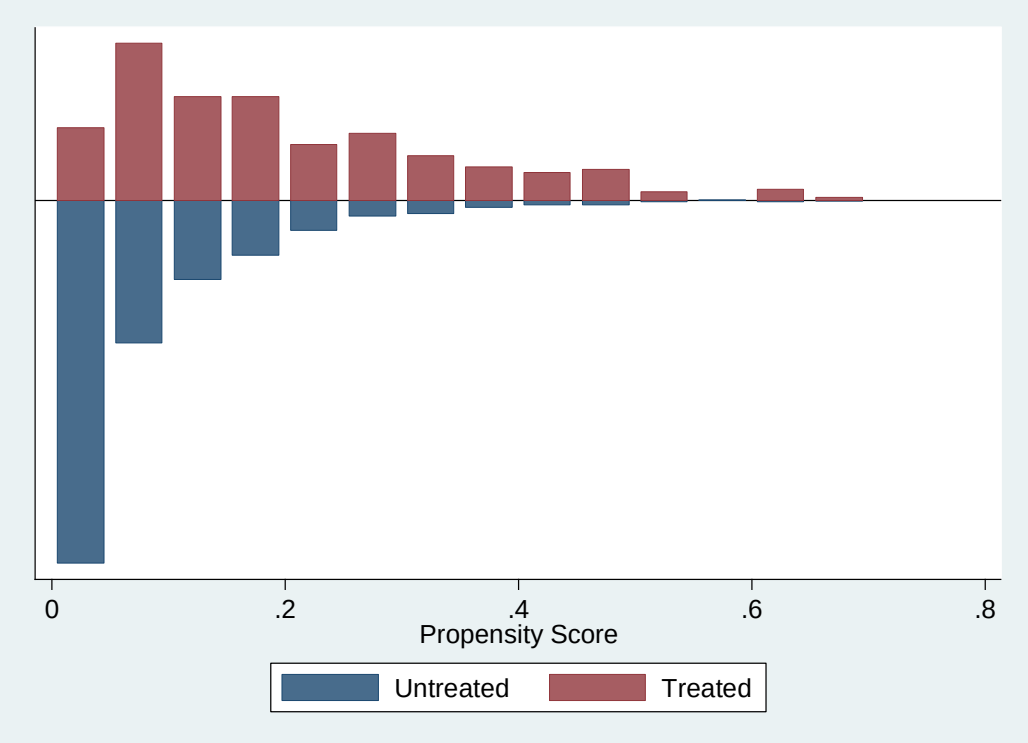

Figure 4.8 Distribution of propensity scores for drug testing (athletes).

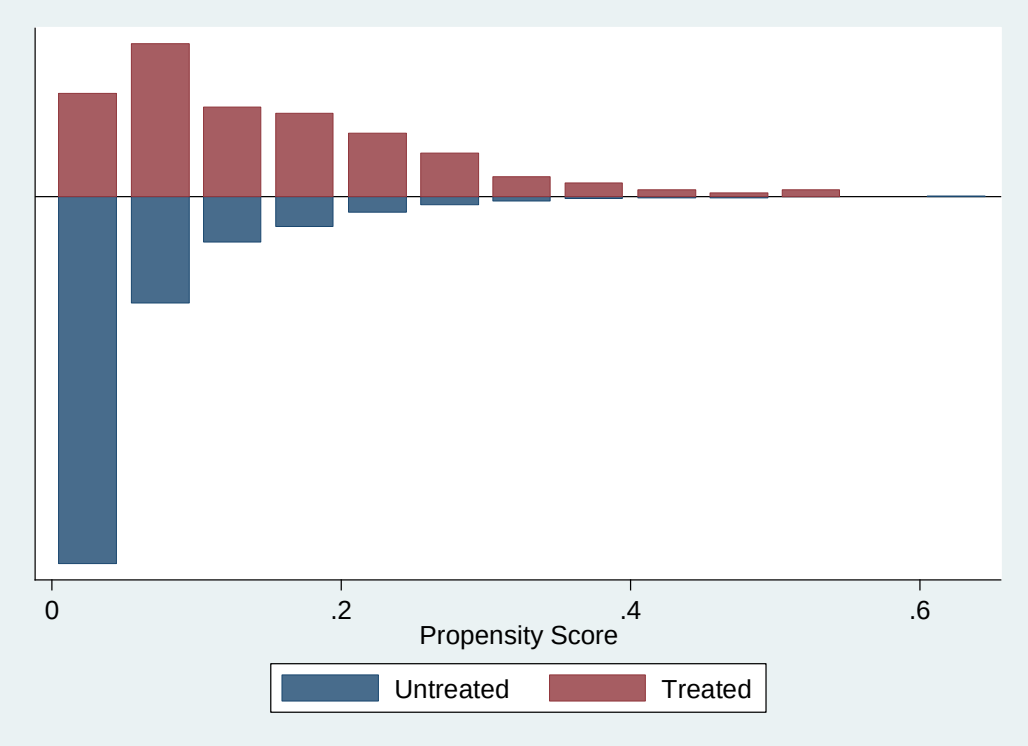

Figure 4.9 Distribution of propensity scores for drug testing (extracurricular).

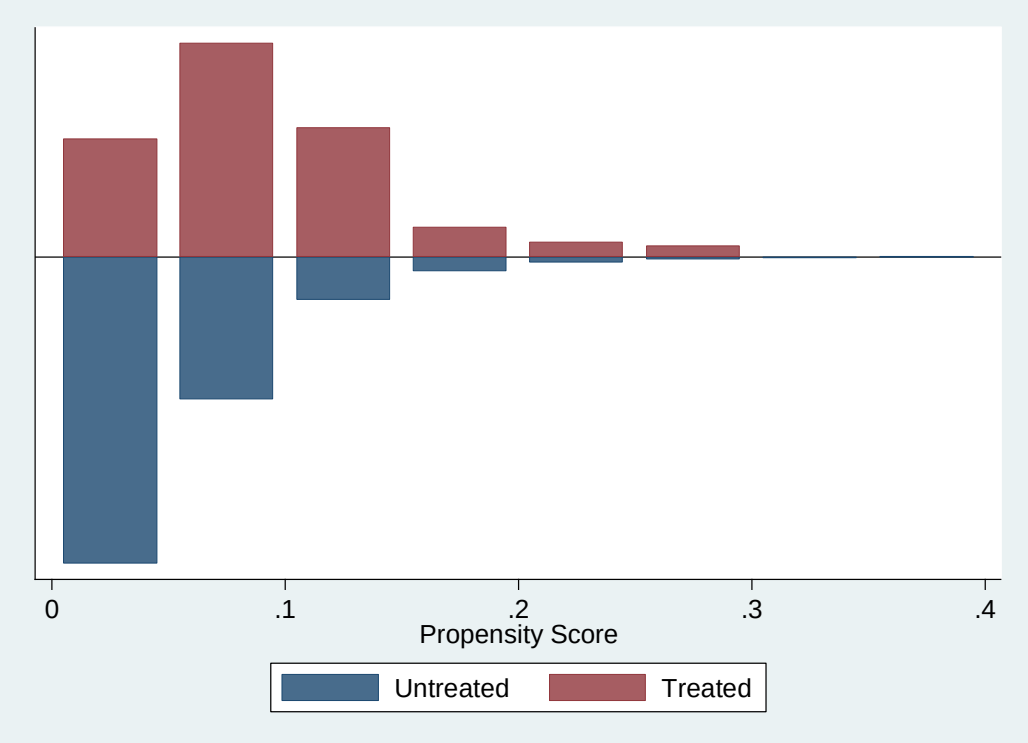

Figure 4.10 Distribution of propensity scores for drug testing (other students)

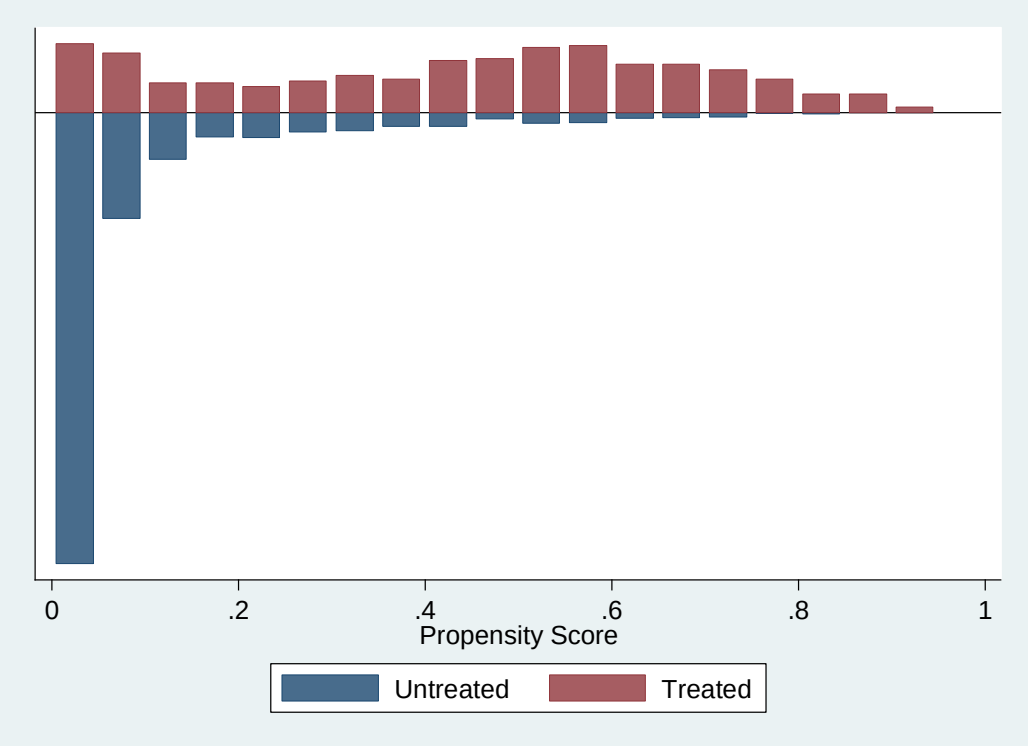

Figure 4.11 Distribution of propensity scores for uniforms.

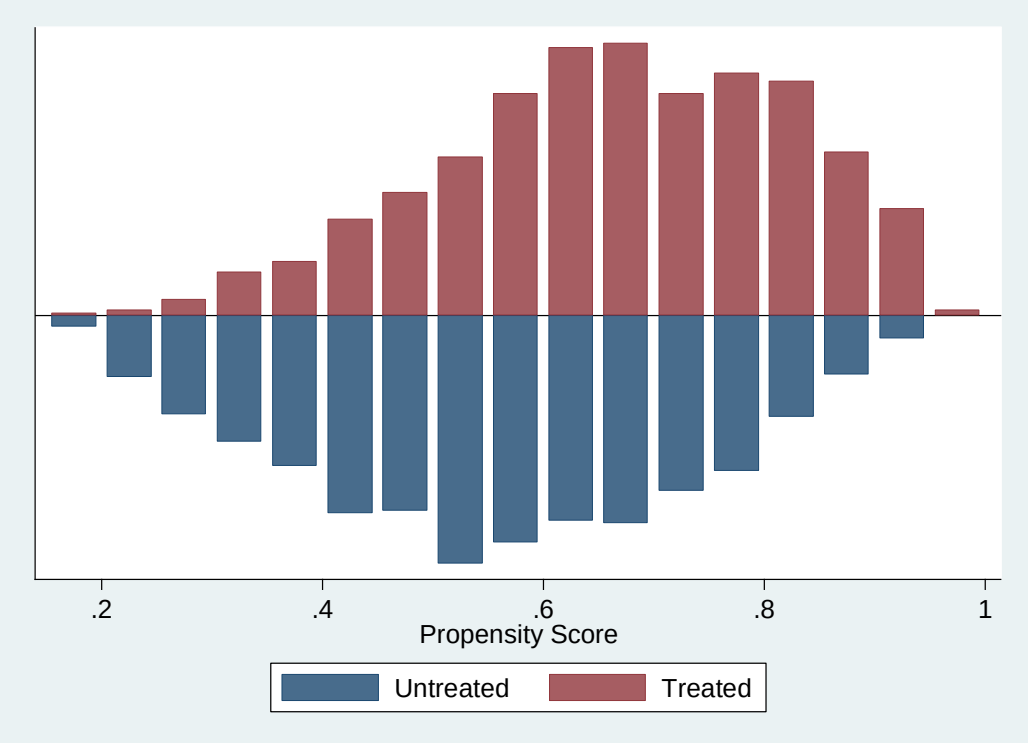

Figure 4.12 Distribution of propensity scores for dress code.

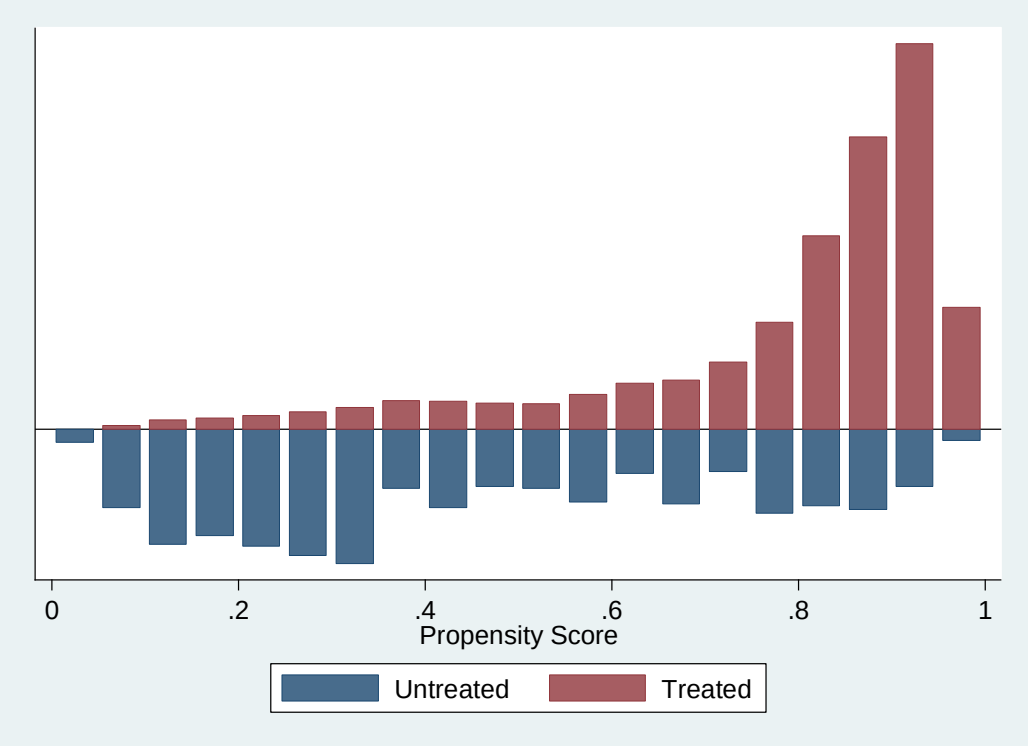

Figure 4.13 Distribution of propensity scores for lockers.

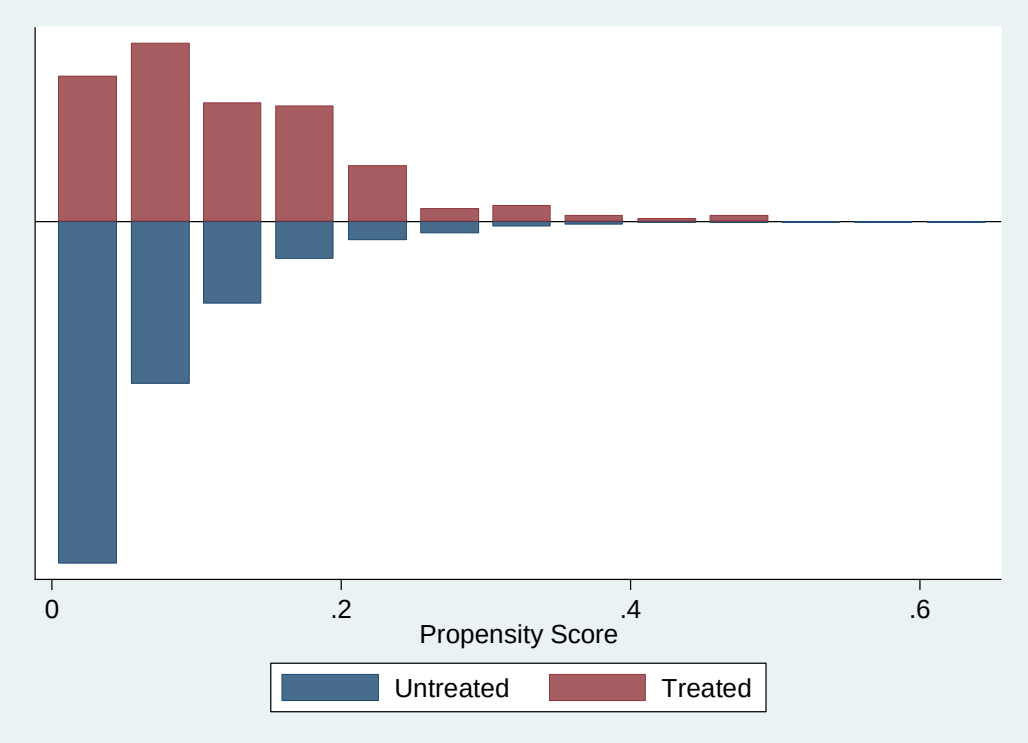

Figure 4.14 Distribution of propensity scores for book bag bans.

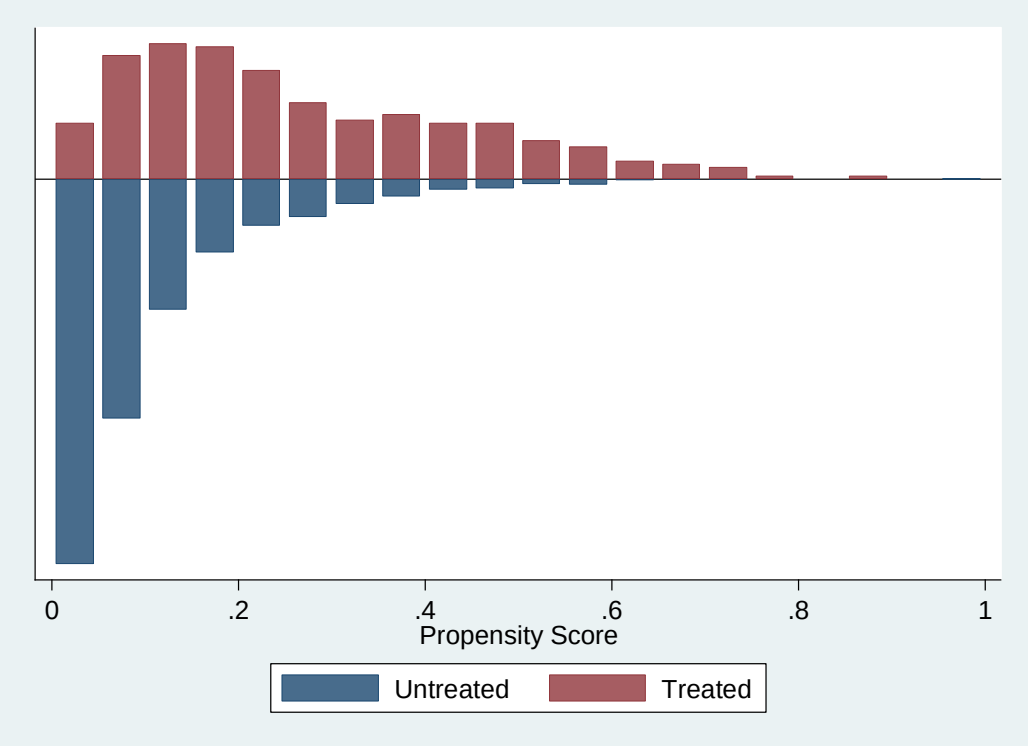

Figure 4.15 Distribution of propensity scores for student badges.

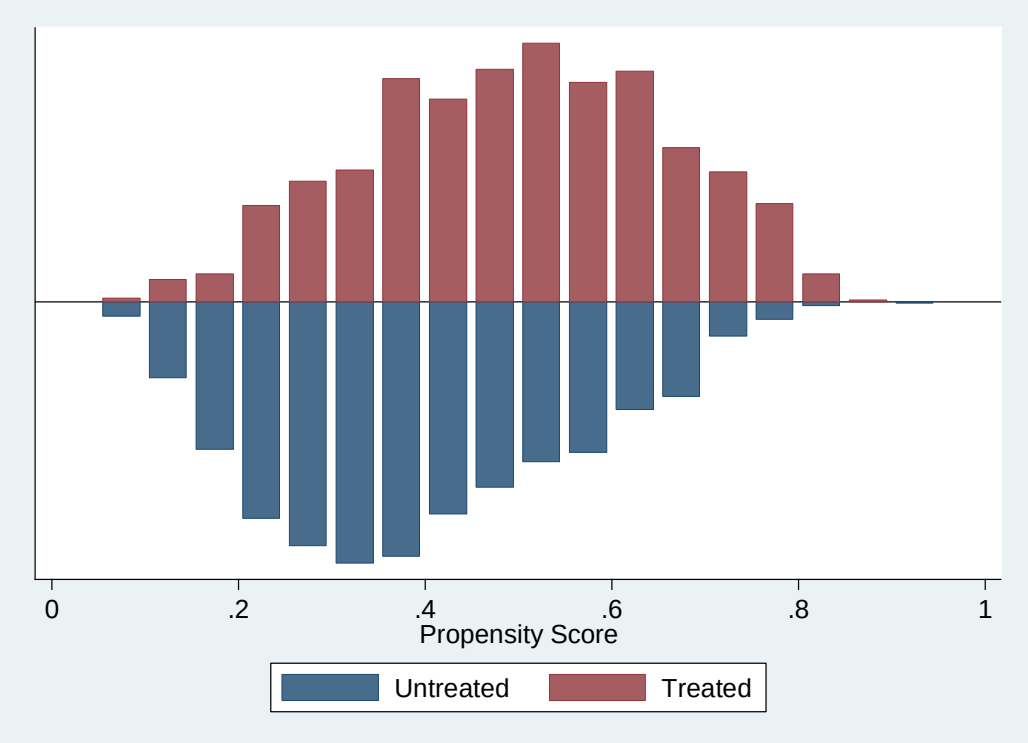

Figure 4.16 Distribution of propensity scores for threat reporting system.

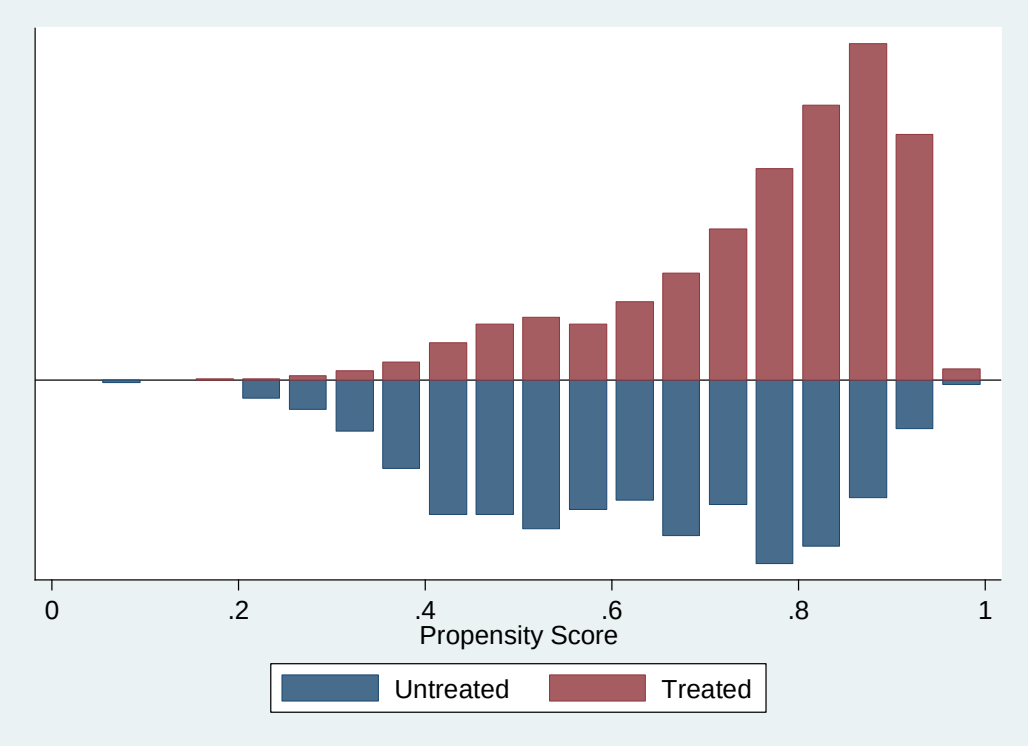

Figure 4.17 Distribution of propensity scores for security cameras.

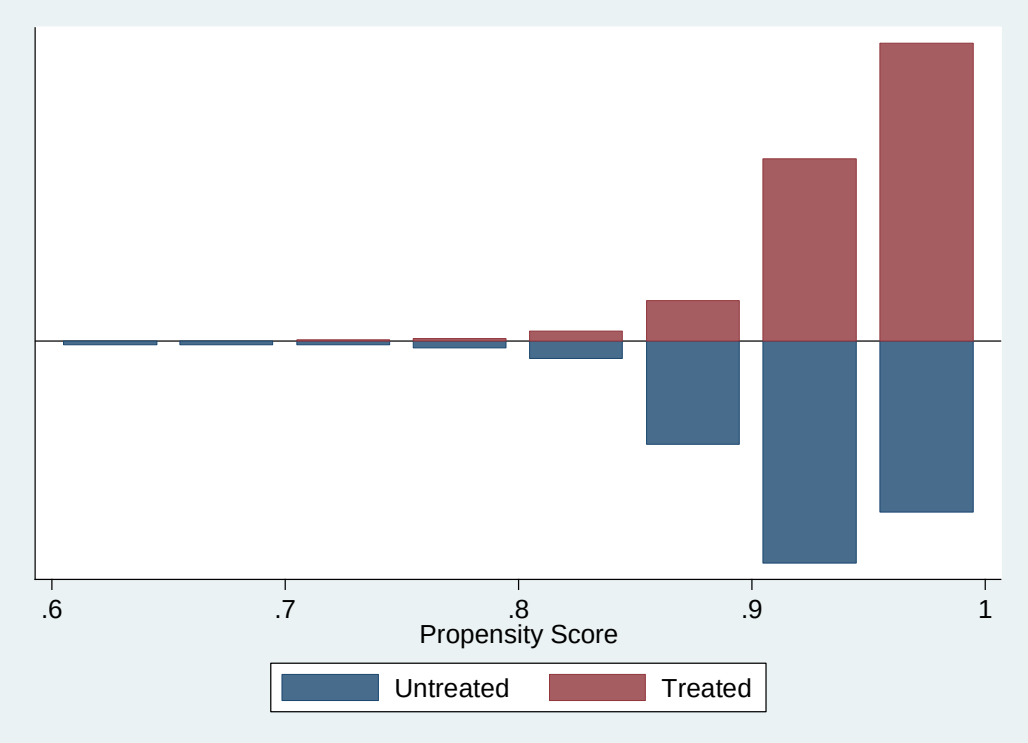

Figure 4.18 Distribution of propensity scores for limit access to social networking.

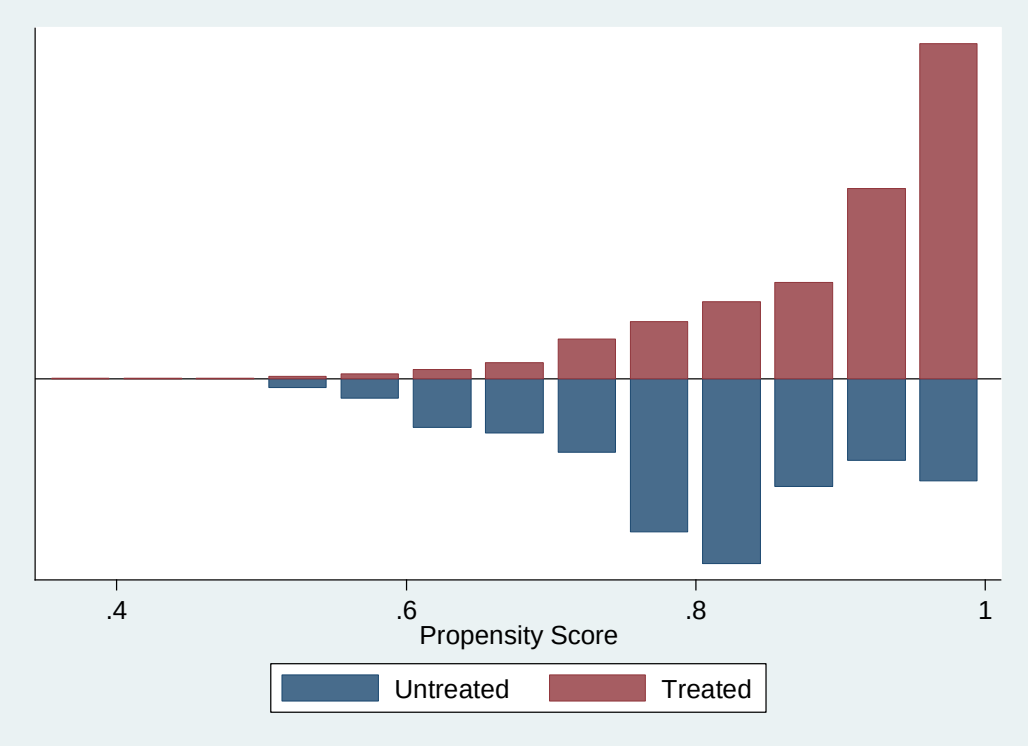

Figure 4.19 Distribution of propensity scores for prohibit phones.

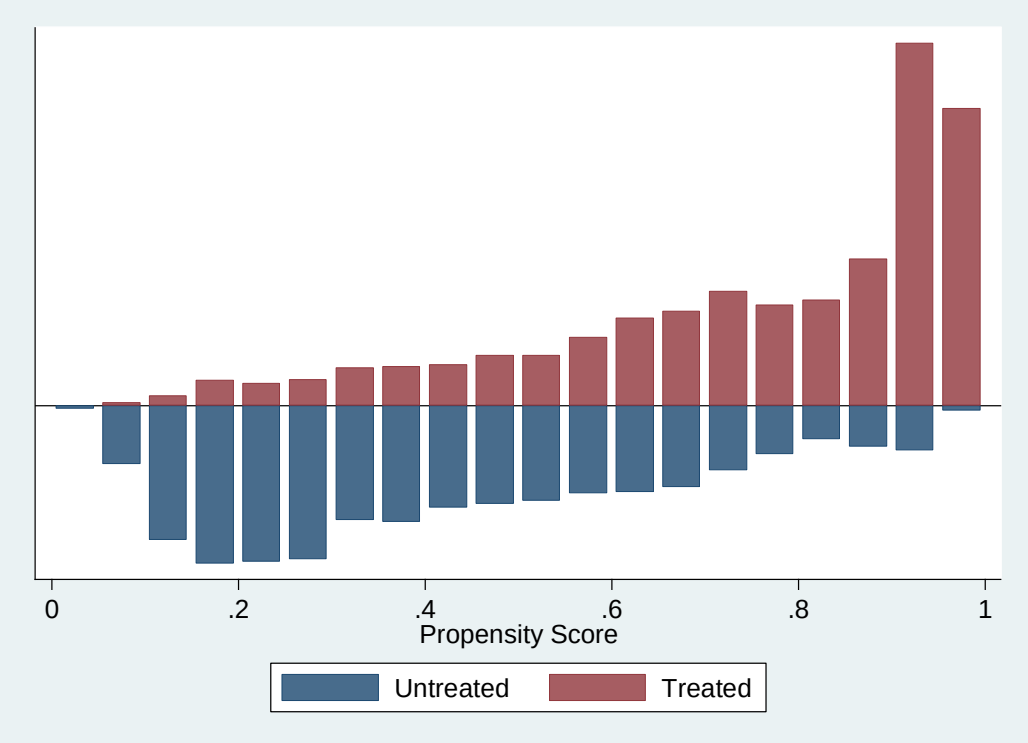

Figure 4.20 Distribution of propensity scores for security staff.

4.3 Covariate Balance Analysis

The initial balance diagnostics performed for each treatment variable identified the inferior bound of the block of the propensity score and the number of treatment schools and the number of comparison schools in each of the blocks of the propensity score following the achievement of balance within smaller blocks of the propensity scores. For each treatment variable, the optimal number of blocks was identified. In each block, two-sample t tests with equal variances were performed to determine whether the mean propensity score was equivalent in the treatment and comparison groups within each of the blocks. When the mean propensity score was reported to be significantly different for treated and comparison schools within a block, that block was split into smaller blocks and balance was re-evaluated. For some treatments, one split was sufficient to balance the propensity score within each block. However, for a number of treatments, it was necessary to split particular blocks multiple times before the propensity score was balanced in each block.

After the balance of propensity scores across treatment and comparison groups was achieved, two sample t tests with equal variances were also performed to test the balancing property for each covariate across treatment and comparison groups within each block of the propensity score. For a large majority of the treatments, the initial specification of variables included in the propensity score model was not balanced (i.e., balancing property was not satisfied). This meant that at one or more of the covariates was imbalanced within a particular block of the propensity score. This indicates that the propensity score model is misspecified prior to weighting (i.e., it does not balance the covariates).

Several procedures were used to analyze covariate balance after weighting. These include a diagnostic and a statistical test (StataCorp, 2015a). Tables 4.4 to 4.21 displays for each treatment the model-adjusted difference in means and ratio of variances between the treated and untreated before and after weighting for each covariate. Standardized differences close to zero and variance ratios close to one indicate good covariate balance (StataCorp, 2015a). However, when these statistics suggested that there were covariates that remained imbalanced after weighting for any treatment, balance was then checked objectively using a statistical test known as the overidentification test (StataCorp, 2015a). For nearly all treatments, the overidentification test indicated that the null hypothesis that the covariates are balanced could not be rejected ($p > .05$). This means that all 29 covariates are balanced after propensity-score weighting. Therefore, it was not necessary to re-specify the propensity score models for these treatments prior to weighting. However, for one treatment, lockers, the overidentification test indicated that the null hypothesis of covariate balance is rejected ($p < .05$) indicating that statistically significant imbalance remained in the covariates. This treatment could be re-specified by re-categorizing and/or dropping variables in the initial propensity score model so that balance could be achieved after weighting. However, once ATEs were eventually estimated for all treatments, this treatment exhibited no statistically significant effects for any outcomes and therefore the propensity score model was not re-specified. Lastly, the overidentification statistic could not be computed for one of the treatments, limit social networking. It was found that a discontinuous region with missing values was encountered, and therefore numerical derivatives could not be computed.

Table 4.4 Covariate balance summary, locked doors.

	Standardized differences		Variance ratios	
Covariate	*Original Sample*	*Weighted Sample*	*Original Sample*	*Weighted Sample*
Size (300-499)	0.11	0.02	1.20	1.03
Size (500-999)	0.20	0.32	1.14	1.23
Size (1,000+)	-0.23	-0.19	0.86	0.88
Grade (Middle)	0.32	0.36	1.36	1.41
Grade (High)	-0.39	-0.36	0.90	0.91
Grade (Combined)	-0.20	-0.22	0.45	0.44
Locale (Suburb)	0.08	0.16	1.06	1.13
Locale (Town)	-0.10	-0.16	0.83	0.74
Locale (Rural)	0.01	-0.05	1.00	0.95
Percent white	-0.02	-0.14	1.01	1.10
Percent free lunch	0.05	0.07	1.08	1.12
Percent LEP	-0.10	-0.06	0.78	0.80
Percent male	0.03	0.08	1.07	0.94
Crime location (Moderate)	0.00	0.01	1.00	1.01
Crime location (High)	-0.03	0.03	0.88	1.12
Transfers in	-0.12	-0.14	0.33	0.20
Transfers out	-0.14	-0.09	0.79	0.82
School disorder	-0.12	0.07	1.11	1.32
Parent participation	0.30	0.38	0.99	0.98
Community involvement	0.19	0.22	1.00	1.02
Percent below 15th	-0.01	0.12	1.10	1.61
Percent college	0.11	0.12	0.91	0.91
Percent academic	0.09	0.19	0.92	0.83
Parent input	0.20	0.24	0.98	0.98
Parent training	0.24	0.30	1.01	1.02
Parent involvement	0.13	0.16	1.24	1.33
Teacher training	0.23	0.37	0.85	0.80
Programming	0.31	0.35	0.64	0.63
		χ^2 (29) = 23.717, p > 0.05		

Table 4.5 Covariate balance summary, locked gates.

	Standardized differences		Variance ratios	
Covariate	*Original Sample*	*Weighted Sample*	*Original Sample*	*Weighted Sample*
Size (300-499)	-0.08	-0.08	0.89	0.89
Size (500-999)	-0.05	-0.07	0.98	0.96
Size (1,000+)	0.21	0.23	1.20	1.21
Grade (Middle)	-0.09	-0.10	0.94	0.93
Grade (High)	0.02	0.04	1.01	1.02
Grade (Combined)	-0.13	-0.14	0.52	0.49
Locale (Suburb)	0.03	0.03	1.02	1.02
Locale (Town)	-0.13	-0.14	0.76	0.75
Locale (Rural)	-0.27	-0.26	0.73	0.73
Percent white	-0.55	-0.55	1.45	1.44
Percent free lunch	0.44	0.43	1.24	1.25
Percent LEP	0.41	0.40	2.38	2.36
Percent male	-0.04	-0.03	1.23	1.22
Crime location (Moderate)	0.23	0.22	1.42	1.40
Crime location (High)	0.22	0.22	2.37	2.36
Transfers in	0.16	0.18	0.63	0.82
Transfers out	0.29	0.28	2.32	2.21
School disorder	0.04	0.02	1.15	1.13
Parent participation	0.05	0.06	1.10	1.10
Community involvement	0.17	0.18	1.13	1.14
Percent below 15th	0.22	0.22	1.67	1.66
Percent college	-0.15	-0.14	1.15	1.15
Percent academic	-0.07	-0.06	1.05	1.05
Parent input	0.32	0.32	0.91	0.91
Parent training	0.26	0.26	0.96	0.96
Parent involvement	0.36	0.34	1.74	1.71
Teacher training	0.31	0.32	0.88	0.88
Programming	0.30	0.28	0.75	0.77
	$\chi^2(29) = 18.911, p > 0.05$			

Table 4.6 Covariate balance summary, random metal detector checks.

	Standardized differences		Variance ratios	
Covariate	*Original Sample*	*Weighted Sample*	*Original Sample*	*Weighted Sample*
Size (300-499)	-0.19	-0.05	0.71	0.90
Size (500-999)	-0.11	-0.25	0.94	0.83
Size (1,000+)	0.39	-0.05	1.22	0.98
Grade (Middle)	0.13	-0.07	1.08	0.97
Grade (High)	0.29	0.24	1.11	1.05
Grade (Combined)	0.03	0.21	1.14	2.23
Locale (Suburb)	-0.28	-0.21	0.76	0.78
Locale (Town)	-0.17	0.17	0.67	1.38
Locale (Rural)	-0.35	-0.32	0.57	0.58
Percent white	-1.00	-0.93	0.90	0.78
Percent free lunch	0.87	0.52	0.83	0.81
Percent LEP	0.07	0.05	0.90	0.96
Percent male	0.00	0.43	0.86	0.59
Crime location (Moderate)	0.34	0.22	1.49	1.27
Crime location (High)	0.40	0.53	3.07	4.32
Transfers in	0.24	0.03	3.22	1.33
Transfers out	0.46	0.06	2.03	1.11
School disorder	0.44	-0.04	1.21	0.78
Parent participation	-0.48	-0.09	0.78	1.02
Community involvement	0.35	0.33	1.02	0.90
Percent below 15th	0.58	0.39	2.75	1.95
Percent college	-0.45	-0.62	1.09	1.46
Percent academic	-0.35	-0.33	1.36	1.45
Parent input	0.29	0.47	0.87	0.80
Parent training	0.14	-0.13	0.97	1.04
Parent involvement	0.32	0.41	1.45	1.59
Teacher training	0.45	0.29	0.71	0.79
Programming	0.27	0.26	0.64	0.67
		χ^2 (29) = 16.702, p > 0.05		

Table 4.7 Covariate balance summary, closed lunch.

	Standardized differences		Variance ratios	
Covariate	*Original Sample*	*Weighted Sample*	*Original Sample*	*Weighted Sample*
Size (300-499)	-0.09	-0.11	0.87	0.85
Size (500-999)	0.02	0.01	1.01	1.00
Size (1,000+)	0.10	0.15	1.10	1.14
Grade (Middle)	0.24	0.23	1.21	1.20
Grade (High)	0.04	0.07	1.03	1.05
Grade (Combined)	-0.04	-0.04	0.85	0.82
Locale (Suburb)	-0.02	0.00	0.99	1.00
Locale (Town)	-0.04	-0.01	0.93	0.97
Locale (Rural)	0.04	0.02	1.05	1.02
Percent white	-0.07	-0.08	1.05	1.06
Percent free lunch	0.03	0.03	0.92	0.92
Percent LEP	0.11	0.12	1.23	1.22
Percent male	-0.01	-0.02	1.01	1.05
Crime location (Moderate)	0.04	0.05	1.06	1.07
Crime location (High)	0.05	0.04	1.22	1.15
Transfers in	0.10	0.15	1.93	4.56
Transfers out	0.11	0.17	0.94	1.19
School disorder	0.26	0.29	1.11	1.13
Parent participation	-0.09	-0.09	0.80	0.80
Community involvement	0.09	0.11	0.87	0.87
Percent below 15th	0.09	0.10	1.22	1.23
Percent college	-0.09	-0.09	0.97	0.96
Percent academic	-0.10	-0.10	0.96	0.96
Parent input	0.11	0.12	0.98	0.98
Parent training	0.04	0.04	0.99	0.99
Parent involvement	0.05	0.07	1.08	1.11
Teacher training	0.04	0.05	1.01	1.01
Programming	0.12	0.14	0.76	0.74
	$\chi^2(29) = 16.379$, $p > 0.05$			

Table 4.8 Covariate balance summary, dog sniffs.

	Standardized differences		Variance ratios	
Covariate	*Original Sample*	*Weighted Sample*	*Original Sample*	*Weighted Sample*
Size (300-499)	-0.24	-0.13	0.68	0.80
Size (500-999)	-0.06	-0.11	0.97	0.94
Size (1,000+)	0.33	0.33	1.30	1.25
Grade (Middle)	0.12	0.01	1.08	1.01
Grade (High)	0.68	0.64	1.38	1.29
Grade (Combined)	0.08	0.07	1.43	1.34
Locale (Suburb)	-0.16	-0.07	0.89	0.95
Locale (Town)	0.25	0.29	1.63	1.75
Locale (Rural)	0.26	0.08	1.33	1.10
Percent white	0.25	0.14	0.83	0.90
Percent free lunch	-0.15	0.02	0.68	0.75
Percent LEP	-0.30	0.03	0.43	1.06
Percent male	-0.08	-0.04	0.93	0.81
Crime location (Moderate)	-0.13	-0.14	0.81	0.79
Crime location (High)	-0.11	0.06	0.65	1.25
Transfers in	0.04	0.12	0.72	1.20
Transfers out	0.18	0.29	1.01	1.48
School disorder	0.32	0.10	0.76	0.60
Parent participation	-0.53	-0.44	0.82	0.83
Community involvement	0.41	0.24	0.91	0.93
Percent below 15th	-0.02	-0.07	0.87	0.73
Percent college	-0.08	-0.14	0.82	0.87
Percent academic	-0.19	-0.23	0.97	1.04
Parent input	0.07	0.18	0.98	0.95
Parent training	-0.11	-0.15	1.01	1.02
Parent involvement	-0.10	-0.12	0.86	0.83
Teacher training	0.14	0.35	1.03	0.90
Programming	-0.08	-0.19	1.11	1.28
	$\chi^2(29) = 24.260$, $p > 0.05$			

Table 4.9 Covariate balance summary, contraband sweeps.

	Standardized differences		Variance ratios	
Covariate	*Original Sample*	*Weighted Sample*	*Original Sample*	*Weighted Sample*
Size (300-499)	-0.17	-0.18	0.74	0.73
Size (500-999)	-0.13	-0.04	0.93	0.98
Size (1,000+)	0.20	0.12	1.15	1.08
Grade (Middle)	0.08	0.03	1.05	1.02
Grade (High)	0.42	0.35	1.14	1.09
Grade (Combined)	0.07	0.09	1.39	1.49
Locale (Suburb)	-0.25	-0.03	0.79	0.98
Locale (Town)	0.02	-0.05	1.05	0.91
Locale (Rural)	0.10	0.02	1.11	1.02
Percent white	-0.31	-0.15	1.16	1.07
Percent free lunch	0.37	0.31	0.98	1.03
Percent LEP	0.03	0.06	1.04	1.27
Percent male	-0.08	0.00	1.24	1.03
Crime location (Moderate)	0.15	0.11	1.24	1.16
Crime location (High)	0.16	0.20	1.71	2.00
Transfers in	0.09	0.05	1.80	2.30
Transfers out	0.19	0.06	1.30	0.88
School disorder	0.32	0.02	0.97	0.71
Parent participation	-0.30	-0.09	0.96	0.97
Community involvement	0.48	0.44	0.93	0.95
Percent below 15th	0.32	0.38	1.86	2.41
Percent college	-0.24	-0.17	1.02	1.07
Percent academic	-0.30	-0.18	1.13	1.06
Parent input	0.23	0.17	0.91	0.93
Parent training	0.15	0.11	0.97	0.98
Parent involvement	0.21	0.23	1.33	1.36
Teacher training	0.41	0.53	0.83	0.75
Programming	0.19	0.30	0.85	0.72
		χ^2 (29) = 20.08, p > 0.05		

Table 4.10 Covariate balance summary, drug testing athletes.

	Standardized differences		Variance ratios	
Covariate	*Original Sample*	*Weighted Sample*	*Original Sample*	*Weighted Sample*
Size (300-499)	-0.11	0.01	0.83	1.01
Size (500-999)	-0.20	-0.01	0.88	0.99
Size (1,000+)	0.27	0.10	1.18	1.06
Grade (Middle)	-0.24	-0.34	0.81	0.76
Grade (High)	0.69	0.47	1.03	0.98
Grade (Combined)	0.15	0.20	1.82	2.18
Locale (Suburb)	-0.27	-0.05	0.77	0.95
Locale (Town)	0.21	-0.04	1.44	0.94
Locale (Rural)	0.31	0.25	1.30	1.22
Percent white	0.12	0.07	0.91	0.95
Percent free lunch	0.03	-0.11	0.73	0.81
Percent LEP	-0.32	-0.33	0.43	0.43
Percent male	-0.14	-0.19	1.29	1.54
Crime location (Moderate)	-0.13	-0.05	0.79	0.92
Crime location (High)	-0.17	-0.16	0.45	0.48
Transfers in	0.06	-0.01	0.32	0.35
Transfers out	0.26	0.06	1.19	0.59
School disorder	0.18	-0.02	0.80	0.73
Parent participation	-0.42	-0.10	0.89	0.92
Community involvement	0.32	0.25	1.08	1.11
Percent below 15th	-0.10	-0.22	0.81	0.58
Percent college	-0.16	-0.06	0.80	0.85
Percent academic	-0.23	0.01	1.05	0.91
Parent input	0.11	0.03	0.97	0.99
Parent training	-0.15	-0.07	1.01	1.01
Parent involvement	-0.01	0.06	0.98	1.10
Teacher training	0.25	0.22	0.86	0.87
Programming	-0.19	-0.07	1.31	1.16
		χ^2 (29) = 9.460, p > 0.05		

Table 4.11 Covariate balance summary, drug testing any other.

	Standardized differences		Variance ratios	
Covariate	*Original Sample*	*Weighted Sample*	*Original Sample*	*Weighted Sample*
Size (300-499)	-0.20	0.24	0.70	1.61
Size (500-999)	-0.10	0.21	0.95	1.15
Size (1,000+)	0.32	-0.29	1.19	0.89
Grade (Middle)	-0.15	-0.21	0.89	0.86
Grade (High)	0.60	0.38	1.04	0.96
Grade (Combined)	0.11	0.14	1.61	1.72
Locale (Suburb)	-0.07	-0.05	0.95	0.96
Locale (Town)	0.22	-0.30	1.45	0.63
Locale (Rural)	-0.05	0.24	0.95	1.33
Percent white	0.10	0.22	0.93	0.88
Percent free lunch	-0.10	0.10	0.86	0.96
Percent LEP	-0.10	-0.07	1.17	1.59
Percent male	-0.10	-0.11	1.29	1.41
Crime location (Moderate)	0.02	0.04	1.03	1.06
Crime location (High)	-0.04	0.14	0.85	1.85
Transfers in	0.12	0.12	1.14	2.36
Transfers out	0.13	-0.03	0.94	0.76
School disorder	0.33	-0.01	0.79	0.69
Parent participation	-0.47	-0.14	0.84	0.99
Community involvement	0.24	0.23	1.00	1.05
Percent below 15th	0.04	0.16	0.81	1.00
Percent college	0.08	-0.27	0.81	1.04
Percent academic	-0.10	-0.22	1.06	1.10
Parent input	0.11	-0.20	0.97	1.11
Parent training	0.06	0.49	0.99	0.92
Parent involvement	-0.01	0.17	1.00	1.32
Teacher training	0.28	0.43	0.86	0.73
Programming	0.07	0.08	0.93	0.98
	$\chi^2(29) = 15.035$, $p > 0.05$			

Table 4.12 Covariate balance summary, uniforms.

	Standardized differences		Variance ratios	
Covariate	*Original Sample*	*Weighted Sample*	*Original Sample*	*Weighted Sample*
Size (300-499)	-0.04	0.13	0.94	1.22
Size (500-999)	0.21	0.18	1.08	1.07
Size (1,000+)	-0.18	-0.38	0.83	0.69
Grade (Middle)	0.17	0.04	1.10	1.02
Grade (High)	-0.46	-0.42	0.64	0.67
Grade (Combined)	0.02	-0.08	1.09	0.70
Locale (Suburb)	-0.16	-0.21	0.88	0.85
Locale (Town)	-0.23	-0.19	0.58	0.63
Locale (Rural)	-0.33	-0.27	0.61	0.66
Percent white	-1.39	-1.33	0.80	0.74
Percent free lunch	1.26	1.41	0.92	0.84
Percent LEP	0.55	0.55	2.99	3.22
Percent male	0.01	-0.06	1.13	1.36
Crime location (Moderate)	0.56	0.61	1.83	1.89
Crime location (High)	0.43	0.39	3.64	3.23
Transfers in	0.14	0.09	0.58	0.55
Transfers out	0.17	0.06	1.71	1.22
School disorder	0.10	0.13	1.34	1.46
Parent participation	-0.10	-0.11	1.05	1.03
Community involvement	-0.13	-0.10	1.08	1.09
Percent below 15th	0.53	0.62	2.93	3.39
Percent college	-0.40	-0.55	1.26	1.33
Percent academic	-0.17	-0.28	1.31	1.43
Parent input	0.24	0.09	0.90	0.97
Parent training	0.19	0.11	0.95	0.97
Parent involvement	0.39	0.24	1.59	1.32
Teacher training	0.27	0.22	0.85	0.86
Programming	0.15	-0.01	0.78	0.92
	$\chi^2(29) = 22.231, p > 0.05$			

Table 4.13 Covariate balance summary, dress code.

	Standardized differences		Variance ratios	
Covariate	*Original Sample*	*Weighted Sample*	*Original Sample*	*Weighted Sample*
Size (300-499)	-0.06	-0.07	0.92	0.90
Size (500-999)	0.03	0.05	1.02	1.02
Size (1,000+)	0.04	0.02	1.03	1.02
Grade (Middle)	0.35	0.38	1.31	1.34
Grade (High)	-0.04	-0.05	0.97	0.97
Grade (Combined)	0.03	0.04	1.13	1.19
Locale (Suburb)	-0.09	-0.10	0.94	0.93
Locale (Town)	0.04	0.01	1.08	1.02
Locale (Rural)	0.02	0.03	1.03	1.03
Percent white	-0.33	-0.35	1.29	1.32
Percent free lunch	0.33	0.34	1.08	1.09
Percent LEP	0.17	0.19	1.51	1.58
Percent male	-0.03	-0.02	1.14	1.11
Crime location (Moderate)	0.20	0.21	1.39	1.42
Crime location (High)	0.07	0.06	1.32	1.26
Transfers in	0.15	0.11	4.89	2.92
Transfers out	0.13	0.11	1.36	1.21
School disorder	0.12	0.11	0.96	0.96
Parent participation	-0.15	-0.16	0.90	0.90
Community involvement	0.18	0.18	0.98	0.98
Percent below 15th	0.16	0.17	1.60	1.63
Percent college	-0.21	-0.23	1.01	1.03
Percent academic	-0.10	-0.10	0.98	0.98
Parent input	0.20	0.21	0.96	0.96
Parent training	0.10	0.10	0.99	0.99
Parent involvement	0.19	0.19	1.36	1.36
Teacher training	0.29	0.30	0.91	0.91
Programming	0.18	0.19	0.75	0.75
	$\chi^2(29) = 24.723, p > 0.05$			

Table 4.14 Covariate balance summary, lockers.

	Standardized differences		Variance ratios	
Covariate	*Original Sample*	*Weighted Sample*	*Original Sample*	*Weighted Sample*
Size (300-499)	-0.21	-0.24	0.75	0.71
Size (500-999)	-0.12	-0.15	0.95	0.93
Size (1,000+)	0.33	0.37	1.41	1.46
Grade (Middle)	0.29	0.28	1.26	1.25
Grade (High)	0.74	0.77	2.08	2.15
Grade (Combined)	0.20	0.17	3.08	2.63
Locale (Suburb)	0.00	-0.01	1.00	0.99
Locale (Town)	0.11	0.11	1.26	1.25
Locale (Rural)	0.19	0.13	1.26	1.18
Percent white	0.55	0.50	0.77	0.79
Percent free lunch	-0.49	-0.52	0.74	0.75
Percent LEP	-0.53	-0.54	0.38	0.36
Percent male	-0.12	-0.08	1.02	0.98
Crime location (Moderate)	-0.22	-0.22	0.73	0.73
Crime location (High)	-0.23	-0.26	0.44	0.40
Transfers in	-0.10	-0.07	0.36	0.44
Transfers out	-0.03	0.02	0.70	0.89
School disorder	0.42	0.44	0.91	0.95
Parent participation	-0.45	-0.45	0.90	0.91
Community involvement	0.38	0.35	0.95	0.95
Percent below 15th	-0.12	-0.09	0.76	0.82
Percent college	0.26	0.28	0.75	0.75
Percent academic	0.04	0.05	0.79	0.80
Parent input	0.00	0.00	1.00	1.00
Parent training	-0.24	-0.22	1.06	1.05
Parent involvement	-0.18	-0.14	0.77	0.82
Teacher training	0.05	0.08	1.09	1.07
Programming	-0.03	0.00	1.12	1.09
		χ^2 (29) = 44.628, p < 0.05*		

* Significant imbalance

Table 4.15 Covariate balance summary, book bag bans.

	Standardized differences		Variance ratios	
Covariate	*Original Sample*	*Weighted Sample*	*Original Sample*	*Weighted Sample*
Size (300-499)	-0.05	0.22	0.93	1.47
Size (500-999)	0.17	0.00	1.07	1.01
Size (1,000+)	-0.08	-0.19	0.93	0.86
Grade (Middle)	0.42	0.35	1.14	1.09
Grade (High)	-0.09	-0.31	0.95	0.84
Grade (Combined)	0.05	0.10	1.25	1.55
Locale (Suburb)	-0.16	-0.22	0.87	0.83
Locale (Town)	0.09	0.17	1.20	1.38
Locale (Rural)	0.06	0.20	1.07	1.26
Percent white	-0.18	-0.29	1.11	1.17
Percent free lunch	0.32	0.49	1.03	1.12
Percent LEP	-0.15	-0.09	0.58	0.67
Percent male	-0.01	-0.04	1.24	1.41
Crime location (Moderate)	0.13	0.18	1.21	1.30
Crime location (High)	-0.07	-0.03	0.76	0.90
Transfers in	0.14	0.08	0.75	0.51
Transfers out	0.12	0.05	0.80	0.81
School disorder	0.18	-0.21	0.93	0.63
Parent participation	-0.40	-0.18	0.83	0.84
Community involvement	0.09	-0.16	1.01	1.02
Percent below 15th	0.07	-0.02	1.23	0.96
Percent college	-0.27	-0.27	0.97	1.00
Percent academic	-0.27	-0.12	1.15	1.08
Parent input	0.13	0.01	0.96	1.00
Parent training	-0.03	0.07	1.01	1.00
Parent involvement	0.04	-0.22	1.07	0.74
Teacher training	0.26	0.04	0.81	0.90
Programming	0.05	-0.11	1.00	1.22
	$\chi^2(29) = 26.216$, $p > 0.05$			

Table 4.16 Covariate balance summary, student badges.

	Standardized differences		Variance ratios	
Covariate	*Original Sample*	*Weighted Sample*	*Original Sample*	*Weighted Sample*
Size (300-499)	-0.33	-0.35	0.51	0.49
Size (500-999)	-0.16	-0.31	0.90	0.83
Size (1,000+)	0.59	0.57	1.26	1.27
Grade (Middle)	0.01	0.08	1.01	1.06
Grade (High)	0.51	0.37	1.11	1.05
Grade (Combined)	-0.09	0.00	0.64	1.00
Locale (Suburb)	0.13	0.02	1.08	1.02
Locale (Town)	-0.22	-0.36	0.60	0.42
Locale (Rural)	-0.33	-0.38	0.61	0.54
Percent white	-0.56	-0.66	1.16	1.13
Percent free lunch	0.35	0.62	0.95	0.96
Percent LEP	-0.01	-0.07	0.70	0.58
Percent male	-0.02	0.17	0.98	0.85
Crime location (Moderate)	0.26	0.37	1.40	1.56
Crime location (High)	0.23	0.33	2.11	2.76
Transfers in	0.31	0.06	3.92	0.31
Transfers out	0.47	0.42	2.26	2.25
School disorder	0.27	0.17	1.08	1.07
Parent participation	-0.31	-0.43	1.05	1.02
Community involvement	0.24	0.06	1.09	1.13
Percent below 15th	0.33	0.65	2.25	4.54
Percent college	-0.16	-0.36	0.96	1.12
Percent academic	-0.09	-0.14	0.98	1.01
Parent input	0.25	0.18	0.90	0.92
Parent training	0.13	0.11	0.97	0.98
Parent involvement	0.32	0.31	1.47	1.45
Teacher training	0.37	0.23	0.79	0.85
Programming	0.32	0.27	0.71	0.71
	$\chi^2(29) = 20.239, p > 0.05$			

Table 4.17 Covariate balance summary, threat reporting system.

	Standardized differences		Variance ratios	
Covariate	*Original Sample*	*Weighted Sample*	*Original Sample*	*Weighted Sample*
Size (300-499)	-0.19	-0.20	0.75	0.73
Size (500-999)	-0.05	-0.05	0.98	0.97
Size (1,000+)	0.36	0.37	1.34	1.35
Grade (Middle)	0.16	0.16	1.11	1.11
Grade (High)	0.17	0.17	1.10	1.10
Grade (Combined)	-0.08	-0.08	0.67	0.68
Locale (Suburb)	0.04	0.05	1.03	1.04
Locale (Town)	-0.02	-0.03	0.96	0.94
Locale (Rural)	-0.06	-0.06	0.94	0.93
Percent white	-0.10	-0.11	1.07	1.08
Percent free lunch	-0.01	0.01	0.90	0.91
Percent LEP	0.00	0.01	0.79	0.80
Percent male	-0.02	-0.03	0.80	0.85
Crime location (Moderate)	0.07	0.08	1.12	1.14
Crime location (High)	-0.01	0.00	0.95	0.99
Transfers in	0.15	0.17	0.95	1.37
Transfers out	0.27	0.30	1.19	1.34
School disorder	0.15	0.16	0.91	0.92
Parent participation	-0.03	-0.04	0.88	0.88
Community involvement	0.35	0.36	1.00	1.00
Percent below 15th	0.01	0.04	0.93	1.00
Percent college	0.04	0.02	0.95	0.96
Percent academic	0.06	0.06	0.84	0.84
Parent input	0.27	0.28	0.92	0.92
Parent training	0.20	0.20	0.97	0.97
Parent involvement	0.19	0.18	1.34	1.32
Teacher training	0.38	0.40	0.84	0.83
Programming	0.38	0.41	0.66	0.63
		χ^2 (29) = 9.891, p > 0.05		

Table 4.18 Covariate balance summary, security cameras.

	Standardized differences		Variance ratios	
Covariate	*Original Sample*	*Weighted Sample*	*Original Sample*	*Weighted Sample*
Size (300-499)	-0.16	-0.16	0.80	0.80
Size (500-999)	-0.06	-0.04	0.97	0.98
Size (1,000+)	0.45	0.44	1.68	1.65
Grade (Middle)	0.06	0.09	1.04	1.06
Grade (High)	0.58	0.56	1.72	1.69
Grade (Combined)	-0.02	-0.04	0.91	0.85
Locale (Suburb)	0.03	0.04	1.02	1.03
Locale (Town)	0.08	0.06	1.17	1.14
Locale (Rural)	-0.02	-0.03	0.98	0.97
Percent white	0.13	0.13	0.92	0.92
Percent free lunch	-0.11	-0.14	0.80	0.79
Percent LEP	-0.31	-0.30	0.46	0.47
Percent male	-0.02	-0.01	0.81	0.79
Crime location (Moderate)	-0.02	-0.03	0.98	0.96
Crime location (High)	-0.08	-0.10	0.75	0.69
Transfers in	0.19	0.18	3.32	2.12
Transfers out	0.25	0.26	1.09	1.10
School disorder	0.34	0.38	0.98	1.03
Parent participation	-0.46	-0.47	1.00	1.00
Community involvement	0.38	0.38	0.99	0.98
Percent below 15th	0.03	0.02	0.97	0.94
Percent college	0.01	0.02	0.88	0.88
Percent academic	-0.13	-0.12	1.04	1.03
Parent input	0.04	0.05	0.99	0.99
Parent training	-0.03	-0.03	1.00	1.00
Parent involvement	-0.08	-0.08	0.89	0.89
Teacher training	0.23	0.22	0.95	0.95
Programming	0.08	0.07	0.86	0.86
		$\chi^2(29) = 28.364$, $p > 0.05$		

Table 4.19 Covariate balance summary, limit social networking. [a]

	Standardized differences		Variance ratios	
Covariate	*Original Sample*	*Weighted Sample*	*Original Sample*	*Weighted Sample*
Size (300-499)	-0.14	-0.16	0.82	0.81
Size (500-999)	0.00	0.06	0.99	1.02
Size (1,000+)	0.10	0.06	1.10	1.05
Grade (Middle)	0.22	0.28	1.21	1.29
Grade (High)	0.05	0.12	1.03	1.08
Grade (Combined)	-0.03	-0.11	0.85	0.61
Locale (Suburb)	-0.07	-0.16	0.95	0.90
Locale (Town)	-0.04	-0.02	0.92	0.95
Locale (Rural)	0.10	0.20	1.12	1.28
Percent white	-0.03	0.00	1.02	1.00
Percent free lunch	0.09	-0.02	0.83	0.80
Percent LEP	-0.14	-0.13	0.68	0.71
Percent male	0.10	0.12	0.62	0.59
Crime location (Moderate)	-0.04	-0.03	0.94	0.95
Crime location (High)	-0.06	-0.11	0.80	0.68
Transfers in	0.18	0.15	5.74	3.65
Transfers out	0.22	0.18	1.90	1.74
School disorder	0.20	0.26	0.99	1.04
Parent participation	-0.18	-0.23	0.83	0.87
Community involvement	0.20	0.23	1.00	0.99
Percent below 15th	0.00	-0.09	1.15	0.94
Percent college	0.01	0.05	0.88	0.85
Percent academic	-0.09	-0.12	0.87	0.91
Parent input	0.27	0.29	0.99	1.00
Parent training	-0.02	-0.06	1.00	1.00
Parent involvement	-0.10	-0.10	0.86	0.86
Teacher training	0.21	0.13	1.01	1.06
Programming	0.15	0.14	0.78	0.80

[a] Note: the overidentification test could not be performed

Table 4.20 Covariate balance summary, prohibit phones.

	Standardized differences		Variance ratios	
Covariate	*Original Sample*	*Weighted Sample*	*Original Sample*	*Weighted Sample*
Size (300-499)	0.22	0.16	1.49	1.34
Size (500-999)	0.28	0.37	1.22	1.30
Size (1,000+)	-0.48	-0.42	0.80	0.83
Grade (Middle)	0.71	0.75	2.80	3.02
Grade (High)	-0.74	-0.68	0.98	0.98
Grade (Combined)	-0.11	-0.15	0.63	0.53
Locale (Suburb)	0.02	0.13	1.01	1.10
Locale (Town)	-0.07	-0.08	0.88	0.86
Locale (Rural)	0.01	-0.05	1.00	0.95
Percent white	-0.16	-0.25	1.14	1.23
Percent free lunch	0.32	0.37	1.17	1.20
Percent LEP	0.07	0.09	1.43	1.42
Percent male	-0.03	-0.03	1.43	1.41
Crime location (Moderate)	0.01	0.07	1.01	1.11
Crime location (High)	0.06	0.06	1.26	1.24
Transfers in	-0.09	-0.08	1.82	1.49
Transfers out	-0.24	-0.19	0.67	0.63
School disorder	-0.17	-0.07	1.00	1.06
Parent participation	0.30	0.27	1.07	1.03
Community involvement	-0.07	-0.07	1.03	1.02
Percent below 15th	-0.01	-0.04	1.25	1.12
Percent college	-0.15	-0.15	1.05	1.02
Percent academic	-0.01	-0.01	1.02	0.99
Parent input	0.08	0.12	0.98	0.97
Parent training	0.00	-0.03	1.00	1.00
Parent involvement	0.09	0.09	1.16	1.16
Teacher training	0.17	0.13	0.89	0.91
Programming	0.11	0.16	0.74	0.67
	$\chi^2(29) = 30.690, p > 0.05$			

Table 4.21 Covariate balance summary, security staff.

	Standardized differences		Variance ratios	
Covariate	*Original Sample*	*Weighted Sample*	*Original Sample*	*Weighted Sample*
Size (300-499)	-0.47	-0.45	0.51	0.54
Size (500-999)	-0.10	-0.06	0.95	0.97
Size (1,000+)	1.01	0.93	4.56	4.25
Grade (Middle)	0.23	0.26	1.18	1.20
Grade (High)	0.70	0.62	1.83	1.72
Grade (Combined)	-0.16	-0.11	0.47	0.62
Locale (Suburb)	0.17	0.14	1.14	1.12
Locale (Town)	-0.11	-0.12	0.80	0.79
Locale (Rural)	-0.35	-0.34	0.69	0.70
Percent white	-0.32	-0.31	1.28	1.27
Percent free lunch	0.05	0.05	1.08	1.10
Percent LEP	-0.03	-0.02	0.73	0.78
Percent male	-0.08	-0.09	0.97	1.12
Crime location (Moderate)	0.11	0.11	1.18	1.19
Crime location (High)	0.13	0.16	1.66	1.86
Transfers in	0.29	0.29	1.49	9.52
Transfers out	0.58	0.56	2.47	2.81
School disorder	0.60	0.55	1.28	1.23
Parent participation	-0.57	-0.51	0.92	0.92
Community involvement	0.44	0.40	1.01	1.01
Percent below 15th	0.22	0.20	1.86	1.80
Percent college	0.04	0.07	0.91	0.91
Percent academic	-0.07	0.01	0.97	0.90
Parent input	0.20	0.18	0.96	0.96
Parent training	0.10	0.11	0.99	0.99
Parent involvement	0.15	0.14	1.26	1.25
Teacher training	0.37	0.37	0.95	0.94
Programming	0.21	0.22	0.88	0.87
	$\chi^2(29) = 20.574, p > 0.05$			

4.4 Average Treatment Effects

This analysis examined whether school-based situational crime prevention measures causes changes in the number of recorded incidents for seven measures of school crime and whether their effects differ by type of crime. After balance of covariates was checked following propensity score weighting, estimation of treatment effects was performed using the inverse-probability weighting (IPW) estimator. Analysis of average treatment effects revealed significant relationships between a variety of SCP measures and school crime outcomes. Results indicate that SCP measures have significant or null effects depending on the outcome measure examined. Tables 4.20 to 4.37 display the average treatment effects for each of the SCP measures across the seven measures of school crime.

SCP measures designed to *increase the effort* of crime examined in the analysis included 1) access controlled/locked doors, 2) access controlled/locked gates, 3) random metal detector checks, 4) closing the campus for lunch, 5) providing school lockers to students, and 6) banning book bags or requiring clear book bags. Four of the six measures reported statistically significant effects. The presence of access controlled or locked gates was found to cause a statistically significant increase in the number of vandalism incidents. Schools with locked gates had .39 more incidents over the course of the school year on average, given balance of groups on observed covariates ($\beta = .39$, $SE = .16$, $p < .05$).

The practice of using random metal detector checks was significantly related to both vandalism and drug/alcohol. This practice resulted in a decrease of nearly one incident of vandalism ($\beta = -.83$, $SE = .39$, $p < .05$) and over one incident of drug/alcohol

(β = -1.35, *SE* = -.58, $p < .05$) on average. Closing the campus during lunchtime was significantly related to two measures of school crime: physical attacks without a weapon and vandalism. Schools that closed campus for lunch experienced a larger effect of over two incidents of physical attacks (β = 2.33, *SE* = .70, $p < .01$) and a small effect of .47 more incidents of vandalism on average (β = .47, *SE* = .19, $p < .05$). Requiring the use of clear book bags or banning book bags was significantly associated with a decrease in three of the outcome measures. This policy produced a decrease of .24 incidents violent crimes with a weapon (β = .24, *SE* = .08, $p < .01$), .38 incidents of weapon possession (β = .38, *SE* = .13, $p < .01$), and over one incident of theft/larceny (β = -1.48, *SE* = .52, $p < .001$) on average. No statistically significant relationships were observed between either access controlled/locked doors or providing lockers to students and any of the school crime outcomes ($p > .05$).

Six measures examined in this study represented SCP techniques designed to *increase the risks* of committing crime. These included 1) contraband sweeps, 2) requiring uniforms to be worn, 3) the use of a threat reporting system, 4) requiring identification badges to be worn, 5) security cameras, and 6) security staff. Four of these six measures were observed to have a statistically significant effect on at least one crime outcome.

Requiring students to wear uniforms at school was significantly associated with the number of weapon possession, vandalism, and drug/alcohol-related incidents at school. Schools that required students to wear uniforms had .22 fewer incidents of weapon possessions (β = -.22, *SE* = .10, $p < .05$) and nearly one less incident of drug/alcohol violation (β = -.81, *SE* = .30, $p < .01$) over the school year on average.

Requiring students to wear a badge or photo identification was observed to have statistically significant but small effects on the recording of violent crimes with a weapon and vandalism. Schools that implemented this practice had .27 fewer incidents of violent crimes with a weapon ($\beta = -.27$, $SE = .09$, $p < .01$), and .60 fewer incidents of vandalism ($\beta = -.60$, $SE = .27$, $p < .05$) on average.

A significant relationship was reported between the use of security cameras to monitor the school and incidents of theft/larceny. The presence of security cameras results in a decrease of nearly two incidents on average ($\beta = -1.55$ $SE = .67$, $p < .05$). For security staff, significant effects were observed for three of the measures of school crime: weapon possession, theft/larceny, and drug/alcohol. The presence of a security guard, security personnel, or sworn law enforcement officer at the school produced an increase of .21 recorded incidents of weapon possession ($\beta = .21$, $SE = .06$, $p < .01$), more than one incident of theft/larceny ($\beta = 1.19$, $SE = .27$, $p < .001$), and nearly one incident of drug/alcohol on average ($\beta = .86$, $SE = .15$, $p < .001$). No statistically significant effects on any school crime measures were reported for contraband sweeps or the presence of a structured threat reporting system ($p > .05$).

The practice of limiting social networking was the only measure in the study that represented an SCP technique intended to *reduce the provocations of crime*. Schools that restricted access to social networking websites on school grounds experienced nearly two more incidents of physical attacks over the school year on average ($\beta = 1.68$, $SE = .83$, $p < .05$).

There were five measures examined in the analysis which represented SCP techniques intended to *remove excuses for crime*. These included 1) the enforcement of a

strict dress code, 2) using dog sniffs to check for drugs, 3) require drug testing for athletes, 4) require drug testing for any other students, and 5) prohibiting cell phones and text messaging devices. The practice of using random dog sniffs to check for drugs was significantly related to the incidence of physical attacks. This practice resulted in an increase of nearly three incidents of physical attacks ($\beta = 2.53$, $SE = 1.12$, $p < .05$) on average.

The practice of requiring drug testing of students involved in athletic activities was significantly related to threats of physical attacks. This practice was found to produce a substantial increase of more than four incidents of threats of physical attacks on average ($\beta = 4.02$, $SE = 1.71$, $p < .05$). Significant relationships were also observed between the practice of requiring drug testing for any other students (i.e., not involved in athletics or any other extracurricular activities) and violent crimes with a weapon ($\beta = -.32$, $SE = .12$, $p < .01$) and vandalism ($\beta = -1.22$, $SE = .35$, $p < .001$). This practice results in a decrease in the recording of these measures. No significant relationships between the enforcement of a strict dress code or prohibiting cell phones and any of the school crime outcomes ($p > .05$).

Table 4.22 Average treatment effects, locked doors.

	Locked doors	
Outcome	ATE (SE)	*t*
Violent crimes with a weapon	.07 (.15)	0.52
Physical attacks – no weapon	.30 (1.66)	0.18
Threats of physical attacks – no weapon	.02 (.90)	0.03
Weapon possession	-.12 (.11)	-1.09
Theft/larceny	-.22 (.40)	-0.55
Vandalism	-.01 (.31)	-0.04
Drug/alcohol	-.45 (.37)	-1.20

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.23 Average treatment effects, locked gates.

	Locked gates	
Outcome	ATE (SE)	*t*
Violent crimes with a weapon	-.14 (.11)	-1.36
Physical attacks – no weapon	.33 (.76)	0.44
Threats of physical attacks – no weapon	-.52 (.54)	-0.98
Weapon possession	.05 (.06)	0.76
Theft/larceny	.11 (.25)	0.45
Vandalism	.39 (.16)	2.40*
Drug/alcohol	.29 (.21)	1.36

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.24 Average treatment effects, random metal detector checks.

	Random metal detector checks	
Outcome	ATE (SE)	*t*
Violent crimes with a weapon	2.98 (1.93)	1.54
Physical attacks – no weapon	-2.16 (3.71)	0.58
Threats of physical attacks – no weapon	3.69 (2.66)	1.39
Weapon possession	-.34 (.25)	-1.38
Theft/larceny	-.76 (1.02)	-0.75
Vandalism	-.83 (.39)	-2.10*
Drug/alcohol	-1.35 (.58)	-2.31*

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.25 Average treatment effects, closed lunch.

	Closed lunch	
Outcome	ATE (SE)	*t*
Violent crimes with a weapon	-.10 (.12)	-0.89
Physical attacks – no weapon	2.33 (.70)	3.31**
Threats of physical attacks – no weapon	.98 (.54)	1.82
Weapon possession	-.13 (.07)	-1.93
Theft/larceny	-.26 (.27)	-1.05
Vandalism	.47 (.19)	2.50*
Drug/alcohol	-.25 (.23)	-1.09

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.26 Average treatment effects, dog sniffs.

	Dog sniffs	
Outcome	ATE (SE)	*t*
Violent crimes with a weapon	.48 (.53)	0.91
Physical attacks – no weapon	2.53 (1.12)	2.26*
Threats of physical attacks – no weapon	-.18 (.60)	-0.31
Weapon possession	.12 (.13)	0.94
Theft/larceny	.20 (.49)	0.40
Vandalism	.44 (.41)	1.08
Drug/alcohol	.36 (.32)	1.14

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.27 Average treatment effects, contraband sweeps.

	Contraband sweeps	
Outcome	ATE (SE)	*t*
Violent crimes with a weapon	.08 (.12)	0.71
Physical attacks – no weapon	4.13 (2.20)	1.88
Threats of physical attacks – no weapon	6.92 (4.05)	1.71
Weapon possession	.18 (.16)	1.12
Theft/larceny	.06 (.69)	0.09
Vandalism	-.80 (.51)	-1.57
Drug/alcohol	-.26 (.47)	-0.55

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.28 Average treatment effects, drug testing athletes.

	Drug testing - athletes	
Outcome	ATE (SE)	*t*
Violent crimes with a weapon	1.89 (1.11)	1.69
Physical attacks – no weapon	-1.42 (.96)	-1.47
Threats of physical attacks – no weapon	4.02 (1.71)	2.34*
Weapon possession	-.09 (.13)	-0.70
Theft/larceny	2.10 (1.20)	1.75
Vandalism	-.87 (.67)	-1.30
Drug/alcohol	.62 (.54)	1.14

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.29 Average treatment effects, drug testing any other.

	Drug testing – other	
Outcome	ATE (SE)	*t*
Violent crimes with a weapon	-.32 (.12)	-2.66**
Physical attacks – no weapon	.08 (1.95)	-0.04
Threats of physical attacks – no weapon	1.11 (1.62)	0.68
Weapon possession	-.27 (.20)	-1.33
Theft/larceny	-.34 (1.01)	-0.34
Vandalism	-1.22 (.35)	-3.49***
Drug/alcohol	-.27 (.88)	-0.31

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.30 Average treatment effects, uniforms.

	Uniforms	
Outcome	ATE (SE)	*t*
Violent crimes with a weapon	.34 (.44)	0.77
Physical attacks – no weapon	-.44 (1.19)	-0.38
Threats of physical attacks – no weapon	.82 (.98)	0.84
Weapon possession	-.22 (.10)	-2.08*
Theft/larceny	.07 (.52)	0.15
Vandalism	-.47 (.25)	-1.91
Drug/alcohol	-.81 (.30)	-2.63**

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.31 Average treatment effects, dress code.

	Dress code	
Outcome	ATE (SE)	*t*
Violent crimes with a weapon	-.05 (.11)	-0.49
Physical attacks – no weapon	-.94 (.73)	-1.28
Threats of physical attacks – no weapon	-.58 (.52)	-1.10
Weapon possession	-.05 (.06)	-0.83
Theft/larceny	-.27 (.26)	-1.02
Vandalism	-.50 (.27)	-1.79
Drug/alcohol	-.42 (.21)	-1.94

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.32 Average treatment effects, lockers.

	Lockers	
Outcome	ATE (SE)	*t*
Violent crimes with a weapon	.03 (.15)	0.23
Physical attacks – no weapon	1.52 (.98)	1.55
Threats of physical attacks – no weapon	1.70 (1.04)	1.63
Weapon possession	-.08 (.08)	-1.06
Theft/larceny	.43 (.56)	0.78
Vandalism	.53 (.77)	0.69
Drug/alcohol	.60 (.42)	1.41

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.33 Average treatment effects, book bag bans.

	Book bag bans	
Outcome	ATE (SE)	*t*
Violent crimes with a weapon	-.24 (.09)	-2.61**
Physical attacks – no weapon	-2.04 (1.16)	-1.76
Threats of physical attacks – no weapon	-.74 (.91)	-0.82
Weapon possession	-.38 (.13)	-2.77**
Theft/larceny	-1.48 (.52)	-2.85***
Vandalism	-.03 (.51)	-0.07
Drug/alcohol	.20 (.48)	-0.42

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.34 Average treatment effects, student badges.

	Student badges	
Outcome	ATE (SE)	*t*
Violent crimes with a weapon	-.27 (.09)	-3.05**
Physical attacks – no weapon	1.15 (1.26)	0.91
Threats of physical attacks – no weapon	2.21 (2.17)	1.02
Weapon possession	-.05 (.15)	-0.33
Theft/larceny	1.22 (1.14)	1.07
Vandalism	-.60 (.27)	-2.18*
Drug/alcohol	-.28 (.34)	-0.83

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.35 Average treatment effects, threat reporting system.

	Threat reporting system	
Outcome	ATE (SE)	*t*
Violent crimes with a weapon	.09 (.11)	0.86
Physical attacks – no weapon	1.44 (.87)	1.66
Threats of physical attacks – no weapon	.68 (.56)	1.21
Weapon possession	.13 (.07)	1.96
Theft/larceny	.22 (.26)	0.85
Vandalism	.20 (.22)	0.96
Drug/alcohol	.22 (.19)	1.16

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.36 Average treatment effects, security cameras.

	Security cameras	
Outcome	ATE (SE)	*t*
Violent crimes with a weapon	.03 (.10)	0.31
Physical attacks – no weapon	.62 (.88)	0.71
Threats of physical attacks – no weapon	-.43 (.62)	-0.71
Weapon possession	-.00 (.07)	-0.05
Theft/larceny	-1.55 (.67)	-2.32*
Vandalism	-.58 (.35)	-1.66
Drug/alcohol	-.19 (.26)	-0.76

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.37 Average treatment effects, limit social networking.

	Limit social networking	
Outcome	ATE (SE)	*t*
Violent crimes with a weapon	.01 (.12)	0.11
Physical attacks – no weapon	1.68 (.83)	2.03*
Threats of physical attacks – no weapon	.43 (.74)	0.59
Weapon possession	-.08 (.17)	-0.51
Theft/larceny	-.93 (89)	-1.05
Vandalism	-.73 (.60)	-1.21
Drug/alcohol	-.12 (.39)	-0.33

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.38 Average treatment effects, prohibit phones.

	Prohibit phones	
Outcome	ATE (SE)	*t*
Violent crimes with a weapon	-.60 (.39)	-1.55
Physical attacks – no weapon	-1.55 (1.67)	-0.93
Threats of physical attacks – no weapon	-.42 (1.22)	-0.34
Weapon possession	-.19 (.25)	-0.74
Theft/larceny	-.91 (.63)	-1.46
Vandalism	-.42 (.45)	-0.94
Drug/alcohol	-.73 (.38)	-1.95

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.39 Average treatment effects, security staff.

	Security staff	
Outcome	ATE (SE)	*t*
Violent crimes with a weapon	.18 (.14)	1.30
Physical attacks – no weapon	1.60 (.86)	1.85
Threats of physical attacks – no weapon	1.15 (.86)	1.35
Weapon possession	.21 (.06)	3.15**
Theft/larceny	1.19 (.27)	4.32***
Vandalism	.22 (.19)	1.16
Drug/alcohol	.86 (.15)	5.52***

*$p < .05$. **$p < .01$. ***$p < .001$

CHAPTER 5

DISCUSSION AND CONCLUSION

The theory and practice of situational crime prevention holds that crime can be prevented by modifying situations to remove and/or reduce the opportunity for crime (Clarke, 1983). Although SCP measures are becoming increasingly prevalent in public schools, there is mixed and inconclusive evidence of their effectiveness and research has largely been limited to examining aggregate outcomes through the use non-experimental, correlational designs. As such, strong causal inferences cannot be established and targeted policy implications are lacking (e.g., Crawford & Burns, 2015, 2016; Jennings et al., 2011; Maskaly et al., 2011; O'Neill & McGloin, 2007). The goal of this dissertation study was to address these gaps in the literature by analyzing a national sample of schools to explore whether an array of school-based SCP measures causes changes in the incidence of seven measures of school crime and whether the effects of SCP measures differ by the type of crime. This study applied a quasi-experimental propensity-score weighting approach to account for the threat of selection bias due to the lack of random assignment in observational data.

Table 5.1 summarizes the effects of SCP measures on the seven measures of school crime. A minus sign indicates that the presence of the SCP measure resulted in a statistically significant decrease in the outcome measure while a plus sign indicates that it produced a statistically significant increase in the outcome measure. Several SCP

Table 5.1 Summary of average treatment effects on school crime outcomes. [a]

Variable	*Violent crimes with a weapon*	*Physical attacks*	*Threats of physical attacks*	*Weapon possession*	*Theft/ larceny*	*Vandalism*	*Drug/ alcohol*
Locked doors	ns	ns	ns	ns	ns	ns	ns
Locked gates	ns	ns	ns	ns	ns	+	ns
Metal detectors	Common support assumption violated						
Random metal detector checks	ns	ns	ns	ns	ns	−	−
Closed lunch	ns	+	ns	ns	ns	+	ns
Dog sniffs	ns	+	ns	ns	ns	ns	ns
Contraband sweeps	ns	ns	ns	ns	ns	ns	ns
Drug testing – athletes	ns	ns	+	ns	ns	ns	ns
Drug testing – extracurricular	Common support assumption violated						
Drug testing – other	−	ns	ns	ns	ns	−	ns
Uniforms	ns	ns	ns	−	ns	ns	−
Dress code	ns	ns	ns	ns	ns	ns	ns
Lockers	ns	ns	ns	ns	ns	ns	ns
Book bag bans	−	ns	ns	−	−	ns	ns
Student badges	−	ns	ns	ns	ns	−	ns
Threat reporting system	ns	ns	ns	ns	ns	ns	ns
Security cameras	ns	ns	ns	ns	−	ns	ns
Limit social networking	ns	+	ns	ns	ns	ns	ns
Prohibit phones	ns	ns	ns	ns	ns	ns	ns
Security staff	ns	ns	ns	+	+	ns	+

[a] Note: “ns” = non-significant relationship

measures were reported to cause significant reductions in measures of school crime, which are suggestive of deterrent effects. For instance, schools that use security cameras might deter students from attempting to commit theft or larceny if the students suspect they are likely to be identified on video surveillance after committing the act. In contrast, other SCP measures, such as having security staff present at the school was found to cause increases in outcome measures, suggesting that these techniques are more effective as a means to detect crime rather than to deter it or that they potentially operate through crime-inducing mechanisms. For instance, having security staff present in schools might increase the recorded incidence of crime if they more often respond to incidents and document them after they have occurred rather than attempt to proactively prevent crime.

Six of the SCP measures were observed to produce significant decreases in crime outcomes. These included 1) random metal detector checks, 2) drug testing any other students, 3) uniforms, 4) book bag bans, 5) student badges, and 6) security cameras. Schools that performed random metal detector checks experienced a decrease in the number of incidents of vandalism and drug/alcohol. These findings are in contrast with the results from a study by Ginsberg and Loffredo (1993) which reported that students at schools with metal detector programs were less likely to carry a weapon in school and going to and from school. The finding here suggests that the use of random metal detector checks serves as an effective deterrent to these types of crime by heightening the risk that students will be detected if they attempt to clandestinely bring in prohibited items used to commit vandalism or drug offenses.

The practice of drug testing any other students (not involved in athletics or extracurricular activities) was found to result in decreased incidents of violent crimes

with a weapon and vandalism. These findings extend on previous research on drug testing in schools which has been limited to examining the effects of student drug testing specifically on drug and alcohol abuse outcomes at the individual-level (e.g., Goldberg et al., 2007; James-Burdumy et al., 2012). Although it is unknown specifically what types of students this category included, there are a few possible explanations that may account for this finding. Some schools might implement random drug testing of students regardless of whether students are involved in athletics and extra-curricular activities. Therefore, if students suspected they were likely to be selected for random drug testing and therefore face punishment, it may have deterred them from using illegal drugs which may have influenced them to commit these types of crime.

Schools that required students to wear uniforms experienced a decrease in the number of weapon possession and drug/alcohol incidents. These findings are consistent with prior research which has found that school uniforms were associated with a decrease in drug crimes (Cheruprakobkit & Bartsch, 2005) and weapon possessions (Granberg-Rademacker et al., 2007). A potential explanation for this effect is that when students are required to wear uniforms, it could be more obvious to school officials if they are carrying weapons or drugs which could serve as a deterrent to these types of crimes. In addition, having to wear uniforms while going to and from school makes it easier for capable guardians outside of school to identify whether someone is a student which could also act as a deterrent.

The practice of requiring clear book bags to be worn or banning book bags caused decreases in the number of violent crimes with a weapon, weapon possession, and theft/larceny. This finding largely contrasts with findings from previous studies based on

correlational or survey-only designs which reported that book bag policies were perceived by students to have little impact on the presence of weapons in school (Brown, 2006), and that clear book bags were found to be associated with an increase in violent incidents (Lesneskie & Block, 2016). The finding here suggests that having these types of strict book bag policies were effective in making it easier for weapons to be detected and therefore deterred students from attempting to bring in weapons to school buildings. In addition, having clear book bags or banning book bags would make it more difficult for students to conceal stolen items which could explain the decreased recording of theft/larceny.

Having a requirement that students wear identification badges while on school premises was found to result in a decrease in the recording of incidents of violent crimes with a weapon and vandalism. These findings are in contrast with past research which has reported null findings of student identification on composite measures of school crime (e.g., O'Neill & McGloin, 2007). The finding here is suggestive of a deterrent effect through the mechanism of reducing anonymity: students were less likely to engage in these crimes when perceiving that they could be easily or quickly identified if they were caught in the act.

Schools that used security cameras experienced decreased incidents of theft/larceny. This finding contrasts with previous research which has reported significant effects of security cameras on measures of violence and weapon possessions (Crawford & Burns, 2016; Granberg-Rademacker et al., 2007) but non-significant effects on property crime (O'Neill & McGloin, 2007). This result may be indicative of a deterrent effect through the mechanism of increasing risk by strengthening formal surveillance: as

students were aware that their actions were being monitored by security cameras, they were less likely to commit acts of theft or larceny knowing that if they did, there would be evidence of them committing the crime and that they would have a high probability of being identified on surveillance footage.

There were six SCP measures that were observed to cause significant increases in measures of school crime, suggestive of detection or potentially crime-inducing effects. These included 1) controlling access to school grounds using locked or monitored gates, 2) closing campus during lunchtime, 3) drug testing of athletes, 4) dog sniffs, 5) limiting access to social networking websites, and 6) having security guards or law enforcement personnel present at the school at least once a week. Schools that had a practice to control access and/or lock gates experienced an increase in the number of vandalism incidents. Though the limited amount of prior research on controlled access/locked gates has found no evidence that they affect school crime (O'Neil & McGloin, 2007), one possible explanation for this finding is that having locked doors encourages vandalism. For instance, when gates are locked it makes it more difficult for offenders to get within school grounds, and therefore it may be more likely to damage property in an attempt to gain entry.

The practice of closing campus during lunch was found to increase the recording of both physical attacks and vandalism. This finding is supportive of the results from prior research by O'Neill and McGloin (2007) which found that closed lunch was associated with an increase in property crime. Although closing campus during lunch would be expected to act as a deterrent by increasing the effort for crime, one explanation for these opposite effects is that it places a large number of students in a confined space

(i.e., cafeteria) which increases the number of provocations and disputes among students, thereby increasing the recording of the physical attacks and vandalism. From the perspective of routine activity theory, it brings motivated offenders and suitable targets into the same time and space (O'Neill & McGloin, 2007). Another explanation for this finding is that if students are unable to go off campus for lunch, their unreleased energy may manifest in forms of crime such as violence or vandalism.

The practice of drug testing athletes led to the increased recording of threats of physical attack. This finding further extends on past research on drug testing in schools which has been limited to assessing the effects of random student drug testing on substance abuse outcomes at the individual-level such as self-reported drug use (e.g., Sznitman et al., 2012, Sznitman & Romer, 2014). The finding here suggests the possibility of crime-causing rather than detection effects. One mechanism that may explain this relationship is that schools that drug test students find students that fail the drug test. Because failing a drug test could potentially result to disciplinary action or being removed from the athletic team, students might then retaliate by making threats of violence against school officials and other staff. An alternative explanation for this finding is that drug testing specific groups of students, such as those engaged in extracurriculars encourages drug use and may facilitate crime. For instance, the American Civil Liberties Union has argued that students who actively participate in extracurricular activities are less likely to engage in drug use because they have less free time. Therefore, this policy deters other students from joining these activities, thus giving them more free time to become involved in drugs (American Civil Liberties Union, 2017). These students

who avoid involvement in athletic activities may be more prone to committing certain forms of violence, such as threats of physical attack which can be facilitated by drug use.

Schools that performed random dog sniffs to search for drugs had significantly higher incidents of physical attacks (not involving a weapon). This finding is in contrast with a correlational study by Crawford & Burns (2015) which found that a similar measure, contraband sweeps, was associated with decreased threats of attacks. Although this practice should deter crime through increasing the risk that students with prohibited items will be caught, the finding here suggests the possibility of a crime-causing effect. While the data in the present study does not indicate how dogs are specifically used, some schools may require students to remain in classrooms when dogs are present while other schools allow dogs and students to be in the same areas. Likewise, some schools may only allow dogs only to search common areas such as lockers and parking lots while other schools may allow dogs to search students. It is possible that in schools where dogs are used to search students, some students perceive that this practice infringes on their privacy especially if they are in possession of items that could be detected through dog sniffs and therefore they could be more likely to react through aggression. In addition, the use of dogs may provoke some more physically aggressive students to physically retaliate against school officials and other personnel performing these checks which are later documented as physical attacks by the school.

The practice of restricting access to social networking websites in school was found to cause an increase in the incidence of physical attacks. Previous research has yet to examine how banning social media in schools impacts specific school crime outcomes. However, the finding here suggests the possibility of a crime-inducing effect. For

instance, if students are unable to access social networking to interact with other students, they could be more likely to engage in face-to-face encounters. Therefore, any disputes between students could to lead to physical aggression, which is then detected and recorded by the school. This explanation may be reflective of the idea of self-help, or the expression of grievance through aggression such as violence or property damage, which is more likely to occur when law is unavailable or does not operate for those with grievances (Black, 1983). When social networking, for instance, is unavailable to those students with grievances, they may be more likely to engage in self-help which is expressed through acts of physical attack.

The presence of security guards, security personnel, or sworn law enforcement officers at school contributed to an increase in the incidence three of the measures of school crime: weapon possession, theft/larceny, and drug/alcohol. These results are likely indicative of a detection effect rather than a crime-causing effect and are consistent with findings from a number of previous studies reporting that the presence of SROs was associated with an increase in the recording and/or reporting of school crime incidents and related measures such as arrest and disciplinary infractions (e.g., Finn et al., 2005; Fisher & Hennessey, 2015; Reingle et al., 2016; Rich-Shea, 2010; Theriot, 2009; Swartz et al., 2015). The presence of security staff in schools could make the detection of crime more likely and therefore increase the recording of crime. For instance, some recent research by Swartz et al. (2015) suggests that it is possible that most security staff present in schools do not proactively seek to prevent crime or patrol areas where these crimes are likely to occur, but rather take on a reactive approach that involves responding to investigate crimes only after it has occurred and been brought to their attention, at which

point they are likely to document the incident, therefore increasing the recording of these measures. In sum, findings from this study do not suggest that school security staff *causes* crime, but that their presence in school makes it more likely that they will detect incidents that occur which contributes to the increased recording of crime.

5.1 Implications for Policy and Practice

The findings from this research speak to the effectiveness of a number of SCP techniques across three domains: a) increasing the effort for crime, b) increasing the risk of crime, and c) removing excuses for crime. However, it is also important to consider how an overall SCP technique (e.g., increase the effort, increase the risk) is operationalized (e.g., locked doors vs. closed lunch) as this may have different impacts on crime. For practices that involve increasing the effort of crime, the current research suggests that at the national level, schools with specific crime problems that may be addressed by SCP measures should prioritize the implementation of measures such as random metal detector checks and policies requiring clear book bags or bans on book bags, as these measures have demonstrated evidence of deterrent effects. For practices that involve increasing the risk of crime, schools should focus on techniques that reduce anonymity (requiring uniforms and student badges) and strengthening formal surveillance through the use of security cameras to monitor the school. Lastly, schools can most effectively remove excuses by requiring some types of students to be drug tested.

There are a few caveats that should be considered when making policy recommendations or changes based on these findings. One important consideration is the heterogeneity of treatment effect, which is the non-random explainable variability in the direction and magnitude of treatment effects for units within a population (Varadhan &

Seeger, 2013). The population of schools used in the study is heterogenous—they have characteristics that vary between schools, such as the grade levels being offered, urbanicity of the school, enrollment size, and the level of crime where the school is located. These varying characteristics might modify the effect of an SCP measure on the school crime outcomes. For instance, SCP measures might have greater effects in high schools because that is where the majority of school violence occurs, but their effects may be more minimal or absent in elementary schools, where serious crimes are of little concern. Likewise, their effects may differ in larger, more urban schools, and schools in areas of concentrated poverty and with high percentages of African American students and teachers. Schools with these characteristics have been reported to experience higher levels of student delinquency and teacher victimization (Gottfredson et al., 2005). Schools which are more communally organized, such as those that emphasize common norms and collaboration, and where students invest greater effort into school have been reported to have less disorder (Payne et al., 2003) and therefore may be less affected by these measures. This study estimates the ATE that assumes a similar treatment effect across heterogeneous school characteristics. However, for some treatments, the average treatment effect in a subgroup may differ considerably from the ATE. In sum, when making policy decisions school administrators should also consider how much effect SCP measures might have on subgroups of schools that share particular characteristics.

Despite the implications of this study suggesting that certain SCP measures should be prioritized, there may be opposition to some of these measures based on legal and ethical grounds despite their potential beneficial impacts on crime. For instance, the practice of randomly drug testing students is a controversial practice that has been

opposed by various public health, education, and civil liberties groups, despite Supreme Court rulings which upheld its constitutionality for students participating in athletics and extracurricular activities (Sznitman et al., 2012). In sum, it is important that schools also consider the possibility of negative reactions that could result when deciding to implement SCP measures that are likely to be deemed controversial.

Another consideration concerns the cost-effectiveness of implementing certain SCP measures. The costs of some SCP measures, such as installing metal detectors in schools or employing armed police officers and security guards may be far too high to justify any beneficial impacts these SCP measures might have on crime. For instance, it has been reported that there are high financial costs associated with acquiring and operating metal detectors and thus many school districts must often resort to accessing state and federal funding that has been set aside for investment in school safety technologies in order to afford them (Green, as cited by Gastic, 2011). However, despite findings from this study reporting deterrent effects of random metal detector checks in schools, resources may be more appropriately and efficiently spent on those measures that achieve the greatest reduction in crime while consuming the least amount of resources. Ultimately, schools should consider the severity of the crime problems in their schools when considering whether it would be cost-effective to employ these SCP measures.

The findings here also suggest that schools should reconsider the need for several other SCP measures. Measures intended to increase the effort of crime by controlling access to school grounds using gates and closing the campus for lunch and were found to increase the recording of certain crimes, as were measures intended to increase the risks

of crime through security staff. In addition, reducing provocations by limiting access to social networking increased the recording of crime, as did removing the excuses for crime through the use of random dog sniffs and drug testing of athletes.

Although the findings here were not supportive of the use of certain measures to prevent crime in schools, this does not discredit the need for them or suggest that they should not be part of a school's arsenal of safety and security measures. Rather, these findings suggest that these measures require more in-depth evaluation. For instance, although the present research suggests that having a closed lunch policy is conducive to the incidence of physical attacks and vandalism, some school officials have argued that it increases student safety by making it possible to screen people coming onto campus and preventing students from creating hazardous situations on streets for drivers and students during lunch (Bliesner, 2012). Likewise, despite findings from this study as well as other studies suggesting that SROs are likely to increase the recording of crime and related measures, their presence has been reported to make schools seem safer, which is related to improved academic achievement and student engagement (Brown, 2006).

Ultimately, the findings from this research do not attempt to discredit the need for SCP measures found to have no effect on crime or even those measures which were found to increase crime. However, it suggests that there must be greater scrutiny of these measures and that their unwavering expansion in schools is not driven by supporting evidence. In addition, these findings point to data and methodological considerations that should be examined to understand why some measures do not appear to work as intended. In sum, schools will need to weigh the potential costs and benefits of

implementing these measures that have not demonstrated effectiveness to determine what is most appropriate for their situation.

5.2 Limitations and Directions for Future Research

Although this study served to fill several theoretical and methodological gaps in the literature on school-based situational crime prevention, it is not without limitations. First, the present data does not permit an examination of the extent of the implementation of SCP measures in schools. While the use of SSOCS data allows for an understanding of the broad implementation of SCP measures, it limits the understanding of finer details. Respondents may have reported that their schools implemented the same SCP measure, but this measure may look different across schools. For instance, while some schools that use security cameras may make them apparent to students and post warning signs that their actions will be recorded (i.e., use to both detect and deter crime), other schools may place them in areas where students are unlikely to know they are being recorded (i.e., use only to detect crime). Likewise, the data here do not permit an understanding of the extent to which school security staff adopt a reactive or proactive approach (e.g., community policing) to school crime. It may be that changes in school crime also depend on the approach used by school security staff, not only their presence. However, this study found that certain measures of school crime were significantly higher in schools which had security guards and law enforcement personnel, suggesting that a more reactive approach was employed by schools in general. In sum, this study was unable to examine how SCP measures operated within schools. Future research therefore should involve the use of both quantitative and qualitative methods to provide a fuller picture of the nature of their implementation.

While this study observed a number of significant relationships, several of the SCP measures were reported to have null effects across all crime types. These included: 1) locked doors 2) contraband sweeps, 3) enforcement of a strict dress code 4) providing school lockers to students, 5) threat reporting system, and 6) prohibiting cell phones and text messaging devices. Future research should therefore explore the non-significant relationships in this study between these measures and school crime outcomes. Because the data provide no information on the nature of the implementation of SCP measures, it may be likely that the non-significant findings are associated with how SCP measures were implemented rather than how effective they are. For instance, some administrators may have reported that their school had policies prohibiting the use of cell phones but in practice the policies were rarely enforced. Although it may be possible that some measures do not have any impact on school crime outcomes, obtaining more detailed information from schools on implementation procedures may help in understanding why some SCP measures do not appear to be effective.

Despite the use of propensity score analysis which can be used to estimate causal effects with observational data collected at a single time point, the use of cross-sectional data makes it difficult to establish the temporal ordering of variables. Future research should therefore attempt to use longitudinal data or combine multiple years of cross-sectional to better establish temporal ordering. Although multiple years of SSOCS data could potentially have been employed for use with this study, the sample size of schools would be significantly lowered because not all schools have records in more than one year. Some schools are included in multiple years only by chance (e.g., Na & Gottfredson, 2011).

Another limitation concerns the generalizability of the results. First, the study used a sample of schools from the 2009-2010 school year. Therefore, the data may not reflect the degree to which SCP measures are currently implemented in schools. While this was the most recent SSOCS dataset made available by NCES for research purposes, future research should utilize a more current sample. Second, even though the data is a nationally representative sample, it only includes public schools and therefore results cannot be generalized to private schools. Future research examining the impacts of SCP measures should therefore include private schools in the sample to gauge whether these effects are also generalizable to these schools. The inclusion of private schools in future studies would serve to strengthen conclusions that SCP measures can be effective across different school settings.

It should be mentioned that the data are based on survey information provided by school administrators and therefore are susceptible to inaccuracies in the reporting of SCP measures and/or recording of crime. Some respondents may not have been aware of all the SCP measures operating in their schools and may not know the true frequency of incidents involving assaults, theft, drug use, and so forth. Surveys of school principals may not be ideal because some research suggests that principals have a tendency to over-report the use of crime prevention tactics within their schools and underreport the amount of crime (Gottfredson, Gottfredson, Czeh, Cantor, Crosse, & Hantman, 2000). Future research should seek to include survey information from teachers, staff, and students.

Lastly, future research should attempt to examine the cost-benefits of different SCP measures. Although some SCP measures have been reported to produce deterrent effects on crimes, it is possible that their impacts might not be considered substantial

enough to justify the costs of acquiring, implementing and operating them. An estimate of the average treatment effect on the treated, combined with an estimate of the average cost of a program per participating unit could allow a cost-benefit analysis of the question of whether to keep or discontinue the use of a program (OECD, 2004).

Ultimately, this study found that school-based SCP measures produced effects that vary by the type of crime as well as SCP measure when examined in a quasi-experimental design, providing mixed support for the utility of the SCP framework in reducing school crime. In addition, this study produced several results that contradict findings from previous correlational, non-experimental and perceptions research on school-based SCP measures. However, by using a quasi-experimental design as well as disaggregated measures of school crime, this study was able to produce stronger evidence supporting the use of a number of school-based SCP measures for particular crime outcomes. To achieve greater confidence in the results, it is important that future research examines in-depth the quality of the implementation of these measures.

REFERENCES

Agnew, R. (1992). Foundation for a general strain theory of crime and delinquency. *Criminology, 30*(1), 47-88.

Agnew, R. (2001). Building on the foundation of general strain theory: Specifying the types of strain most likely to lead to crime and delinquency. *Journal of Research in Crime and Delinquency, 38*(4), 319-361.

Agnew, R. (2002). Experienced, vicarious, and anticipated strain: An exploratory study on physical victimization and delinquency. *Justice Quarterly, 19*(4), 603-632.

Agnew, R. (2010). Controlling crime: Recommendations from general strain theory. In H. Barlow, & S. Decker, *Criminology and public policy* (pp. 25-44). Philadelphia, PA: Temple University Press.

American Civil Liberties Union. (2017). *Why student drug testing does not work.* Retrieved from ACLU: https://www.aclu.org/other/why-student-drug-testing-does-not-work

Anderman, E. M., & Kimweli, D. M. (1997). Victimization and safety in schools serving early adolescents. *Journal of Early Adolescence, 17*(4), 408-438.

Apel, R., & Sweeten, G. (2009). Propensity score matching in criminology and criminal justice. In A. R. Piquero, & D. Weisburd, *Handbook of Quantitative Criminology* (pp. 543-562). New York: Springer-Verlag.

Augustine, M. C., Wilcox, P., Ousey, G. C., & Clayton, R. R. (2002). Opportunity theory and adolescent school-based victimization. *Violence and Victims, 17*(2), 233-253.

Austin, P. C. (2011). An introduction to propensity score methods for reducing the effects of confounding in observational studies. *Multivariate Behavioral Research, 46*(3), 399-424.

Austin, P. C., Jambere, N., & Chiu, M. (2016). Propensity score matching and complex surveys. *Statistical Methods in Medical Research, 0*(0), 1-18.

Bachman, R., Randolph, A., & Brown, B. L. (2011). Predicting perceptions of fear at school and going to and from school for African American and white students: The effects of school security measures. *Youth & Society, 43*(2), 705-726.

Baird, S., Bohren, A., McIntosh, C., & Ozler, B. (2012). *Designing experiments to measure spillover and threshold effects.* The George Washington University.

Barnes, L. M. (2008). *Policing the schools: An evaluation of the North Carolina school resource officer program (Doctoral dissertation).* Retrieved from ProQuest Dissertations and Theses database (UMI No. 3326961).

Barnes, T. N., Leite, W., & Smith, S. W. (2015). A quasi-experimental analysis of schoolwide violence prevention programs. *Journal of School Violence, 16*(1), 1-19.

Beccaria, C. (1986). *On crimes and punishments.* Indianapolis, IN: Hackett Publishing Company, Inc.

Becker, S. O., & Ichino, A. (2002). Estimation of average treatment effects based on propensity scores. *The Stata Journal, 2*(4), 358-377.

Beger, R. (2002). Expansion of police power in public schools and the vanishing rights of students. *Social Justice, 29*(1-2), 119-130.

Berk, R. A. (2005). Randomized experiments as the bronze standard. *Journal of Experimental Criminology, 1*(4), 417-433.

Black, D. (193). Crime as social control. *American Sociological Review, 48*(1), 34-45.

Bliesner, G. (2012, March 13). *Why a closed lunch at high school is safest.* Retrieved from KSL.com: https://www.ksl.com/?nid=1009&sid=19522933

Blosnich, J., & Bossarte, R. (2011). Low-level violence in schools: Is there an association between school safety measures and peer victimization? *Journal of School Health, 81*(2), 107-113.

Booren, L. M., & Handy, D. J. (2009). Students' perceptions of the importance of school safety strategies: An introduction to the IPSS survey. *Journal of School Violence, 8*(3), 233-250.

Bosworth, K., Ford, L., & Hernandaz, D. (2011). School climate factors contributing to student and faculty perceptions of safety in select Arizona schools. *Journal of School Health, 81*(4), 194-201.

Boxer, P., & Dubow, E. F. (2002). A social-cognitive information-processing model for school-based aggression reduction and prevention programs: Issues for research and practice. *Applied and Preventive Psychology, 10*(3), 177-192.

Brantingham, P., Brantingham, P., & Taylor, W. (2005). Situational crime prevention as a key component in embedded crime prevention. *Canadian Journal of Criminology and Criminal Justice, 47*(2), 271-292.

Brezina, T., Piquero, A., & Mazerolle, P. (2001). Student anger and aggressive behavior in school: An initial test of Agnew's macro-level strain theory. *Journal of Research in Crime and Delinquency, 38*(4), 362-286.

Brookhart, M. A., Schneewiess, S., Rothman, K. J., Glynn, R. J., Avorn, J., & Sturmer, T. (2006). Variable selection for propensity score models. *American Journal of Epidemiology, 163*(12), 1149-1156.

Brookmeyer, K. A., Fanti, K. A., & Henrich, C. C. (2006). Schools, parents, and youth violence: A multilevel ecological analysis. *Journal of Clinical Child Adolescent Psychology, 35*(4), 504-514.

Brown, B. (2006). Controlling crime and delinquency in schools: An exploratory study of student perceptions of school security measures. *Journal of School Violence, 4*(4), 105-125.

Bryk, A., & Driscoll, M. (1988). *The school as community: Theoretical foundations, contextual influences, and consequences for students and teachers.* Madison, WI: University of Wisconsin, National Center on Effective Secondary Schools.

Burrow, J. D., & Apel, R. (2008). Youth behavior, school structure, and student risk of victimization. *Justice Quarterly, 25*(2), 349-380.

Caliendo, M., & Kopeinig, S. (2008). Some practical guidance for the implementation of propensity score matching. *Journal of Economic Surveys, 22*(1), 31-72.

Carlton, M. P. (2017). *Summary of school safety statistics.* Washington, DC: U.S. Department of Justice, Office of Justice Programs.

Chen, G. (2008). Communities, students, schools, and school crime. *Urban Education, 43*(3), 301-318.

Cheurprakobkit, S., & Bartsch, R. A. (2005). Security measures on school crime in Texas middle and high schools. *Educational Research, 47*(2), 235-250.

Chrusciel, M. M., Wolfe, S., Hansen, J. A., Rojek, J. J., & Kaminski, R. (2015). Law enforcement executive and principal perspectives on school safety measures: School resource officers and armed school employees. *Policing: An International Journal of Police Strategies and Management, 38*(1), 24-39.

Clarke, R. (1983). Situational crime prevention: Its theoretical basis and practical scope. *Crime and Justice: An Annual Review of Research, 4*, 225-256.

Clarke, R. (1997). *Situational crime prevention: Successful case studies.* Criminal Justice Press.

Cohen, L., & Felson, M. (1979). Social change and crime rate trends: A routine activity approach. *American Sociological Review, 44*(4), 588-607.

Cook, P. J., Gottfredson, D. C., & Na, C. (2010). School crime control and prevention. *Crime and Justice, 39*(1), 313-440.

Cornish, D. B., & Clarke, R. V. (2003). Opportunities, precipitators and criminal decisions: A reply to Wortley's critique of situational crime prevention. *Crime Prevention Studies, 16*, 41-96.

Cornish, D., & Clarke, R. V. (1986). *The reasoning criminal: rational choice perspectives on offending.* New York: Springer-Verlag.

Craig, W. M., Pepler, D., & Atlas, R. (2000). Observations of bullying in the playground and in the classroom. *School Psychology International, 21*(1), 22-36.

Crawford, C., & Burns, R. (2015). Preventing school violence: assessing armed guardians, school policy, and context. *Policing: An International Journal of Police Strategies and Management, 38*(4), 631-647.

Crawford, C., & Burns, R. (2016). Reducing school violence: Considering school characteristics and the impacts of law enforcement, school security, and environmental factors. *Policing: An International Journal of Police Strategies and Management, 39*(3), 455-477.

DeVoe, J. F., Kaffenberger, S., & Chandler, K. (2005). *Results from the 2001 school crime supplement to the National Crime Victimization Survey: Statistical analysis report.* Washington, DC: National Center for Education Statistics, U.S. Department of Education.

Dohy, J., & Banks, T. (2017). The impact of school policing on student behaviors in Ohio public schools. *Journal of School Violence*.

Drukker, D. (2014). *In the spotlight: Double-robust treatment effects.* Retrieved from The Stata News: https://www.stata.com/stata-news/news29-1/double-robust-treatment-effects/

DuGoff, E., Schuler, M., & Stuart, E. A. (2014). Generalizing observational study results: Applying propensity score methods to complex surveys. *Health Research Services Research, 49*(1), 284-303.

Durant, R., Treiber, F., Getts, A., McCloud, K., Linder, C., & Woods, E. (1996). Comparison of two violence prevention curricula for middle school adolescents. *Journal of Adolescent Health, 19*(2), 111-117.

Eitle, D. J., & Eitle, T. M. (2004). School and county characteristics as predictors of school rates of drug, alcohol, and tobacco offenses. *Journal of Health and Social Behavior, 45*(4), 408-421.

Emsley, R., Lunt, M., Pickles, A., & Dunn, G. (2008). Implementing double-robust estimators of causal effects. *The Stata Journal, 8*(3), 334-353.

Espelage, D. L., Low, S., Polanin, J. R., & Brown, E. C. (2013). The impact of a middle school program to reduce aggression, victimization, and sexual violence. *Journal of Adolescent Health, 53*(2), 180-186.

Farrell, A. D., Meyer, A. L., & White, K. S. (2001). Evaluation of responding in peaceful and positive ways (RIPP): A school-based prevention program for reducing violence among urban adolescents. *Journal of Child and Family Studies, 30*(4), 451-463.

Felson, R., Liska, A., South, S., & McNulty, T. (1994). The subculture of violence and delinquency: Individual vs. school context effects. *Social Forces, 73*(1), 155-173.

Finn, P., & McDevitt, J. (2005). *National assessment of school resource officer programs final project report.*

Fisher, B. W., & Hennessy, E. A. (2016). School resource officers and exclusionary discipline in U.S. high schools: A systematic review and meta-analysis. *Adolescent Research Review, 1*(3), 217-233.

Fitzpatrick, K. M. (1999). Violent victimization among America's school children. *Journal of Interpersonal Violence, 14*(10), 1055-1069.

Frailing, K., & Harper, D. W. (2013). *Fundamentals of criminology: New dimensions.* Durham, NC: Carolina Academic Press.

Funk, M. J., Westreich, D., Davidian, M., & Wiesen, C. (2010). Doubly robust estimation of treatment effects. In D. Faries, A. Leon, J. Haro, & R. Obenchain, *Analysis of observational health care data using SAS.* SAS Press.

Garcia, C. (2003). School safety technology in America: Current use and perceived effectiveness. *Criminal Justice Policy Review, 14*(1), 30-54.

Garrido, M. M., Kelley, A. S., Paris, J., Roza, K., Meier, D. E., Morrison, R. S., & Aldridge, M. D. (2014). Methods for constructing and assessing propensity scores. *Health Services Research, 49*(5), 1701-1720.

Gastic, B. (2011). Metal detectors and feeling safe at school. *Education and Urban Society, 43*(4), 486-498.

Gerlinger, J., & Wo, J. (2016). Preventing school bullying: Should schools prioritize an authoritative school discipline approach over security measures? *Journal of School Violence, 15*(2), 133-157.

Ginsberg, C., & Loffredo, L. (1993). Violence-related attitudes and behaviors of high school students-New York City, 1992. *Journal of Student Health, 63*(10), 438-439.

Goldberg, L., Elliot, D. L., MacKinnon, D. P., Moe, E. L., Kuehl, K. S., Yoon, M., . . . Williams, J. (2007). Outcomes of a prospective trial of student-athlete drug testing: The student athlete testing using random notification (SATURN) study. *Journal of Adolescent Health, 41*(5), 421-429.

Gottfredson, G. D., Gottfredson, D. C., Czeh, E. R., Cantor, D., Crosse, S. B., & Hantman, I. (2000). *A national study of delinquency prevention in school final report.* Ellicott City, MD: Gottfredson Associates.

Gottfredson, G. D., Gottfredson, D. C., Payne, A. A., & Gottfredson, N. C. (2005). School climate predictors of school disorder: Results from a national study of delinquency prevention in schools. *Journal of Research in Crime and Delinquency, 42*(4), 412-444.

Gottfredson, G., & Gottfredson, D. (1985). *Victimization in schools.* New York: Plenum Press.

Gottfredson, M., & Hirschi, T. (1990). *A general theory of crime.* Stanford, CA: Stanford University Press.

Granberg-Rademacker, J. S., Bumgarner, J., & Johnson, A. (2007). Do school violence policies matter? An empirical analysis of four approaches to reduce school violence. *Southwest Journal of Criminal Justice, 4*(1), 3-29.

Greene, M. B. (2005). Reducing violence and aggression in schools. *Trauma Violence, & Abuse, 6*(3), 236-253.

Gregory, A., Cornell, D., Fan, X., Sheras, P., Shih, T., & Huang, F. (2010). Authoritative school discipline: High school practices associated with lower bullying victimization. *Journal of Educational Psychology, 102*(2), 483-496.

Grossman, D. C., Neckerman, H. J., Koepsell, T. D., Liu, P., Asher, K. N., & Rivara, F. P. (1997). Effectiveness of a violence prevention curriculum among children in elementary school: A randomized controlled trial. *Journal of the American Medical Association, 277*(20), 1605-1611.

Hankin, A., Hertz, M., & Simon, T. (2011). Impacts of metal detector use in schools: Insights from 15 years of research. *Journal of School Health, 81*(2), 100-106.

Hawkins, J. D., Catalano, R., Kosterman, R., Abbot, R., & Hill, K. (1999). Preventing adolescent health-risk behaviors by strengthening protection during childhood. *Archives of Pediatric and Adolescent Medicine, 153*(3), 226-234.

Heinrich, C., Maffioli, A., & Vazquez, G. (2010). *A primer for applying propensity-score matching.* Inter-American Development Bank.

Hindelang, M., Gottfredson, M., & Garafalo, J. (1978). *Victims of personal crime: An empirical foundation for a theory of personal victimization.* Cambridge, MA: Ballinger.

Hirschi, T. (1969). *Causes of delinquency.* Berkeley, CA: University of California Press.

Ho, D. E., Imai, K., King, G., & Stuart, E. A. (2007). Matching as nonparametric preprocessing for reducing model dependence in parametric causal inference. *Political Analysis, 15*(3), 199-236.

Huber, C., & Drukker, D. (2015, July 7). *Introduction to treatment effects in Stata: Part 1.* Retrieved from The Stata Blog: https://blog.stata.com/2015/07/07/introduction-to-treatment-effects-in-stata-part-1/

Imbens, G. W. (2004). Nonparametric estimation of average treatment effects under exogeneity: A review. *Review of Economics and Statistics, 86*(1), 4-29.

Jackson, A. (2002). Police-school resource officers' and students' perception of the police and offending. *Policing: An International Journal of Police Strategies and Management, 25*(3), 631-650.

James-Burdumy, S., Goesling, B., Deke, J., & Einspruch, E. (2012). The effectiveness of mandatory-random student drug testing: A cluster randomized trial. *Journal of Adolescent Health, 50*(2), 172-178.

Jenkins, P. H. (1997). School delinquency and the school social bond. *Journal of Research in Crime and Delinquency, 34*(3), 337-367.

Jennings, W. C., Khey, D. N., Maskaly, J., & Donner, C. M. (2011). Evaluating the relationship between law enforcement and school security measures and violent crime in schools. *Journal of Police Crisis Negotiations, 11*(2), 109-124.

Johnson, I. M. (1999). School violence: The effectiveness of a school resource officer program in southern city. *Journal of Criminal Justice, 27*(2), 173-192.

Lenis, D., Nguyen, T. Q., Dong, N., & Stuart, E. A. (2017). *It's all about balance: Propensity score matching in the context of complex survey data.* Johns Hopkins University, Dept. of Biostatistics Working Papers. Retrieved from http://biostats.bepress.com/jhubiostat/paper284

Lesneskie, E., & Block, S. (2016). School violence: The role of parental and community involvement. *Journal of School Violence,* 1-19.

Li, M. (2012). Using the propensity score method to estimate causal effects: A review and practical guide. *Organizational Research Methods, 16*(2), 1-39.

Link, J. W. (2010). *School resource officers in Missouri public schools: School safety and academic success (Doctoral dissertation).* Retrieved from ProQuest Dissertations and Theses database (UMI No. 3440207).

Lunt, M. (2014). *Propensity analysis in Stata revision: 1.1.* Retrieved from personalpages.manchester.ac.uk/staff/mark.lunt/propensity_guide.pdf

Maskaly, J., Donner, C. M., Lanterman, J., & Jennings, W. G. (2011). On the association between SROs, private security guards, use-of-force capabilities, and violent crime in schools. *Journal of Police Crisis Negotiations, 11*(2), 159-176.

Maxfield, M. G. (1987). Lifestyle and routine activity theories of crime: Empirical studies of victimization, delinquency, and offender decision-making. *Journal of Quantitative Criminology, 3*(4), 275-282.

May, D. C., Fessel, S. D., & Means, S. (2004). Predictors of principals' perceptions of school resource officer effectiveness in Kentucky. *American Journal of Criminal Justice, 29*(1), 75-93.

Mayer, M. J., & Leone, P. E. (1999). A structural analysis of school violence and disruption: Implications for creating safer schools. *Educational & Treatment of Children, 22*(3), 333-356.

McCord, J., Widom, C. S., Bamba, M. I., & Crowell, N. A. (2000). *Education and delinquency: Summary of a workshop.* Washington, DC: National Academy Press.

Minogue, N., Kingery, P., & Murphy, L. (1999). *Approaches to assessing violence among youth.* Rosslyn, VA: Hamilton Fish National Institute on School and Community Violence.

Na, C., & Gottfredson, D. C. (2011). Police officers in schools: Effects on school crime and processing of offending behaviors. *Justice Quarterly, 30*(4), 1-32.

Neiman, S., Murphy, C., Thomas, T., & Hansen, R. (2015). *2009-10 School survey on crime and safety (SSOCS) survey documentation.* Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Nickerson, A. B., & Martens, M. P. (2008). School violence: Associations with control, security/enforcement, educational/therapeutic approaches, and demographic factors. *Social Psychology Review, 37*(2), 228-243.

O'Neill, L., & McGloin, J. M. (2007). Considering the efficacy of situational crime prevention in schools. *Journal of Criminal Justice, 35*(5), 511-523.

Organisation for Economic Co-operation and Development. (2004). *Evaluating local economic and employment development: How to assess what works among programmes and policies.* OECD.

Pan, W., & Bai, H. (2015). *Propensity score analysis: Fundamentals and developments.* Guilford Publications.

Payne, A. A. (2008). A multilevel analysis of the relationships among communal school organization, student bonding, and delinquency. *Journal of Research in Crime and Delinquency, 45*(4), 429-455.

Payne, A. A., Gottfredson, D. C., & Gottfredson, G. D. (2003). Schools as communities: The relationships among communal school organization, student bonding, and school disorder. *Criminology, 41*(3), 749-778.

Perumean-Chaney, S. E., & Sutton, L. M. (2013). Students and perceived school safety: The impact of school security measures. *American Journal of Criminal Justice, 38*(4), 570-588.

Reingle, J., Jetelina, K., & Jennings, W. G. (2016). Structural school safety measures, SROs, and school-related delinquent behavior and perceptions of safety: A state-of-the-art review. *Policing: An International Journal of Police Strategies and Management, 39*(3), 455-477.

Reis, J., Trockel, M., & Mulhall, P. (2007). Individual and school predictors of middle school aggression. *Youth and Society, 38*(3), 322-347.

Rich-Shea, A. (2010). *Adolescent youth and social control: The changing role of public schools (Doctoral dissertation).* Retrieved from ProQuest Dissertations and Theses database (UMI No. 3427444).

Ridgeway, G., Kovalchik, S. A., Griffin, B., & Kabeto, M. U. (2015). Propensity score analysis with survey weighted data. *Journal of Causal Inference, 3*(2), 237-249.

Rosenbaum, P. R. (2007). Interference between units in randomized experiments. *Journal of the American Statistical Association, 102*(477), 191-200.

Rosenbaum, P. R., & Rubin, D. B. (1985). Constructing a control group using multivariate matched sampling methods that incorporate the propensity score. *The American Statistician, 39*(1), 33-38.

Rubin, D. R. (2008). For objective causal inference, design trumps analysis. *The Annals of Applied Statistics, 2*(3), 808-840.

Sampson, R. J. (2011). *Great American city: Chicago and the enduring neighborhood effect.* Chicago: University of Chicago Press.

Sampson, R. J., & Wooldredge, J. D. (1987). Linking the micro- and macro-level dimensions of lifestyle-routine activity and opportunity models of predatory victimization. *Journal of Quantitative Criminology, 3*(4), 371-393.

Sampson, R., Raudenbush, S., & Earls, F. (1997). Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science, 277*(5328), 918-924.

Schreck, C. J. (1999). Criminal victimization and low self-control. *Justice Quarterly, 16*(3), 633-654.

Schreck, C. J., Miller, J. M., & Gibson, C. L. (2003). Trouble in the school yard: A study of the risk factors of victimization at school. *Crime and Delinquency, 49*(3), 460-483.

Sevigny, E. L., & Zhang, G. (2016). Do barriers to crime prevention moderate the effects of situational crime prevention policies on violent crime in high schools? *Journal of School Violence*, 1-16.

Shadish, W. R. (2013). Propensity score analysis: Promise, reality, and irrational exuberance. *Journal of Experimental Criminology, 9*(2), 129-144.

Simon, H. A. (1955). A behavioral model of rational choice. *Quarterly Journal of Economics, 69*(1), 99-118.

Simon, H. A. (1991). Bounded rationality and organizational learning. *Organizational Science, 2*(1), 125-134.

Stafford, M. C., & Warr, M. (1993). A reconceptualization of general and specific deterrence. *Journal of Research in Crime and Delinquency, 30*(2), 123-135.

StataCorp. (2015a). *Stata 14 base reference manual.* College Station, TX: Stata Press.

StataCorp. (2015b). Stata statistical software: Release 14. College Station, TX: StataCorp LP.

Stevenson, Q. W. (2011). *School resource officers and school incidents: A quantitative study (Doctoral dissertation).* Retrieved from ProQuest Dissertations and Theses database (UMI No. 3461388).

Stewart, E. A. (2003). School social bonds, school climate, and school misbehavior: A multilevel analysis. *Justice Quarterly, 20*(3), 575-604.

Stuart, E. A. (2010). Matching methods for causal inference: A review and a look forward. *Statistical Science, 25*(1), 1-21.

Sullivan, C., & Hirschfield, P. (2011). Problem behavior in the middle school years: An assessment of the social development model. *Journal of Research in Crime and Delinquency, 48*(4), 566-593.

Swartz, K., Osborne, D. L., Dawson-Edwards, C., & Higgins, G. E. (2015). Policing schools: Examining the impact of place management activities on school violence. *American Journal of Criminal Justice, 41*(3), 1-19.

Swearer, S., Espelage, D., Vaillancourt, T., & Hymel, S. (2010). What can be done about school bullying? Linking research to educational practice. *Educational Researcher, 39*(1), 38-47.

Sznitman, S., & Romer, D. (2014). Student drug testing and positive school climates: Testing the relation between two school characteristics and drug use and behavior in a longitudinal study. *Journal of Studies on Alcohol and Drugs, 75*(1), 65-73.

Sznitman, S., Dunlop, S., Nalkur, P., Khurana, A., & Romer, D. (2012). Student drug testing in the context of positive and negative school climates: Results from a national survey. *Journal of Youth and Adolescence, 41*(2), 146-155.

Terry-McElrath, Y. M., O'Malley, P. M., & Johnston, L. D. (2013). Middle and high school drug testing and student illicit drug use: A national study 1998-2011. *Journal of Adoscent Health, 52*(6), 707-715.

Theriot, M. T. (2009). School resource officers and the criminalization of student behavior. *Journal of Criminal Justice, 37*(3), 280-287.

Thoemmes, F., & Ong, A. D. (2016). A primer on the inverse probability of treatment weighting and structural models. *Emerging Adulthood, 4*(1), 40-59.

Tibbetts, S. G. (2011). Modern applications of the classical perspective: Deterrence, rational choice, and routine activities or lifestyle theories of crime. In S. G. Tibbetts, *Criminological theory: The essentials* (pp. 52-64). SAGE Publications.

Tillyer, M. S., Fisher, B. S., & Wilcox, P. (2011). The effects of school crime prevention on students' violent victimization, risk perception, and fear of crime: A multilevel opportunity perspective. *Justice Quarterly, 28*(2), 249-277.

Tyler, T. (1997). The psychology of legitimacy: A relational perspective on voluntary deference to authorities. *Personality and Social Psychology Review, 1*(4), 323-45.

Tyler, T. (2007). Procedural justice and the courts. *Court Review, 44*(1), 26-31.

Varadhan, R., & Seeger, J. D. (2013). Estimation and reporting of heterogeneity of treatment effects. In P. Velentgas, N. A. Dreyer, & P. Nourjah, *Developing a protocol for observational comparative effectiveness research: A user's guide.* Rockville, MD: Agency for Healthcare Research and Quality.

Wang, A., Nianogo, R. A., & Arah, O. A. (2017). G-computation of average treatment effects on the treated and the untreated. *BMC Medical Research Methdology, 17*(3), 1-5.

Weishew, N., & Peng, S. (1993). Variables predicting students' problem behaviors. *Journal of Educational Research, 87*(1), 5-17.

Welsh, W. (2000). The effects of school climate on school disorder. *Annals of the American Academy of Political and Social Science, 567*, 88-107.

Welsh, W. (2001). Effects of student and school factors on five measures of school disorder. *Justice Quarterly, 18*(4), 911-947.

Welsh, W. (2003). Individual and institutional predictors of school disorder. *Youth Violence and Juvenile Justice, 1*(4), 346-368.

Welsh, W., Greene, J., & Jenkins, P. (1999). School disorder: The influence of individual, institutional, and community factors. *Criminology, 37*(4), 73-116.

Welsh, W., Stokes, R., & Greene, J. (2000). A macro-level model of school disorder. *Journal of Research in Crime and Delinquency, 37*(3), 243-283.

Wilcox, P., & Clayton, R. (2001). A multilevel analysis of school-based weapon possession. *Justice Quarterly, 18*(3), 509-541.

Wilcox, P., Tillyer, M. S., & Fisher, B. S. (2009). Gendered opportunity? School-based adolescent victimization. *Journal of Research in Crime and Delinquency, 46*(2), 245-269.

Wilkerson, D. (2001). *The relationship between the school resource officer and patterns of suspensions from school due to violence, gang activity, and substance/alchohol abuse (Doctoral dissertation).* Retrieved from ProQuest Dissertations and Theses database (UMI No. 3051857).

Wynne, S. L., & Joo, H. (2011). Predictors of school victimization: Individual, familial, and school factors. *Crime and Delinquency, 57*(3), 458-488.

Zhang, A., Musu-Gillette, L., & Oudekerk, B. (2016). *Indicators of school crime and safety: 2015.* Washington DC: National Center for Education Statistics, U.S. Department of Education, and Bureau of Justice Statistics, Office of Justice Programs, U.S. Department of Justice.