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Social Control in Schools: The Relationships between School Security Measures and Informal Social Control Mechanisms

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ABSTRACT

Social control and procedural justice theories indicate that informal social control reduces problem behaviors. However, many schools have implemented formal control mechanisms such as school security measures. This study examines the association between school security measures (security personnel, metal detectors, and surveillance cameras) and students' perceptions of informal social control (relationships with teachers, other school adults, and the fairness and consistency of school rules). We used structural equation modeling to examine these relationships in a nationally representative sample of 6,547 secondary students surveyed as part of the School Crime Supplement to the National Crime Victimization Survey (*M* age = 14.94; 51% male, 60% White non-Hispanic, 14% Black non-Hispanic, 20% Hispanic). The results indicated that the presence of security personnel in schools was associated with poorer student relationships with teachers. Findings for the other school security measures were nonsignificant or inconsistent across models. Implications for theory and practice are discussed.

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school climate; school rules;
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Schools are a foundational socializing institution for U.S. adolescents with lasting effects through adulthood (Eccles & Roeser, 2011), and patterns of criminal and delinquent behaviors often begin in school (Sampson & Laub, 1990). The presence of informal social control can play an important role in shaping students' delinquent behaviors in school (Cook, Gottfredson, & Na, 2010; Gottfredson, 2001; Hirschi, 1969). For example, students' relationships with teachers and other school adults and their perceptions of the fairness of school rules are important mechanisms of informal social control that have consistently been found to relate to lower rates of student problem behaviors including juvenile delinquency (Cook et al., 2010; Gottfredson, 2001; Hirschi, 1969; Tyler, 1990). In recent years, however, schools have increasingly begun to incorporate formal control mechanisms in the form of school security measures such as security personnel, surveillance cameras, and metal detectors (Addington, 2009; Steinka-Fry, Fisher, & Tanner-Smith, 2016; Zhang, Musu-Gillette, & Oudekerk, 2016). Yet the presence of formal control mechanisms may erode the strength of informal social control mechanisms in schools. For instance, if school security measures monitor student behavior so that school adults no longer have to, this may result in less adult investment in students and thus poorer student–teacher relationships (Devine, 1996).

Although informal and formal control mechanisms have implicitly overlapping goals (i.e., reducing student problem behavior), it is largely unknown how these different systems of control relate

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to one another in school contexts. On one hand, because both types of control mechanisms have similar goals, students in schools that have implemented formal control mechanisms might also perceive stronger informal social control. Such a finding would indicate that school security measures may enhance students' bonds to the school and improve their perception of the fairness and consistency of school rules. On the other hand, schools' reliance on mechanisms meant to provide formal control may limit the strength of informal social control mechanisms, potentially eroding students' bonds to the school and limiting the strength of informal social control mechanisms such as students' relationships with teachers. The current study therefore aims to address these issues by examining whether the presence of three different school security measures (i.e., security personnel, metal detectors, and surveillance cameras) is related to students' perceptions of three informal social control mechanisms in schools: relationships with teachers, relationships with adults in the school, and perceptions of the fairness and consistency of school rules.

Criminological perspectives on informal and formal social control

Historically, schools have relied on informal social control mechanisms to prevent student problem behaviors in school. Social control theory suggests that when students feel more emotionally connected to those around them, they tend to engage in behaviors that elicit approval from those individuals (Hirschi, 1969). Given that teachers and other adults are integral parts of maintaining the social order, when students form relational bonds to adults in the school, students are less likely to engage in the behaviors adults may deem problematic that will threaten those relational bonds (Cornelius-White, 2007; Krohn & Massey, 1980). Similarly, students who attend schools that are organized in a more communal nature have stronger bonds to the school and lower rates of misbehavior (Bryk & Driscoll, 1988; Payne, 2008; Payne, Gottfredson, & Gottfredson, 2003). This stronger bond to the school and increased sense of connectedness also serves a protective function against risky and criminal behaviors (McNeely & Falci, 2004; Resnick et al., 1997). Because students' relationships with adults are an important component of their bond or sense of connectedness to school, having positive relationships with adults in the school may act as one mechanism of informal social control.

Another mechanism of informal social control that may deter students from engaging in problem behaviors in schools is students' perceptions of the fairness of school rules. Procedural justice theory (Tyler, 1990) indicates that people are more likely to follow rules perceived as fair. Therefore, in school settings, when students perceive that rules are fair and consistently enforced, they may be more likely to conform to the behavioral expectations of their school (Cook et al., 2010; Gottfredson, 2001; Tyler, 1990). On the other hand, if students believe that school rules are unfair and inconsistently enforced, students may be less likely to abide by them (Gottfredson, Gottfredson, Payne, & Gottfredson, 2005; Martella, Nelson, Marchand-Martella, & O'Reilly, 2011; Nelson, Martella, & Galand, 1998). Students' perceptions of school rules—particularly in regard to their fairness and the consistency of their enforcement—are therefore another key mechanism of informal social control that may shape student behavior within school settings. Taken together, these theoretical perspectives suggest that informal social control mechanisms are one useful approach for managing student problem behavior in school settings.

In recent years, formal control mechanisms designed to reduce students' problem behaviors have become increasingly common in schools (Zhang et al., 2016). School security measures are one of the most widespread formal control mechanisms in schools nationwide, although there is little research that has examined their effect on student behavior (Addington, 2009; Tanner-Smith, Fisher, Addington, & Gardella, 2018). Although school security measures are typically used to detect and deter violent behaviors or drug- or weapon-related activities in school, they may have a more widespread influence on student behavior. Namely, formal control mechanisms may reinforce informal social control mechanisms. For instance, routine activity theory suggests that interpersonal crime is more likely to occur when there is a confluence of a motivated offender, a suitable target,

and a lack of capable guardianship (Cohen & Felson, 1979; Popp & Peguero, 2011). School security measures may therefore act as real or virtual guardians in school, thereby increasing the potential for detecting and deterring misbehavior.

On the other hand, however, the presence of formal control mechanisms may actually erode informal social controls in schools. For example, when control mechanisms in schools become increasingly formalized, this may shift the responsibilities for managing student behavior away from adults in the school and toward police departments and juvenile courts (Beger, 2002; Kupchik & Monahan, 2006). In such a situation, the duty of providing guardianship may fall less on school personnel and more on police officers or other apparatuses designed to detect threats (e.g., surveillance cameras). Informal social control mechanisms such as student–teacher relationships and perceptions of school rules may thus become less salient to students when compared to more formal approaches to control. Therefore, the formalization of guardianship may erode the usefulness of and perceived need for informal social control mechanisms among students (Devine, 1996; Hirschfield, 2008; Noguera, 1995).

Formal control and the role of school security measures

Security personnel

Although security personnel have been present in schools for several decades, concerns about school violence in the late 1990s continued the shift toward increasing the presence of security personnel in U.S. schools (Addington, 2009; Casella, 2003). The presence of security personnel in schools may affect students' perceptions of informal social control mechanisms, although the direction of this effect is unclear. Because security personnel are typically free to patrol the building at their discretion, they may increase the likelihood that student problem behaviors are detected and punished (i.e., due to net-widening effects), thereby deterring future problem behaviors and increasing students' perceptions of school rules as consistently enforced. However, the involvement of security personnel—particularly police officers and school resource officers—in the discipline process may have negative consequences for students' relationships with teachers and other adults in the school. For instance, the presence of police in schools may lead to an outsourcing of student discipline to police departments and juvenile courts, thereby removing teachers from their traditional role in addressing students' problem behaviors (Devine, 1996; Kupchik & Monahan, 2006) and weakening their relationships with students.

Additionally, compared to schools without security personnel, those with security personnel—particularly sworn police officers—may respond to students' problem behaviors with sanctions that involve the justice system. To the extent that students view their problem behaviors as infractions of school rules rather than illegal behaviors, the formal legal approach of security personnel may not be perceived as fair. Therefore, the presence of security personnel has the potential to reduce students' beliefs that school rules are fair. Alternatively, because security personnel are largely responsible for preventing, detecting, and addressing illegal behaviors, their presence may increase the consistency of the enforcement of school rules, particularly in schools where illegal behaviors are more common. Security personnel may thus improve students' perceptions of school rules, particularly through the consistency of their enforcement.

There is little extant research that has examined the effects of security personnel on informal social control mechanisms in schools. Ethnographic work in New York City revealed that the presence of police in schools weakened students' relationships with their teachers because teachers became more reliant on the police to handle behavior problems, leading to less holistic relationships with their students (Devine, 1996). Other qualitative work has identified similar trends, whereby students report feeling less connected to the school due to their interactions with security personnel in school (Kupchik, 2010; Nolan, 2011). Quantitative studies have yielded similar results. For example, in a sample of secondary students from a district that implemented school resource officers, students who had more interactions with a school resource officer reported lower feelings of school

connectedness (which included perceptions of school rules, relationships with adults in the school, and an overall sense of belonging to the school), even though they had more positive perceptions of the school resource officers (Theriot, 2016). This research suggests that increased exposure to formal social control mechanisms—in this case, security personnel—may be associated with weaker informal social control.

Metal detectors

Metal detectors—either in the form of free-standing machines or handheld wands—are typically used to detect weapons or other contraband. Some schools use metal detectors daily for all students whereas other schools use them randomly. The expected association between metal detectors and informal social control mechanisms is unclear. On one hand, metal detectors may reinforce students' perceived authority of school rules and bolster the effect of school rules as an informal social control mechanism. If students observe that metal detectors increase the detection of contraband or prevent students from bringing contraband to school, they may perceive that metal detectors effectively reinforce school rules and the social and behavioral norms espoused by adults in the school. Conversely, metal detectors may have deleterious effects on informal control mechanisms in school by creating unwelcoming, prison-like environments where students do not feel trusted (Addington, 2009; Devine, 1995; Finley, 2006; Noguera, 1995, 2003), potentially leading to weaker relationships between students and adults in the school. Thus, although metal detectors may be utilized with the explicit intention of limiting the presence of contraband in school, they may also affect perceptions of informal social control.

To date, there is little empirical evidence that has examined the effects of metal detectors in schools (see Hankin, Hertz, & Simon, 2011 for a review), and prior studies have not addressed their relationship with informal social control. Studies have, however, examined more distal outcomes that may be related to informal social control such as perceptions of safety and crime in schools. One study found that students with metal detectors in their school felt less safe at school, particularly in rural and suburban schools (Gastic, 2011). Other studies have reported a lack of relationship between metal detector use and students' perceived risk of victimization at school (Schreck, Miller, & Gibson, 2003), their exposure to assault or larceny (Burrow & Apel, 2008), or drug-related offenses (Cheurprakobkit & Bartsch, 2005), although some have reported that metal detector use was associated with lower levels of interpersonal crime (Cheurprakobkit & Bartsch, 2005). A study using national survey data found that schools' use of metal detectors (in combination with security personnel and/or surveillance cameras) was associated with greater exposure to drugs, firearms, and fighting, and decreased exposure to property crime, but these effects were relatively small in magnitude (Tanner-Smith et al., 2017). Therefore, the existing evidence about the effect of metal detectors on informal social control is inconsistent, but suggests a lack of beneficial effects and the potential for negative ones.

Surveillance cameras

Some scholars suggest that surveillance cameras may not have the negative effects often attributed to other school security measures. Hirschfield (2010) suggested that surveillance cameras—in contrast to other forms of school security like metal detectors—are an inclusive form of social control because they cannot discriminate against certain students and are not intended to remove students from school. Additionally, the near ubiquity of video recording devices on computers, mobile phones, and in public spaces may have desensitized young people to the presence of surveillance cameras. Surveillance cameras may be viewed as useful tools for consistently and fairly enforcing school rules (e.g., reviewing footage to see who vandalized school property), thereby increasing the effectiveness of school rules as a mechanism of informal social control. However, there are still concerns that surveillance cameras—particularly in combination with other school security measures—may foster an environment of distrust, and erode students' relationships with adults and their sense of belonging at school (Addington, 2009; Noguera, 1995, 2003).

Prior research has not directly examined the relationship between the presence of surveillance cameras and the strength of informal social control mechanisms in schools, instead addressing outcomes related to crime, victimization, and perceived safety. Studies have shown that surveillance cameras had no significant relationship with assault or larceny at school (Burrow & Apel, 2008), or more general indicators of school crime and victimization (Blosnich & Bossarte, 2011; Schreck et al., 2003). Although some students and administrators reported feeling safer at school because of surveillance cameras (Bosworth, Ford, & Hernandez, 2011; Brown, 2005; Garcia, 2003), other studies found no relationship between surveillance cameras and perceived school safety (Bracy, 2011) or even increases in school disorder (Mayer & Leone, 1999). Although prior studies provide some evidence about the relation between surveillance cameras and student behavior, there is still a question of whether this form of school security affects informal social control mechanisms in schools.

The current study

In sum, available theoretical frameworks and findings from extant empirical literature do not provide clear evidence about the direction and magnitude of the expected relation between the presence of school security measures (formal social control) and students' perceptions of informal social control in schools. Indeed, research pertaining to the relation between informal and formal control mechanisms in school settings is scarce even though there are both theoretical and applied implications related to this area of inquiry. As such, the current study attempts to address these gaps in the criminology and school safety literatures by addressing the following research questions:

RQ1: What are the associations between school security measures (security personnel, metal detectors, surveillance cameras) and students' relationships with teachers?

RQ2: What are the associations between school security measures and students' relationships with adults in the school?

RQ3: What are the associations between school security measures and students' perceptions of the fairness and consistency of school rules?

Method

Participants

The data used in this study come from the 2011 School Crime Supplement (SCS) to the National Crime Victimization Survey (NCVS). The NCVS is a cross-sectional nationally representative stratified random household sample. Eligible participants in the SCS were 12- to 18-year-olds living in participating households that had been enrolled in a primary or secondary school in the past six months. This included a total of 6,547 participants that were used as part of the analytic sample. The sample was 51.42% male, 59.92% White non-Hispanic, 14.14% Black non-Hispanic, 20.23% Hispanic, 5.71% other race/ethnicity, had a mean age of 14.94 ($SD = 1.97$), and 92.08% attended public schools. The SCS does not provide information about whether any participants attended the same school. Therefore, this study only includes student-level responses and is unable to model any nesting of students within schools. However, given the national sampling frame and the large sample size, it is unlikely that a large proportion of the students attended the same school as other students in the sample.

Measures

The SCS included multiple items measuring students' self-reported relationships with teachers, relationships with adults in the school, and perception of the fairness and consistency of school rules. To reduce the influence of measurement error, these measures were modeled as latent variables within a structural equation modeling framework. In a three-factor confirmatory factor

analysis model that included the intercorrelations of all three factors, the estimated latent variables were each indicated by the corresponding set of survey items for the three mechanisms of informal social control (see Figure 1). The model was assessed using a suite of fit statistics to examine how well the confirmatory factor analysis model fit the generating data, including the chi-square test, the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker-Lewis index (TLI). The chi-square test provides a significance test of whether the model is a good fit to the data; a significant chi-square value indicates a lack of fit. RMSEA values range between 0 and 1, with lower values indicating better fit. Traditionally, RMSEA values below .06 indicate close fit, and values above .10 indicate poor fit. The CFI and TLI—which are highly correlated—also range between 0 and 1, but higher values indicate better fit for these statistics. Values greater than .95 are traditionally interpreted as indicators of good fit, while values between .90 and .95 indicate marginal fit (Hu & Bentler, 1999). As shown in Table 1, this three-factor model fit the data well.

Relationships with teachers

The first factor, relationships with teachers, included three items addressing students’ perceptions of their relationships with teachers. These items included the following: (a) teachers treat students with respect; (b) teachers care about students; and (c) teachers do or say things that make students feel bad about themselves (reverse scored). These items were measured on a scale from 1 (*strongly disagree*) to 4 (*strongly agree*). Factor loadings for relationships with teachers ranged from 0.56 to 1.12.

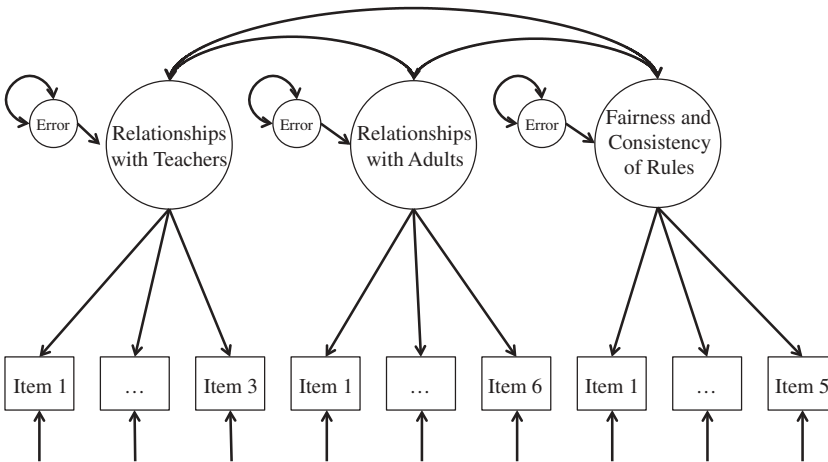


Figure 1. Structural equation model of the three latent dependent variables.

Table 1. Fit statistics for each of three different structural equation models.

Variable	Confirmatory factor analysis model		School security measures added as predictors		School security measures and control variables added as predictors	
	M	SD	M	SD	M	SD
Chi-square	1,649.99 (df = 74)	13.68	1,727.69 (df = 107)	43.16	1,836.56 (df = 195)	13.00
RMSEA	.06	.00	.05	.00	.04	.00
CFI	.99	.00	.99	.00	.99	.00
TLI	.99	.00	.99	.00	.99	.00

Note. Fit statistics were averaged across 20 imputed datasets; 95% confidence intervals for fit statistics are not available for multiply imputed data.

Relationships with adults

The second factor, students' relationships with adults in the school, was created from a series of six items addressing students' perceptions of their relationships with adults in the school. These items included the following: there is an adult at school who (a) notices when you are not there; (b) listens to you when you have something to say; (c) tells you when you do a good job; (d) always wants you to do your best; (e) believes that you will be a success; and (f) really cares about you. These items were measured on a scale from 1 (*strongly disagree*) to 4 (*strongly agree*). Factor loadings ranged from 1.00 to 1.23.

Fairness and consistency of rules

The third factor, the fairness and consistency of school rules, included a series of five items addressing the extent to which students believed that the school rules were fair and consistently enforced. These items included the following: (a) everyone knows what the school rules are; (b) the school rules are fair; (c) the punishment for breaking school rules is the same no matter who you are; (d) the school rules are strictly enforced; and (e) if a school rule is broken, students know what kind of punishment will follow. All of these items were measured on a scale from 1 (*strongly disagree*) to 4 (*strongly agree*). The factor loadings for the fairness and consistency of school rules ranged from 1.00 to 1.18.

School security measures

Students responded to the following dichotomous items (0 = *no*, 1 = *yes*) regarding the presence of school security measures: Does your school take any measures to make sure students are safe? For example, does the school have: (a) security guards and/or police officers, (b) metal detectors, or (c) security cameras?

Control variables

There were also a set of demographic variables and one methodological variable that functioned as control variables in all outcome models. The demographic control variables were student age, race/ethnicity (dummy coded as White non-Hispanic, Black non-Hispanic, Hispanic, and other), gender (0 = *female*, 1 = *male*), family income treated as an ordinal variable ranging from 1 (*less than \$7,500 per year*) to 14 (*more than \$75,000 per year*), whether the student attended a public school (0 = *no*, 1 = *yes*), and whether an adult was present at the time of the interview (0 = *no*, 1 = *yes*).

Data analysis

The data analysis used structural equation modeling (SEM) to address our three research questions. This analytic approach has two primary advantages that make it suitable for the current study. First, SEM permits examination of relationships between latent variables, which is useful for reducing the impacts of measurement error on the model results by isolating the shared variance among the measured variables. Moreover, SEM does not assume that each measured variable contributes to the underlying latent construct equally, unlike more simplistic indices or scales that sum or average individual items. Second, an SEM approach can readily accommodate multiple dependent variables in a single model, thereby reducing the number of significance tests and the likelihood of Type I error. Because this study includes three outcome constructs (i.e., the measures of informal social control), an analytic approach that can model these simultaneously is advantageous compared to one that models them each separately. To analyze the relationships between school security measures and students' perceptions of informal social control mechanisms (i.e., relationships with teachers, relationships with other adults, and the fairness and consistency of school rules), it was necessary to create two models. In the first model, all measures of informal social control were modeled as endogenous latent variables, correlated with each other (see [Figure 1](#)), and regressed on the three school security measures, which were included as exogenous manifest variables. In the second

model, we included the full set of control variables. Hereafter, these two models are referred to as the “unadjusted” and “adjusted” models, respectively. All analyses were adjusted for the complex sampling design using the sampling weights provided in the SCS. The data were cleaned and prepared using Stata version 14.1 and the final models were estimated using MPlus 7.

Missing data

Across the full set of variables used in these analyses, there was a modest amount of missing data. Missingness ranged from 0.21% to 0.96% of cases across the measures of informal social control, 2.25% to 10.23% across the three school security measures, and 0.00% to 20.36% across the control variables. Full information maximum likelihood was used to address missing data in the dependent variables and multiple imputation was used to address missing data in the independent variables. There were 20 imputed datasets and results were pooled across these datasets using Rubin’s (1987) rules. Measures of model fit (shown in Table 1) were also calculated for each of the 20 individual datasets and were pooled across them.

Results

Descriptive statistics of the independent and control variables used in analysis are shown in Table 2. Roughly one half of the sample was male, and 92% of the respondents were enrolled in public schools. Most of the sample was White non-Hispanic (60%), with 20% of the sample identifying as Hispanic and 14% as Black non-Hispanic. The most prevalent school security measure was surveillance cameras (85%), followed by security personnel (71%), and metal detectors (12%). Tetrachoric correlations among the three security measures were .37 ($p < .001$) for security personnel and metal detectors, .33 ($p < .001$) for security personnel and surveillance cameras, and .29 ($p < .001$) for metal

Table 2. Descriptive statistics for control variables and school security measures ($N = 6,547$).

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	Range	%
Age	6,547	14.94	1.97	12–18	
Race/ethnicity					
White non-Hispanic	6,546				59.92
Black non-Hispanic	6,546				14.14
Hispanic	6,547				20.23
Other	6,547				5.71
Male	6,547				51.42
Income	6,547				
< \$5,000					2.63
\$5,000–\$7,499					1.62
\$7,500–\$9,999					1.44
\$10,000–\$12,499					2.45
\$12,500–\$14,999					2.05
\$15,000–\$17,499					0.24
\$17,500–\$19,999					2.53
\$20,000–\$24,999					0.56
\$25,000–\$29,999					5.52
\$30,000–\$34,999					4.84
\$35,000–\$39,999					5.47
\$40,000–\$49,999					10.38
\$50,000–\$74,999					18.01
\$75,000 >					35.04
Public school	5,851				92.08
Adult present	6,490				10.75
School security measures					
Security personnel	5,694				71.25
Metal detectors	5,530				11.66
Surveillance cameras	5,228				85.17

detectors and surveillance cameras, indicating that when schools used one security measure, they also tended to use others. There were also significant correlations among each of the three measures of informal social control. Specifically, fairness and consistency of rules was positively correlated with both students' relationships with teachers ($r = .41, p < .001$), and adults in the school ($r = .31, p < .001$). Additionally, students' relationships with teachers were positively correlated with their relationships with adults in the school ($r = .44, p < .001$). The magnitude and statistical significance of these correlations remained approximately constant in the subsequent structural equation models that included both school security measures and the full set of control variables.

School security measures and informal social control

Before including the full set of control variables in the regression analyses, a structural equation model was estimated using each of the three school security measures as predictors of each of the three latent variables representing forms of informal social control. Fit statistics for this model are displayed in Table 1. Similar to the confirmatory factor analysis models, the fit statistics indicated that this model fit well to the generating data. As shown in Table 3, the presence of security personnel, metal detectors, and surveillance cameras were each associated with the measures of informal social control. The regression coefficients can be interpreted as the change in standard deviation units in the measures of informal social control associated with the presence of a given school security measure, adjusted for the presence of each of the other school security measures. The presence of both security personnel ($b = -0.16, p < .001, 95\% \text{ CI } [-0.22, -0.10]$) and metal detectors ($b = -0.14, p = .001, 95\% \text{ CI } [-0.23, -0.06]$) were associated with poorer relationships with teachers. Students in schools with these two types of school security measures had poorer relationships with their teachers by 0.16 and 0.14 standard deviation units, respectively. None of the other associations were statistically significant.

Table 3 shows the results of the model that included all of the control variables listed above in addition to the three school security measures. The fit statistics are presented in Table 1 and again indicate that the model fit well to the generating data. In this model, the regression coefficients are interpreted as the change in standard deviation units of the dependent variable attributable to the presence of a given school security measure, adjusted for the presence of each of the other school

Table 3. Results of structural equation models predicting measures of informal social control ($N = 6,547$).

Variable	Relationships with teachers		Relationships with adults		Fairness and consistency of rules	
	<i>b</i>	95% CI	<i>b</i>	95% CI	<i>b</i>	95% CI
Unadjusted model						
Security personnel	-0.16***	[-0.22, -0.10]	-0.02	[-0.07, 0.03]	-0.04	[-0.09, 0.00]
Metal detectors	-0.14***	[-0.23, -0.06]	-0.06	[-0.13, 0.01]	0.06	[0.00, 0.13]
Surveillance cameras	0.01	[-0.07, 0.09]	0.03	[-0.04, 0.09]	-0.03	[-0.09, 0.03]
Adjusted model						
Security measures						
Security personnel	-0.11**	[-0.17, -0.05]	0.01	[-0.04, 0.06]	-0.02	[-0.07, 0.03]
Metal detectors	-0.08	[-0.16, 0.01]	-0.04	[-0.11, 0.04]	0.07*	[0.01, 0.14]
Surveillance cameras	0.06	[-0.02, 0.14]	0.05	[-0.01, 0.12]	0.00	[-0.06, 0.06]
Control variables						
Age	-0.03***	[-0.05, -0.02]	0.00	[-0.01, 0.02]	-0.02**	[-0.03, -0.01]
White (vs. other)	-0.15*	[-0.26, -0.04]	-0.01	[-0.10, 0.08]	-0.11*	[-0.19, -0.02]
Black (vs. other)	-0.28***	[-0.40, -0.15]	0.05	[-0.05, 0.15]	-0.03	[-0.13, 0.07]
Hispanic (vs. other)	-0.05	[-0.17, 0.07]	-0.02	[-0.11, 0.07]	-0.03	[-0.12, 0.06]
Male	-0.02	[-0.07, 0.03]	-0.09***	[-0.14, -0.05]	-0.02	[-0.06, 0.02]
Income	0.02***	[0.02, 0.03]	0.02***	[0.01, 0.02]	0.01**	[0.01, 0.02]
Public school	-0.36***	[-0.46, -0.26]	-0.32***	[-0.40, -0.23]	-0.22***	[-0.29, -0.14]
Adult present	-0.01	[-0.07, 0.04]	-0.01	[-0.06, 0.03]	0.01	[-0.03, 0.05]

Note. Higher values on relationships with teachers, relationships with adults, and fairness and consistency of rules represent more favorable outcomes.

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

security measures and the control variables. Adding the control variables altered the statistical significance of a few relationships. There was no longer a significant association between the presence of metal detectors and students' relationships with their teachers ($b = -0.08$, $p = .07$, 95% CI $[-0.16, 0.01]$). However, the presence of security personnel was still associated with poorer relationships with teachers ($b = -0.11$, $p = .001$, 95% CI $[-0.17, -0.05]$), and the presence of metal detectors was associated better perceptions of school rules after adding the control variables ($b = 0.07$, $p = .03$, 95% CI $[0.01, 0.14]$).

Discussion

Informal social control mechanisms are an important way for schools to prevent crime and delinquency; when students form strong relationships with teachers and other adults in the school and perceive school rules as fair and consistently enforced, they tend to engage in fewer problem behaviors (Cook et al., 2010; Gottfredson, 2001; Tyler, 1990). In recent years, however, structural changes to schools have resulted in an increased reliance on formal control mechanisms such as school security measures (Zhang et al., 2016). It is unclear whether this influx of formal control mechanisms has had an effect on the more traditional informal social control mechanisms. This study used nationally representative data from U.S. students ages 12 to 18 to examine whether the presence of school security measures was related to three informal social control mechanisms. A structural equation modeling approach was used to simultaneously model the relationships among three school security measures and three informal social control mechanisms. Overall, the findings indicated that the three different school security measures varied in their association with the different mechanisms of informal social control.

Across both the unadjusted and adjusted models, students who reported attending schools with security personnel also reported that they had poorer relationships with their teachers. This parallels findings from prior research that the implementation of police in schools is associated with a lower sense of connectedness to school in general (Theriot, 2016), and may lead to an erosion of the relationships between students and teachers in particular (Devine, 1996). Bringing security personnel into schools is one way that schools have outsourced school discipline to law enforcement agencies and juvenile courts (Kupchik & Monahan, 2006), potentially releasing teachers from their traditional role of monitoring and controlling students' behaviors. In other words, because there are security personnel in the school, teachers may be more likely to refer students who engage in problem behaviors to the security personnel rather than addressing the behavior themselves. This is reflective of Devine's (1996) observation that teachers worked with students' minds whereas police worked with students' bodies, thereby limiting the potential for strong bonds to develop between students and teachers. In the current study, there was no significant association between the presence of security personnel and students' relationships with other adults in the school or their perception of the fairness and consistency of school rules; thus, security personnel may only have an eroding effect on students' relationships with teachers. An alternative explanation for this finding is that students who already had weaker relationships with their teachers were more likely to attend schools with security personnel. Although we did not have access to longitudinal data to empirically establish the causal ordering of this relationship, this alternative explanation may be unlikely. If schools implemented security personnel as a response to a school environment characterized in part by poor student-teacher relationships, one would expect to see similar effects for metal detectors and security cameras, which, under this assumption, also presumably would have been implemented in response to similar school environments. However, similar patterns did not exist for these other school security measures, suggesting that there may be something particularly meaningful about the presence of security personnel in regard to students' relationships with their teachers.

In the unadjusted model, the presence of metal detectors was associated with poorer relationships with teachers, but was unrelated to students' relationships with adults and unrelated to perceptions of school rules. However, after adjusting for student demographic characteristics, the presence of

metal detectors was associated with improved perceptions of the fairness and consistency of school rules. This change in the adjusted model's results is likely due to confounding between metal detectors and other school and student characteristics; only a small proportion of U.S. schools use metal detectors and those schools are often some of the most disadvantaged schools (Steinka-Fry et al., 2016; Zhang et al., 2016). Nonetheless, it is somewhat surprising that metal detectors were associated with better perceptions of the fairness and consistency of school rules given that metal detectors are often viewed as one of the more punitive and exclusionary forms of school security (Hirschfield, 2010; Kupchik & Ward, 2014). However, if the schools with metal detectors were the most likely to have contraband brought into the building, perhaps the presence of metal detectors made students feel more confident that it would be detected and removed more consistently.

The results provided no evidence that surveillance cameras were associated with any of the three informal control mechanisms examined. Thus, it is unclear whether there is no true effect of surveillance cameras in the population, or whether their effect may differ across types of schools. On one hand, because of the ubiquity of cameras—not only in school hallways, but also in malls, communities, and on students' mobile phones—being under video surveillance may not have a meaningful impact on contemporary students. Indeed, some researchers contend that surveillance cameras are one of the most inclusionary types of formal control in schools because they monitor all students equally without singling out individual students (Hirschfield, 2010; Kupchik & Ward, 2014). In this vein, some schools may use cameras to watch for intruders or outside threats, potentially having no effect on students' experiences or their perceptions of school safety or connectedness. On the other hand, some schools may use cameras to monitor the students themselves, potentially acting as a mechanism of exclusion in a similar way as the police did in Devine's (1996) ethnographic work. More research is needed to understand how surveillance cameras are used in schools and how their effects might potentially vary across school contexts (see Warnick, 2007 for an analysis).

Together, these results provide some evidence that schools utilizing formal control mechanisms such as school security measures may unintentionally weaken informal social control in the school. Namely, the presence of security personnel was consistently associated with poorer relationships between students and teachers. This finding mirrors the results of ethnographic work (Devine, 1996) and survey research (Theriot, 2016), and merits further exploration. Notably, it also parallels community research suggesting that increased formal control such as more police presence, arrests, and incarceration limits community-level informal social control (Bazemore, 2001; Clear & Karp, 1999; Renauer, 2007; Rose & Clear, 1998; Warner, 2007).

As schools become increasingly scrutinized for practices that systematically exclude students from school (Hirschfield, 2008)—particularly students of color (Skiba et al., 2014)—schools may want to reconsider the forms of control in place within their schools. Not only might school security measures like security personnel criminalize students by exposing them to more formalized methods of recording and addressing their problem behaviors (Na & Gottfredson, 2013; Theriot, 2009), but, as found here, they may also weaken informal social control mechanisms that bond students to the school social order and reduce their levels of delinquency. In an era when school security measures are present in a vast majority of schools nationwide (Zhang et al., 2016), and most schools have more than one security measure in place (Steinka-Fry et al., 2016), critically examining each school's perceived need for and use of school security measures may help mitigate their potential negative effects, including the erosion of student-teacher relationships.

Limitations and future research

This study is among the first to quantitatively investigate the relationships between the use of school security measures and students' perceptions of informal social control mechanisms in schools. Although this study provides initial evidence pertinent to these associations, the findings should

be interpreted in light of the study's limitations. First and most importantly, because this study used cross-sectional data, causal interpretations are not warranted. Although the theoretical argument presented for why the implementation of formal control mechanisms in schools may influence students' perceptions of the informal social control mechanisms already in place, it is also possible that schools with weaker informal social control may be more likely to implement formal control mechanisms such as school security measures in an effort to better manage student behavior. Future studies should attempt to replicate this study's findings using longitudinal data sources that will permit stronger causal inferences. Second, because this study relied on deidentified secondary data without information about the names or locations of students' schools or communities, examining within-school variability was not possible. There are individual- and group-level systematic differences within schools relative to how students perceive their school environments (Voight, Hanson, O'Malley, & Adekanya, 2015); accordingly, there is likely to be variability among students within a school in the extent to which the presence of formal control mechanisms affects perceptions of informal social control mechanisms (see Fisher, Mowen, & Boman, 2018). Finally, a lack of school-level covariates limited the analyses that could be conducted. Prior research has shown that measures of school context such as the patterns of school discipline and levels of disadvantage are related to the impacts of school security measures (Fisher, 2016). A lack of contextual data in this study precluded analyzing variability in the associations across school contexts. Despite these limitations, the current study is one of the first to quantitatively assess the relationships between formal and informal social control mechanisms in schools, and thus makes important contributions to the criminological literature on school safety and delinquency.

Conclusions

As schools continue to find ways to minimize students' delinquent and problem behaviors, there are a variety of potential mechanisms at their disposal. However, these mechanisms may not always be compatible with one another. This study provided evidence that the presence of security personnel in schools—a mechanism of formal control—is associated with weakened student-teacher relationships—a form of informal social control that has been consistently associated with lower levels of problem behavior among students (Cornelius-White, 2007; Gottfredson, 2001; Krohn & Massey, 1980). Schools that implement security personnel in an effort to reduce students' problem behaviors may therefore unintentionally erode one of the most important mechanisms already in place for reducing student problem behaviors. Schools should therefore seek to reduce student problem behaviors in other ways that are based in strong empirical and theoretical work, such as by fostering positive relationships within the school community and establishing rules that students perceive as fair and consistently enforced. Relying on school security measures at the expense of informal control mechanisms may do a disservice to both schools and students.

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