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Effects of Disciplinary Actions on Incident Recurrence in Missouri Public Schools

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Abstract: This paper attempts to examine the extent to which the differentiated types of disciplinary actions, i.e., in-school-suspension, out-of-school suspension, and expulsion, have separate and differentiated effects on incident occurrence in school. In doing so, we examine whether stringent actions, such as out-of-school suspension and expulsion taken in one year reduce the number of serious offense incidents in the year that immediately follows in elementary and secondary schools. The result supports the practices of disciplinary actions based on a rational choice theory for preventive purposes. Statistical evidence found in this study suggests that the practice of disciplinary actions such as removal of students effectively reduces the incidents of problematic behaviors in the following years.

Key words: school violence, disciplinary actions, zero-tolerance policy in the U.S.

1. Introduction

Prevention of school violence and crimes has received national attention as an important educational policy agenda in the United States since the Congress declared *Safe, Disciplined, and Alcohol- and Drug-Free Schools* as one of the National Education Goals in 1990. The Gun-Free School Zones Act (GFSA), which required schools to adopt a "zero-tolerance" policy against guns on campus or face a loss of federal funding, mandated a one-year expulsion of students for possession of a firearm, and a referral of law-violating students to the criminal or juvenile justice system. With rising pressure from these policy mandates as well as concerns among school communities, the use of severe disciplinary actions such as expulsion and out-of-school suspension has become prevalent in U.S. schools. However, the preventive effects of the "zero-tolerance" policy and the practices of stringent disciplinary actions against school violence and crimes have yet to be subject to further empirical studies. Presumably, punitive actions of any form have a preventive power to reduce offense incidents in schools in the long run. But do they? Moreover, the type of disciplinary actions taken in each school varies from in-school suspension, out-of-school suspension, and complete expulsion from school in some extreme cases.

This paper attempts to investigate the extent to which these different types of disciplinary actions have separate and differentiated effects on incident occurrence. In doing so, we examine whether stringent actions, such as out-of-school suspension and expulsion taken in one year reduce the number of serious offense incidents in the year that immediately follows in elementary and secondary schools. In extreme cases, we expect that in-school suspension may even encourage students to take chances and increase the incidents of similar offences, while severe actions such as out-of-school suspension and expulsion may suppress such phenomena. Previous studies

suggest no clear evidence on whether severe disciplinary actions effectively correct the misbehaviors of students (Henderson and Friedland 1996; Imich 1994). This paper, unlike preceding work, attempts to test this association from various perspectives of quantitative approaches.

2. Theoretical background

School discipline policies and practices can be discussed from two separate theoretical perspectives: rational choice theory and positivity theory (Lawrence 1998). The rational choice theory explains that individuals commit crimes based on their own rational decisions. In light of this view, it makes logical sense to punish law-violating students for corrective purposes. Disciplinary practice is therefore expected to deter another crime attempt by students. Based on the rational choice theory, severe punishments such as suspension and expulsion which deprive students of various educational benefits and opportunities should effectively prevent future criminal conducts by students.

In contrast with the rational choice theory, the positivist theory asserts that the individuals' criminal behaviors are affected by external factors, such as social and cultural environment. With this theory, severe punishments of students are not effective in deterring future criminal conduct as the practice of placing students in a punitive situation does not address the "exogenous" causes of their non-rational behaviors. For example, previous studies on youth delinquency explored the causes of problematic behaviors of students with the findings suggesting schools as a strong predictor for delinquent behaviors (Bartollas 1993; Kratcoski and Kratcoski 2004). The purpose of this study is to test the validity of disciplinary actions in schools by taking these theories into consideration. In doing so, particular attempts are made to quantitatively analyze the correlations existing between disciplinary actions and offense incidents in a cross-sectional and time-series (longitudinal) data frame. In this study, we use a large dataset collected by the Missouri Department of Elementary and Secondary Education. Detailed descriptions of the dataset and variables used in the analysis are presented in the next section.

3. Data

The dataset used for the analysis of this paper is the *Core Data Collection System* available from the Missouri Department of Elementary and Secondary Education, which is downloadable from the website.[1] There exist approximately 2,600 elementary and secondary schools in the State of Missouri,[2] as of October 24, 2008 enrolling 894,609 students (Missouri Department of Elementary and Secondary Education). This paper uses the school-level data and investigates disciplinary actions taken by K-12 public schools in the State between year 2004 and 2008 and their impact on the incremental changes in the number of incidents in the immediate subsequent years. As the first step to eliminate spurious noises in the dataset, schools with exceptionally large outliers in the observed variables are excluded from the data. This process leaves us with the final pooled sample data consisting of 10,020 observations. Moreover, the dataset is constructed such that only the schools that existed throughout the studied years 2004–2008 be included, forming a balanced panel of 2,504 elementary and secondary schools.

Disciplinary actions included in the analysis are: (1) in-school suspension, (2) out-of-school suspension, and (3) expulsion. Table 1 above provides the detailed descriptions of the removal type taken as disciplinary actions by the Missouri public schools. Relative to removal of students by in-school suspension and out-of-school suspension, expulsion is considered a severe form of disciplinary action as the complete removal without educational services results in disconnection

Table 1. Definition of the type of removal

Type of removal	Description
In-school suspension	Removal of student from regular classroom setting (within a school building) for a fixed amount of time with student automatically returning to regular classroom setting after the suspension is completed.
Out-of-school suspension	Removal of student from school for a fixed amount of time with student automatically returning to school after the suspension is completed.
Expulsion	Removal of student from school for an indefinite period of time until student is reinstated by local board of education.

Source: Missouri Department of Elementary and Secondary Education, http://dese.mo.gov/planning/profile/.

of students from school activities (Adams 2000), depriving students of their educational opportunities for an indefinite period of time. Our interest is to examine the impact of these disciplinary actions taken by schools in year (t−1) on the number of offense incidents in the subsequent year t. The type of offense reported in the dataset includes: (1) alcohol, (2) drug, (3) tobacco, (4) violence, (5) weapon, and (6) other.

Other school-specific factors considered in this paper are students' racial composition, represented as the percent of white students enrolled in each school, percent of free and reduced lunch eligible students, students per teacher ratio, students per classroom teacher ratio, students per administrator ratio, teacher average salary, teacher average years of experience, percent of

Table 2. Summary statistics for the State of Missouri K-12 Public Schools

	Year				
	2004	2005	2006	2007	2008
Total incidents	21,175	17,597	17,419	15,922	16,111
Type of offense:					
Alcohol	495	521	472	446	572
Drug	2,502	2,373	2,213	2,102	2,477
Tobacco	205	161	110	152	127
Violence	4,470	3,881	1,462	727	1,084
Weapon	780	792	660	726	910
Other	12,719	9,859	12,502	11,763	10,081
Type of removal:					
In-school suspension	3,367	1,522	1,557	1,520	1,758
Out-of-school suspension	17,573	15,864	15,746	14,296	14,294
Expulsion	140	157	81	82	52
% enrollment White students	67.4	66.9	66.4	65.8	65.6
	(39.4)	(39.4)	(39.4)	(39.4)	(39.4)
% free or reduced lunch students	37.8	38.8	38.7	38.8	39.0
	(27.2)	(27.5)	(26.8)	(26.8)	(26.6)
Students per administrator ratio	234.0	233.8	228.5	223.8	218.3
	(154.3)	(153.9)	(149.4)	(147.4)	(146.1)
Students per teacher ratio	11.3	12.1	11.3	11.0	11.2
	(6.5)	(38.9)	(14.3)	(8.1)	(22.3)
Students per classroom teacher ratio	14.7	14.8	14.8	14.6	14.3
	(8.5)	(8.7)	(11.3)	(10.7)	(10.8)
Teacher average salary	38,573	39,263	40,579	42,093	43,564
	(9,339.6)	(9,748.0)	(9,968.5)	(10,223.3)	(10,521.9)
Teacher average years of experience	12.8	12.7	12.6	12.6	12.5
	(3.8)	(3.8)	(3.8)	(3.7)	(3.6)
% teachers with a masters degree	45.9	47.4	47.7	48.0	49.4
	(21.4)	(21.8)	(21.4)	(21.6)	(22.1)
Teacher FTE count	25.1	25.0	25.5	25.7	25.9
	(19.2)	(19.1)	(19.5)	(19.7)	(20.0)
K-12 enrollment	871,614	867,338	869,109	865,449	850,734
Sample	2,504	2,504	2,504	2,504	2,504

Note: Numbers in parentheses are standard deviations.
Source: Missouri Department of Elementary and Secondary Education, Core Data Collection System and the Educator Certification System. Public schools which existed in 2004–2008 are included in the dataset.

teachers with a masters degree, and teacher FTE count. Previous studies reveal racial and gender disparities in the number of disciplinary actions taken in schools (Costenbader and Markson 1998; Imich 1994; McFadden and marsh 1992; Mendez at al. 2002; Mendez and Knoff 2003; Skiba et al. 2002; Thornton and Trent 1998). Moreover, researchers have examined various predictors of severe disciplinary actions at the school level, using variables such as educational level (Gottfredson and Gottfredson 2001; Hellman and Beaton 1986), socioeconomic status (Brantlinger 1991), achievement (Imich 1994; Morrison and D'Incau 1997), school size (Imish 1994), school location (Vavrus and Cole 2002), student attendance, teacher-student-ratio, academic quality, student instability and community crime rate (Hellman and Beaton 1986).

Many studies consistently show that African-American male students are more likely to be suspended from school. Mendez and Knoff (2003) use cross-sectional data collected from 142 schools in West Central Florida and find the highest percentage of suspension rates among black male students in elementary and secondary schools. A study by Skiba et al. (2002) also find that black male students have the highest rates of suspensions based on the dataset of a large, urban Midwestern public school district which enrolls 50,000 students. Hellman and Beaton (1986) find that teacher-student ratio and teacher absenteeism rates predict higher suspension rates in middle schools, while a lower level of academic performance, a higher level of student instability, a higher percentage of male faculty members and a higher level of community crime rates are associated with higher rates of student suspension. The variables used in this paper are chosen based on these previous findings and are included in our dataset if such variables are available from the original database of the Missouri Department of Elementary and Secondary Education. The summary statistics of the variables for years 2004–2008 is provided in Table 2 above.

4. Estimation framework

Our first hypothesis is based on a simple question: Does the number of disciplinary actions taken in one year (t–1) have any impact on incident occurrence in the following year (t)? Presumably, punitive actions of any form have a preventive power to reduce the number of offenses in school. Secondly, do different types of disciplinary actions have the same impact on the incidents in the following year? In other words, does in-school suspension taken in one year (t–1) reduce the incidents of serious offenses in the subsequent year (t) to the similar extent that stringent actions such as out-of-school suspension and expulsion do? The analytical model of our hypotheses is based on estimation of the following standard fixed-effect model:

$$y_{it} = \alpha + x_{it}\beta + v_i + \varepsilon_{it} \tag{1}$$

where y_{it} refers to the offense incidence with the subscript i indicating the individual schools and t being the unit of time for year; x_{it} is a vector of explanatory variables which includes the number of disciplinary actions taken by each school in years t and (t–1) along with school characteristics; v_i is the school-specific residual and ε_{it} is the standard residual with mean 0 and uncorrelated with covariates x_{it} and v_i. Then, the vector of coefficients β is of our interest, and the model (1) is consistently estimated as the solution to the following equation

$$\left(y_{it} - \bar{y}_i\right) = \left(x_{it} - \bar{x}_i\right)\beta + \left(\varepsilon_{it} - \bar{\varepsilon}_i\right) \tag{2}$$

where $\bar{y}_i = \sum_t y_{it}/T_i$, $\bar{x}_i = \sum_t x_{it}/T_i$, and $\bar{\varepsilon}_i = \sum_t \varepsilon_{it}/T_i$. Thus, averaging out all the variables included

in the model eliminates the time-constant effect α and unobserved school-specific effect v_i. The fixed-effect model (1) is estimated by the application of ordinary least squares to equation (2) without the intercept term.[3] However, a drawback of estimating the equation (1) by the least squares dummy variable (LSDV) approach as described above lies in the assumption that the error term ε_{it} is homoskedastic with no serial correlation, which may be too strong an assumption. The misspecification yields biased estimation of the coefficients β, which is of our most interest. In order to remedy this potential issue of serially correlated errors, we apply the method of Cochran-Orcutt iterations, where the error process is defined as

$$\varepsilon_{it} = \rho\varepsilon_{i,t-1} + \eta_{it} \tag{3}$$

where ρ is estimated by $\hat{\rho} = 1 - d/2$ and d is the Durbin-Watson's d-statistic. Therefore, our estimation technique of β is based on the fixed-effect generalized least squares (GLS) model with the Cochran-Orcutt iterations.

5. Type of offense and disciplinary actions

As the first step to understand the preventive effects of disciplinary actions taken in the Missouri public schools, we examine the association between disciplinary actions and offense type. The numbers of disciplinary actions taken, i.e., students removal by in-school suspension, by out-of-school suspension, and expulsion, which are used as the dependent variable is a type of count data with a large number of observations indicating 0, particularly for elementary schools. Considering the nature of the count data, therefore, we investigate the correlation using the fixed-effect Poisson regression rather than applying the ordinary least squares (OLS). The estimation result is presented in table 3.

The first column (1) in the table reveals that the alcohol- and tobacco-related offenses and violence are likely to be treated by in-school suspensions. The estimation result in the second column (2) shows that drug- and weapon-related offenses are the major causes of out-of-school

Table 3. Estimation of fixed-effect Poisson regression of student removals on incidents of offenses (t = 2005 to 2008)

Type of offense	(1) In-school suspension (t)		(2) Out-of-school suspension (t)		(3) Expulsion (t)	
Alcohol (t)	.1087	**	.8870	***	-.0039	
	(.0538)		(.0593)		(.0052)	
Tobacco (t)	.2035	**	.9712	***	.0151	*
	(.0877)		(.0978)		(.0085)	
Violence (t)	.1180	***	.8292	***	-.0008	
	(.0083)		(.0092)		(.0008)	
Drug (t)	.0104		1.0578	***	.0047	**
	(.0193		(.0213)		(.0019)	
Weapon (t)	-.0217		1.0970	***	-.0111	**
	(.0483)		(.0532)		(.0047)	
Other (t)	.2302	***	.7529	***	.0036	***
	(.0040)		(.0044)		(.0004)	
Constant	-.5010	***	.5577	***	.0211	***
	(.0447)		(.0493)		(.0043)	
Adjusted R^2	---		---		---	
Pseudo R^2	.3451		.8689		.0139	
Sample	10,016		10,016		10,016	

Note: Numbers in parentheses for OLS estimates are standard errors, and the numbers in parentheses for Poisson estimates are robust standard errors. *** indicates statistical significance at .01, ** significant at .05, * significant at .10.
Source: Missouri Department of Elementary and Secondary Education, Core Data Collection System and the Educator Certification System, 2005–2008.

suspensions, while alcohol, tobacco, and violence are also treated by this type of suspension. The fixed-effect Poisson estimation result shown in the third column (3) indicates that tobacco- and drug-related offenses are positively correlated with expulsion, while weapon-related incidents are negatively correlated. Overall, the results in Table 3 reveal that out-of-school suspension is the most widely exerted disciplinary action taken in Missouri public schools for all types of offenses.

6. Empirical results

The impact of disciplinary actions taken in one year (t−1) on incident occurrence in the subsequent year (t) estimated by the fixed-effect GLS regression with AR(1) error process is presented in Table 4, by the type of offense. The result for alcohol in the first column reveals the concurrent positive effects of in-school and out-of-school suspension in year t on the alcohol-related incidents in the same year, simply representing the correlation observed in Table 3. That is, in-school suspension and out-of-school suspension are likely forms of disciplinary actions taken by the Missouri public schools for alcohol-related incidents. However, none of the actions taken in the previous year shows a statistically significant effect on incident recurrence in the following year. A similar trend is found for tobacco-related incidence with similar marginal effects.

The concurrent effect of the disciplinary actions in year t and the number of students' violent acts in the same year is shown in the third column. Out-of-school suspension is a likely form of punishment taken by schools for students' violent behaviors. However, expulsion is not a typical form of action exerted for this type of incident. The result also indicates that all types of disciplinary actions taken in one year (t−1) tend to reduce the occurrence of student violence in the immediate subsequent year t. A particularly significant and large negative effect is obtained on the coefficient for expulsion. An important implication drawn from this finding is that although expulsion is not a typical form of disciplinary action taken by schools as observed in the concurrent effect in year t, the strict action of expulsion significantly reduces the recurrence of student violence should it be taken in year (t−1). The result for drug-related offenses reveals similarly a significant and negative

Table 4. Estimation of fixed-effect GLS model of disciplinary incidents on removal types with an AR(1) error process (t = years 2005 to 2008)

	Number of incidents by type of offense (t)				
	Alcohol	Tobacco	Violence	Drug	Weapon
In-school suspension (t)	.0106 ***	.0164 ***	.0091	.0300 ***	.0051
	(.0040)	(.0027)	(.0160)	(.0112)	(.0046)
Out-of-school suspension (t)	.0064 ***	.0051 ***	.1643 ***	.0710 ***	.0098 ***
	(.0011)	(.0007)	(.0046)	(.0031)	(.0013)
Expulsion (t)	-.0616	.0151	-.8183 ***	-.0494	-.2620 ***
	(.0390)	(.0262)	(.1628)	(.1082)	(.0445)
In-school suspension (t−1)	.0035	.0017	-.0249 **	.0106	.0106 ***
	(.0027)	(.0017)	(.0110)	(.0075)	(.0029)
Out-of-school suspension (t−1)	-.0015	-.0005	-.0266 ***	.0036	-.0031 ***
	(.0010)	(.0007)	(.0040)	(.0028)	(.0011)
Expulsion (t−1)	.0082	-.0332	-.7245 ***	-.2813 ***	-.2502 ***
	(.0309)	(.0207)	(.1312)	(.0859)	(.0351)
$\hat{\rho}$	.1182	.0756	.3137	.1456	.0482
Pseudo R^2	.0131	.0178	.2602	.1025	.0325
Sample	7,512	7,512	7,512	7,512	7,512

Note: Numbers in parentheses are standard errors. *** indicates statistical significance at .01, ** significant at .05, * significant at .10. Other independent variables included in the estimations are %white students enrollment, %free or reduced lunch students, FTE teacher count, student per teacher ratio, student per classroom teacher ratio, student per administrator ratio, average teacher salary, %teachers with maters degree, average teacher experience in years, and the constants.
Source: Missouri Department of Elementary and Secondary Education, Core Data Collection System and the Educator Certification System, 2004–2008.

effect of expulsion on the drug-related incidents in the subsequent year. The result clearly suggests that a higher number of expulsions taken in one year ($t-1$) significantly reduce the incidence recurrence in the following year.

Finally, the last column in Table 4 shows that out-of-school suspension is a likely form of school action taken for weapon-related offenses, and this practice appears to reduce similar incidents in the following year. Expulsion may not be a typical form of disciplinary action for weapon-related offenses. However, the result shows that practicing this form of severe action reduces weapon-related incidents committed by students in the subsequent year. Interestingly, in-school suspension taken in year ($t-1$) tends to have a reversed effect and raise the recurrence of weapon-related incidents by students in year t. The result provides important evidence that for relatively serious offenses such as weapon-related incidents, in-school suspension may actually encourage students to take chances, leading to an increase in incidence, while more severe actions such as out-of-school suspension and expulsion may suppress such phenomena.

7. Conclusions

This study finds differentiated effects of three types of disciplinary action taken in one year ($t-1$) on the occurrence of offense incidents in the subsequent year (t). Our result supports the validation of the practices of disciplinary actions based on a rational choice theory for preventive purposes in school. Statistical evidence suggests that the practice of disciplinary actions such as removal of students effectively reduces the incidents of problematic behaviors in the following years. However, an important finding of this study is that the incident recurrence is *relatively* influenced by disciplinary actions taken in a sense that serious convictions must be treated with likewise severe actions in order to effectively reduce the occurrence. Serious offenses by students when lightly treated with in-school suspension may even encourage them to further engage in similar offenses in the following year.

Based on the rational choice theory, these severe punishments should be effective in preventing future criminal conduct although the deprivation of students' educational benefits remains a social issue. Although our result supports this view of the rational choice theory, it is important, at least from the viewpoint of policy implications drawn from this study, to be reminded that severe disciplinary actions not only deprive students of various educational opportunities, but also fail to deter future criminal behaviors if external factors beyond individual students' control, rather than their own rational decision, lead them to criminal behaviors.

Footnotes

1. The dataset used in this study is downloadable and can be extracted from the website http://dese.mo.gov/schooldata/school_data.html/.
2. The number of schools is based on the building file.
3. The intercept term is assumed to contain unobserved school characteristics such as managerial ability of principals and teachers that can be viewed as being (roughly) constant over the period in question.

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