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A Quasi-Experimental Design Analysis of the Effects of School-Wide Positive Behavior Interventions and Supports on Discipline in Florida

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Abstract

School discipline continues to be a challenge for schools, resulting in loss of instructional time for both teachers and students. With respect to discipline actions, school suspension is one of the most widely used, yet research continues to demonstrate an empirical link between receipt of suspension and poor student outcomes, including increased risk of dropping out of school. Therefore, interventions with empirical support for reducing school-wide disciplinary actions are needed. This study examined the effect of school-wide positive behavior interventions and supports (SWPBIS) on disciplinary actions using quasi-experimental design analysis. We (propensity score) matched 593 Florida schools implementing SWPBIS with fidelity with 593 Florida schools that have never been trained. Overall, we found statistically significantly fewer out-of-school suspensions for students with disabilities and Black students within schools implementing SWPBIS with fidelity and an effect size of −0.55, indicating meaningful improvements.

Keywords

school-wide, intervention(s), positive behavior, support(s), group designs, data analysis, studies

During the 2011–2012 school year, almost 3.4 million elementary and secondary students in the United states received at least one in-school suspension (ISS), whereas 3.1 million received at least one out-of-school suspension (OSS; Snyder, de Brey, & Dillow, 2016). Nearly one quarter of a million students engaged in behaviors that resulted in referrals to law enforcement, and more than 64,000 students were arrested for acts that occurred on school grounds or during off-campus school activities such as transportation. In addition, over 166,000 students were disciplined with corporal punishment despite it being outlawed in public schools in 31 states. Further analysis of these actions reveals disproportionate disciplinary consequences among races/ethnicities and students with disabilities (SWD). Black students were more likely to receive most of the disciplinary actions compared with other races/ethnicities. Hispanic and American Indian/Alaska Native students were also generally more likely to be disciplined than White students. While SWD received almost 2 times the number of in-school and OSSs than their typically developing peers. These outcomes are consistent with previous research (Rausch & Skiba, 2004; Skiba et al., 2011; Skiba, Michael, Nardo, & Peterson, 2002; Vincent, Swain-Bradway, Tobin, & May, 2011; Vincent & Tobin, 2011) indicating disproportionality in disciplinary consequences continues to be an issue.

Researchers have connected these disciplinary actions with poor student outcomes. Exclusionary discipline practices, such as suspension and expulsion, remove students from classroom instruction, in turn decreasing engagement and academic achievement (Arcia, 2006; Losen, Hodson, Keith, Morrison, & Belway, 2015; Noltemeyer, Ward, & McLoughlin, 2015). This also increases the likelihood of dropping out of school (Noltemeyer et al., 2015) and arrest as a young adult (Mowen & Brent, 2016). Although research on academic outcomes for students exposed to school-based corporal punishment has only been conducted outside of the United States (Gershoff & Font, 2016), parental corporal

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punishment has been studied here for decades and has been linked to increased risk of detrimental outcomes including aggression, antisocial behavior, internalizing and externalizing problem behaviors, low self-esteem, and impaired cognitive ability, among others (Gershoff & Grogan-Kaylor, 2016). Students who are arrested as juveniles are also more likely to have diagnosed mental health or emotional disorders and be arrested in early adulthood, particularly if they were arrested more than once or for felony offenses (Barret & Katsiyannis, 2016). Given these poor long-term outcomes of disciplinary actions, there is a continued need for less reliance on these punitive practices while increasing procedures that teach and reinforce appropriate behaviors. Such procedures serve as a means of preventing problem behaviors among all students via systematic frameworks such as school-wide positive behavior interventions and supports (SWPBIS).

SWPBIS

SWPBIS is a multitiered system of behavioral supports that increases use of evidence-based prevention and intervention strategies throughout a school (Sugai & Horner, 2009) and has been implemented for more than 30 years in over 25,000 schools in the United States and other countries (OSEP Technical Assistance Center on Positive Behavioral Interventions and Supports, 2017). This framework organizes behavioral supports into three tiers: universal (Tier 1), secondary (Tier 2), and tertiary (Tier 3). All tiers heavily emphasize frequent and accurate data collection and analysis to inform systems- and individual-level decisions, including moving individual students to more intensive supports and systematically removing those supports once the student demonstrates improvement. Universal tier supports are preventive in nature and provided to all students in a school. These include (a) defining three to five positively stated behavioral expectations that apply to all students, staff, and school settings; (b) providing explicit instruction of the expectations, including modeling, practice, and feedback occurring in each setting; (c) frequently acknowledging appropriate behaviors; and (d) developing a continuum of consequences for rule violations that can be implemented consistently and are appropriate for the severity of the behavior, with a designation of behaviors and consequences handled by teachers versus administrators. Secondary tier supports are implemented with a subset of students who continue to engage in problem behaviors despite implementing the universal tier with fidelity. These targeted interventions are often based on the SWPBIS expectations and may include check-in/check-out (Crone, Hawken, & Horner, 2010) and small group social skills instruction (Mitchell, Stormont, & Gage, 2011). Tertiary tier interventions are the most intensive and individualized based on the student's behaviors, typically involving a functional behavior assessment and behavior intervention plan. When receiving secondary or tertiary supports, a student continues to access the universal support system as well.

Empirical Support for SWPBIS

Numerous studies have evaluated the effects of SWPBIS on student behavioral outcomes and found that, when SWPBIS is implemented with fidelity, improvements are apparent in office discipline referrals (ODRs), disciplinary actions, school climate and safety, academic achievement, bullying and peer victimization, and organizational health (Bradshaw, Koth, Bevans, Ialongo, & Leaf, 2008; Bradshaw, Koth, Thornton, & Leaf, 2009; Bradshaw, Mitchell, & Leaf, 2010; Childs, Kincaid, George, & Gage, 2016; Gage, Leite, Childs, & Kincaid, 2017; Horner, Sugai, & Anderson, 2010; Sadler & Sugai, 2009; Simonsen et al., 2012; Waasdorp, Bradshaw, & Leaf, 2012). Despite a large body of research, few SWPBIS studies have used experimental or quasi-experimental designs (QEDs) to compare disciplinary actions among schools implementing SWPBIS to schools that are not.

Randomized Controlled Trials (RCTs) With Disciplinary Outcomes

To date, only a few school-level RCTs have been conducted (Algozzine et al., 2012; Bradshaw et al., 2010; Horner et al., 2010) that have examined disciplinary actions. Algozzine et al. assessed SWPBIS as part of an integrated multitiered system of support that included behavioral and academic supports for kindergarten through Grade 3 students in urban schools. Using a randomized, wait-list controlled trial with seven schools, the researchers found treatment schools had a statistically significantly larger percentage of students earning zero or one ODRs, and a significantly smaller percentages of students earning two to five or six or more ODRs. Treatment schools also had fewer suspensions, but the difference was not significant. Bradshaw and colleagues (2010) studied 37 elementary schools in Maryland for 5 years, with 21 schools randomly assigned to the SWPBIS condition and 16 schools used for comparison. Aside from SWPBIS fidelity, there were no statistically significant differences in outcomes between treatment and control schools. Statistically significant reductions in suspensions, the number of students with an ODR, and ODRs per student were observed over time within treatment schools. ODR data were not collected from control schools; therefore, no between-condition comparisons could be conducted. Horner and colleagues conducted a randomized, wait-list controlled trial with 30 schools in Illinois and another 30 in Hawaii. Fifteen schools in each state were randomly assigned to the treatment condition, where they received SWPBIS training following pre-intervention data collection

(i.e., Time 1), or the control/delayed condition, where they received SWPBIS training only after the treatment schools had been trained and outcome data collected again (i.e., Time 2). At Time 2, the researchers found statistically significant differences between the groups in perceived school safety. Similar to Bradshaw et al., however, ODR data were not collected during control time periods, thus no comparisons were made between groups, and ODRs actually increased for the treatment group whose referrals were measured twice.

QEDs With Disciplinary Outcomes

Several QED studies have also evaluated outcomes for schools implementing and not implementing SWPBIS (Caldarella, Shatzer, Gray, Young, & Young, 2011; Flannery, Fenning, Kato, & McIntosh, 2014; Nelson, Martella, & Marchand-Martella, 2002). Caldarella et al. compared two Western U.S. middle schools, one implementing SWPBIS and the other serving as a control school, over 4 years. The researchers found significant reductions in ODRs, tardiness, and unexcused absences in the treatment school. These results are hindered, however, by the small sample size and lack of SWPBIS fidelity data. Working in the U.S. Midwest and Pacific Northwest, Flannery and colleagues assessed behavioral outcomes over 3 years in eight high schools implementing SWPBIS compared with four not implementing. Treatment schools had significant declines in ODRs compared with control schools, and these declines were related to increased SWPBIS fidelity. Nelson et al. implemented a SWPBIS-based system that also incorporated reading tutoring, conflict resolution, family training videos, and individualized function-based interventions in seven schools in the U.S. Pacific Northwest. The district's 28 other elementary schools served as comparison sites, and significant decreases in suspensions, emergency removals, and ODRs were found for treatment schools, though as in other studies, SWPBIS fidelity was not measured.

Disproportionate Discipline and SWPBIS

A few researchers have conducted exploratory analyses of SWPBIS on disproportional disciplinary actions. Vincent and Tobin (2011) examined 2 years of suspension and expulsion data collected from 77 schools in several states implementing SWPBIS and using the School-Wide Information System (SWIS; May et al., 2003). Within a subset of 36 schools that had fewer OSSs during the second time point, the researchers found that the decreases in OSSs and expulsions did not occur proportionally across student ethnicities. For example, White and Latino/a students were proportionally underrepresented in the number of days they were excluded, whereas Black students were overrepresented. Vincent and Tobin (2011) also examined disproportionate discipline for SWD, but unfortunately there were only 29 SWD in the data set, therefore, no meaningful analyses could be conducted.

Vincent et al. (2011) compared SWIS ODR data across 3 years for 72 schools implementing SWPBIS with fidelity and 81 schools implementing SWPBIS below fidelity levels. For both implementers and nonimplementers, Black students received disproportionally more ODRs, whereas White students received disproportionally fewer. The differences in these discipline gaps were statistically significant when comparing implementers to nonimplementers, with schools implementing SWPBIS still overreferring Black students but at a smaller magnitude than comparison schools. Skiba et al. (2011) also examined SWIS discipline data from 436 schools across the United States, though the researchers were primarily assessing disproportionality rather than SWPBIS effectiveness. In this sample, Black and Latino/a students in elementary and middle schools were overrepresented in suspension/expulsion compared with White students. Furthermore, Black and Latino/a elementary students were also more likely to receive harsher, exclusionary punishments than White students for less severe behaviors such as disruption or noncompliance, with similar patterns evident in middle schools as well.

Limitations of Current SWPBIS Research

There are a number of limitations of note in the SWPBIS research. First, there are a small number of experimental or quasi-experimental evaluations of SWPBIS that (a) included a comparison group that never received SWPBIS training and (b) examined differences in discipline outcomes between schools. Furthermore, several of these experimental studies did not include SWPBIS fidelity data or length of time implementing SWPBIS (Caldarella et al., 2011; Nelson et al., 2002), making it difficult to determine if changes in outcomes were solely due to SWPBIS. Second, all of the studies examining disproportionate discipline focused almost exclusively on ethnicity, and there is very little known about disproportionate discipline for SWD in schools implementing SWPBIS (Skiba et al., 2011; Vincent et al., 2011; Vincent & Tobin, 2011). Third, studies examining disproportionate discipline exclusively relied on SWIS ODR data. The majority of schools using SWIS are currently or have at one time been trained to implement SWPBIS, thus limiting comparisons with schools that have never been trained to implement SWPBIS. Overall, it is clear that (a) more experimental, school-level studies on the impact of SWPBIS on discipline outcomes are needed and (b) analyses of disproportionate discipline comparing schools trained to implement SWPBIS with schools that have never received training are needed to compare with prior exploratory research.

Purpose

This study was designed to address some of the limitations noted above and to extend school-level experimental research on the effects of SWPBIS on disciplinary outcomes by conducting a QED study in Florida. Among all U.S. states, Florida suspends the most students at both the elementary and secondary levels (Snyder & Dillow, 2015). During the 2011–2012 school year, Florida schools suspended 5.1% of all elementary students and a staggering 19% of all secondary students (Losen et al., 2015). The gap between Black and White student suspension rates in Florida are consistent with national trends, with almost 10% of Black students being suspended compared with only 3% of White students. SWD in Florida comprise 12.9% of the student population and 5.9% of Florida's school districts have been identified as having a significant discrepancy in the rates of suspension/expulsions of SWD (see http://flpbs.fmhi.usf.edu). Further complicating the discipline picture in Florida is corporal punishment. Florida is among the handful of states that permits corporal punishment as a disciplinary outcome (Gershoff & Font, 2016). Although its use is not ubiquitous or at high rates, Gagnon, Gurel, and Barber (2017) found an association between suspensions and corporal punishment, with higher rates of suspension in districts allowing the use of corporal punishment.

Although schools in Florida suspend the most students, Florida has one of the most robust statewide technical assistant support for implementing SWPBIS (Gage et al., 2014). Florida's FLPBIS: MTSS Project at the University of South Florida provides technical assistance and support to Florida schools interested in implementing SWPBIS. The project began in 2000 and, as of 2016, 1,708 schools have received the initial SWPBIS Tier 1 training allowing for analyses of differential effects by years of implementation (see Childs et al., 2016 for an overview of the project). Taken together, Florida is an ideal state for analysis as the state has higher than average suspension rates, disproportionate suspension rates for Black students, and statewide SWPBIS implementation and support.

Primary Research Questions

Research Question 1: Is there a statistically significant difference in the frequency of suspensions and incidents of corporal punishment between schools implementing SWPBIS with fidelity and matched comparison schools?
Research Question 2: Do schools implementing SWPBIS with fidelity have significantly fewer incidents of referrals to law enforcement, school arrests, and expulsions than matched comparison schools?

Exploratory Research Questions

Research Question 3: Are there differences in the frequency of suspension and corporal punishment for SWD and Black students in schools implementing SWPBIS with fidelity than matched comparison schools?
Research Question 4: Are there differences in frequency of suspension and corporal punishment for schools with more years implementing SWPBIS with fidelity?

Method

Sample

We collected data from all Florida public schools from the U.S. Department of Education's (USDOE) Civil Rights Data Collection (CRDC) website (https://ocrdata.ed.gov) for all available discipline outcomes for the 2011–2012 and 2013–2014 school years (the most recent data available). The CRDC is a biennial survey required by the USDOE's Office of Civil Rights. Data are collected from all public local educational agencies and schools. Next, we collected school demographic data for all Florida public schools from the U.S. Department of Education's National Center for Educational Statistics Common Core of Data (https://nces.ed.gov/ccd/) for the 2013–2014 school year. Last, we collected SWPBIS implementation data from the FLPBIS: MTSS Project (http://flpbs.fmhi.usf.edu/) for the 2013–2014 school year. Data were restructured and merged across the three data sets using the state-assigned school ID number provided in all three data sets.

First, we removed all schools that did not report discipline outcomes, including virtual schools, adult education programs, and hospital/homebound programs, leaving 3,513 schools. Next, we removed 407 alternative schools, vocational schools, and special education schools because (a) their reporting of incidents was inconsistent (e.g., one alternative school for students with behavioral disorders reported no suspensions, whereas another reported >100 suspensions) and (b) the primary purpose of this study was to identify the effects of SWPBIS on regular, public school discipline outcomes, particularly in light of the unique challenges implementing SWPBIS in alternative settings (Simonsen, Jeffrey-Pearsall, Sugai, & McCurdy, 2011). Last, we removed schools that were trained to implement SWPBIS, but did not implement SWPBIS with fidelity, defined as 70% or greater on the Benchmarks of Quality (BoQ) during the 2013–2014 school year. We removed these schools so that our analysis accurately estimated a treatment-on-the-treated effect and to ensure schools trained to implement SWPBIS were not included in the comparison group. During the 2013–2014 school year, 1,129 regular schools were trained to implement SWPBIS. Of those, 593

Table 1. Demographic Characteristics of Schools and Establishing Equivalence.

School-level characteristic	All possible comparison schools (n = 1,832)		PSM comparison schools (n = 593)		SWPBIS schools (n = 593)		Equivalence (g)
	M	*SD*	*M*	*SD*	*M*	*SD*	
Total number of students	810.2	576.4	880.3	547.0	828.0	415.6	−0.12
Percentage of free/reduced lunch	60.3	25.8	60.0	24.0	60.7	22.1	0.03
White (%)	36.4	28.4	48.7	27.9	48.9	25.2	0.01
Black (%)	26.5	27.4	21.4	24.2	20.7	21.4	−0.03
Hispanic (%)	31.1	27.3	23.5	20.8	23.7	18.6	0.01
Male (%)	51.3	5.5	51.6	2.9	51.7	3.2	0.03
Years implementing SWPBIS	0.0	0.0	0	0	4.5	2.3	
ISS in 2011	155.8	375.4	138.6	301.3	130.5	280.1	−0.03
OSS in 2011	83.1	143.5	110.5	186.0	101.4	139.6	−0.06
Corporal punishment in 2011	1.2	10.1	1.4	9.8	1.4	8.4	0.00
Level							
Primary	64.2%		68.1%		70.8%		0.06
Middle	15.9%		19.7%		19.1%		−0.02
High	15.0%		10.8%		8.6%		−0.08
Other configuration	4.9%		1.3%		1.5%		0.01

Note. Equivalence is defined as < .25 standard deviation units. PSM = propensity score matched; SWPBIS = School-wide positive behavior interventions and supports; g = standardized mean difference effect size; ISS = in-school suspensions; OSS = out-of-school suspensions.

implemented SWPBIS with fidelity and were retained, whereas the remaining 536 schools were removed from the data set (see Childs et al., 2016 for a description of the FLPBIS: MTSS Project's training and implementation framework).

Table 1 provides the demographic characteristics of schools implementing SWPBIS with fidelity and all possible comparison schools (n = 1,832). Schools implementing SWPBIS with fidelity were larger in size and had more White students attending than comparison schools. Seventy-one percent of schools implementing SWPBIS with fidelity were elementary schools, 19% were middle schools, and 9% were high schools. The average years schools implemented SWPBIS with fidelity in 2013–2014 was 4.5 years. In addition to demographics, we also included suspensions and corporal punishment from the 2011–2012 school year to ensure baseline equivalence on the primary outcomes to meet What Works Clearinghouse (WWC) design standards (see below). Overall, the average number of ISSs for 2013–2014 was 131 per school, 101 OSSs, and 1.4 corporal punishment incidents.

Measures

Fidelity of implementation

BoQ. The BoQ (Cohen, Kincaid, & Childs, 2007; Kincaid, Childs, & George, 2005, 2010) is a 53-item rating scale used to assess implementation fidelity at the Tier 1/Universal level of SWPBIS. BoQ items are organized and scored around 10 SWPBIS elements that have been defined as critical with regard to implementation. The 10 elements are aggregated to arrive at a total score. The BoQ is part of the standard protocol for the FLPBIS: MTSS Project's comprehensive evaluation and is collected from all SWPBIS schools each spring. Implementation with fidelity was defined as a BoQ score of 70% or above, which is empirically based on a BoQ validation study conducted by Cohen and colleagues (2007). Internal consistency of the BoQ total score is $\alpha = .96$, test–retest reliability is $r = .94$ ($p < .01$), and inter-rater reliability is $r = .87$ ($p < .01$; Cohen et al., 2007).

School characteristics. We included 12 school-level demographic characteristics in the final data set. We captured the (a) total student enrollment for each school, (b) the percentage of male students, the percentage of students in each school who were categorized as (c) White, (d) Black, and (e) Hispanic, (f) the percentage of students receiving free or reduced lunch, and (*g*) the school level (e.g., elementary, middle). We also captured each school's latitude and longitude coordinates to ensure matching of regional characteristics, such as urban and rural settings. Last, we included each school's 2011–2012 total frequency of (a) corporal punishment, (b) ISS, and (c) OSS for baseline equivalence.

Outcome variables. Six outcome variables examined in the study included (a) corporal punishment, (b) ISS, (c) OSS, (d) expulsion, (e) referral to law enforcement, and (f) school-related arrest. The CRDC data set separates the OSS

and ISS variables into two types: (a) the number of students with only one suspension and (b) the number of students with more than one suspension. We summed the two types of suspensions for an overall OSS and ISS frequency. The Florida Department of Education operationally defines each of the discipline outcomes as part of their student information system database (see http://www.fldoe.org/core/fileparse.php/8863/urlt/0108080-114425.pdf).

Data Analysis

We conducted a QED analysis comparing schools implementing SWPBIS with fidelity (treatment) with propensity score-matched (PSM) comparison schools never trained to implement SWPBIS. No missing data were present in the final data set.

Propensity score matching. Propensity score matching (PSM) methods are designed to reduce bias in treatment effect estimates in experimental design studies that do not have random assignment of schools to conditions (i.e., Leite, 2017). A propensity score is defined as the conditional probability of treatment assignment based on all available covariates (Rosenbaum & Rubin, 1983) and can be used for one-to-one matching treatment for comparison schools. The value of PSM is that a covariate equivalent comparison group can be matched to a treatment group, meeting established standards for high-quality QED research proposed by the WWC (2014) evidence standards. Furthermore, PSM treatment estimates have been found to be as accurate as those from RCT studies (Fortson, Verbitsky-Savitz, Kopa, & Gleason, 2012).

Following procedures outlined by Leite (2017), we estimated propensity scores using logistic regression. Specifically, all treatment schools were coded as one and all other schools were coded as a zero on a treatment indicator. The treatment indicator was then used as the dependent variable in a logistic regression model, with all 10 school-level covariates (see Table 1) and each school's longitude and latitude coordinates modeled to predict treatment status. The propensity score is then the predicted probability of a school being assigned to the treatment or comparison group based on the model covariates. This approach, thus, reduces selection bias by establishing equivalence on the included model covariates. We were confident in our model covariates for successful matching because they are congruent with, and extend beyond, those used by Fortson et al. (2012).

Next, we used each school's estimated propensity score to match schools using the one-to-one optimal matching method (Rosenbaum, 1989), which minimizes global propensity score distance (i.e., predicted probability of being in the treatment or comparison group) between treatment and comparison schools by finding the smallest average absolute distance across all the matched schools. All treatment schools were successfully matched to a comparison school across all covariates, including the baseline discipline outcomes, ensuring successful matching for treatment outliers and reduction of selection bias (see Table 1). The one-to-one optimal matching algorithm was conducted using the *matchit* (Ho, Imai, King, Stuart, & Whitworth, 2017) and *optmatch* (Hansen, Fredrickson, Buckner, Errickson, & Solenberger, 2016) packages in R 3.4.1 (R Core Team, 2016). To confirm covariate equivalence, we calculated standardized mean difference effect sizes (g), where equivalence is defined as $g <$ .25 standard deviations (WWC, 2014).

Estimation of treatment effects. All six outcome variables (i.e., ISS, OSS, corporal punishments, referral to law enforcement, school-related arrest, and expulsion) were all scaled as frequency counts, therefore, modeling of treatment effects relied upon Poisson regression to accurately estimate treatment effects given their distributional characteristics. However, all six outcomes had very large numbers of zeros; therefore, all six primary models were estimated using zero-inflated Poisson (ZIP) regression to accurately model data with excess zero counts (Long, 1997). The ZIP model allows for overdispersion resulting from excess zeros and the resulting coefficients can be exponentiated to odds ratios (ORs) for interpretation.

Although the PSM model, or design part of the analysis (Rubin, 2007), controlled for all available confounds on the treatment effect (Leite, 2017), we controlled for covariates with standardized mean differences (g) greater than .05 per WWC (2014), which included school level, number of students, and OSSs in 2011–2012 in all ZIP models. All ZIP models were estimated using the "pscl" package version 1.4.9 (Jackman, 2015) in R 3.4.1 (R Core Team, 2016).

Effect size calculations. To increase interpretation of the treatment effects, we converted the treatment effect ORs to standardized mean difference (g) effect sizes. As the effect sizes are directly calculated from the ZIP models, they represent treatment effects controlling for covariates with equivalence values greater than the .05 standard deviation units, thus meeting WWC standards (2014). Conversions from ORs to g were conducted following procedures outlined by Borenstein, Hedges, Higgins, and Rothstein (2009).

Results

Establishing Baseline Equivalence

We conducted PSM to identify a covariate equivalent comparison group on all available school-level demographic characteristics, including 2011–2012 discipline outcomes and school location (i.e., latitude and longitude). From the 1,832 possible comparison schools, the PSM procedure

identified 593 comparison schools matched to the 593 schools implementing SWPBIS with fidelity, for a final analytic sample of 1,186 schools. We calculated equivalence using the *optmatch* package (Hansen & Klopfer, 2006), with equivalence defined as $g < .25$. Equivalence statistics are reported in Table 1 and establish equivalence for all covariates. However, three of the nine covariates equivalence values were greater than .05 standard deviation units (school level, number of students, and OSSs in 2011–2012), therefore, we included all three in all subsequent models per WWC (2014).

Treatment Effects for Primary Outcomes

We estimated six ZIP models to evaluate differences in the frequency (i.e., count) of ISS, OSS, corporal punishment incidents, referral to law enforcement, school-related arrests, and expulsions for schools implementing SWPBIS with fidelity and PSM-matched comparison schools. All models included school level, number of students, and OSSs in 2011–2012. Results for the six models are presented in Table 2. Across all models, differences between schools implementing SWPBIS with fidelity and PSM comparison schools were only statistically significant for OSS. Although SWPBIS was not significant for the other models, a few covariates findings are worth noting. There was no significant relation between frequency of OSS in 2011-–2012 and the frequency of corporal punishment, school-related arrests, and expulsions in 2013–2014. Furthermore, schools with nontraditional grade groups (e.g., K–12) had significantly more corporal punishment than schools with traditional grade groupings. Last, students in middle and high schools were significantly more likely to have contact with law enforcement and to be expelled from school than elementary school students.

Effect Sizes

Although there was not a significant treatment effect for all discipline outcomes, we calculated effect sizes for all for future meta-analytic modeling. As noted, the coefficients from the ZIP models were converted to ORs (i.e., exponent of the coefficient) and then converted to *g*. The effect size for OSS was $g = -0.55$, suggesting that schools implementing SWPBIS with fidelity use OSS significantly and moderately less frequently than PSM comparison schools. All other effect sizes were less than .20 standard deviations, well below what is considered a small effect.

Exploratory Analyses

In addition to overall treatment effects, we examined differences in discipline outcomes for SWD and for Black students. Again, significant differences were only evident for OSS. Based on the effect sizes reported in Table 3, SWD in schools implementing SWPBIS with fidelity were significantly less likely to receive OSS. In addition, we examined differences for students receiving only one OSS and students receiving more than one OSS, finding little difference between the two OSS measures for SWD. Black students were also significantly less likely to receive an OSS in a school implementing SWPBIS with fidelity. However, the effect size was smaller than that found for SWD or overall. Again, few differences were found for the two different measures of OSS.

Finally, we examined differences by the number of years implementing SWPBIS (see Table 4). As noted, years of experience ranged from 1 to 10 years. We recoded years of experience into four groups: PSM comparison schools ($n = 593$), schools in their first 1 to 2 years of implementation ($n = 128$), school implementing 3 to 5 years ($n = 303$), and schools implementing for 6 to 10 years ($n = 162$). We modeled years of experience for all of the discipline outcomes, but the only significant treatment effect was for OSS. For all models, the reference group for years of experience was the PSM comparison group. Schools implementing SWPBIS with fidelity and having 3 to 5 years of experience had significantly fewer OSS, with an overall effect size of $d = -0.83$. No significant differences were found for the other years of experience groups. When looking at different types of OSS, we found significant differences between treatment groups for the number of students with only one OSS and for the number of students with more than one OSS. Schools implementing in their first 2 years had $g = -0.41$ fewer OSS, whereas schools implementing 3 to 5 years had $g = -0.55$ fewer OSS, and schools implementing greater than 6 years had $g = -0.35$ fewer OSS.

Discussion

Over the past 30 years, SWPBIS has become a widely used framework for addressing school discipline problems. A number of studies have found promising outcomes for students and schools (Bradshaw et al., 2008; Bradshaw et al., 2009; Bradshaw et al., 2010; Childs et al., 2016; Gage et al., 2017; Sadler & Sugai, 2009; Simonsen et al., 2012; Waasdorp et al., 2012), but only a handful of studies have used rigorous research methodologies (Algozzine et al., 2012; Caldarella et al., 2011; Flannery et al., 2014; Horner et al., 2010; Nelson et al., 2002). In this quasi-experimental study, we evaluated discipline outcomes for 593 Florida schools implementing SWPBIS with fidelity compared with 593 PSM comparison schools that had not been trained in SWPBIS. Across the six discipline outcomes, results indicated only OSS were significantly different between the two groups, which supports findings in several prior studies (e.g., Bradshaw et al., 2010; Nelson et al., 2002). In addition, the effect size for OSS is well above the WWC's

Table 2. Zero-Inflated Poisson Regression Models for Discipline Outcomes.

	ISS			OSS			Corporal punishment			Referral to law enforcement			School–related arrest			Expulsion		
Parameter	Estimate	OR	*SE*	Estimate	OR	*SE*	Estimate	OR	*SE*	Estimate	OR	*SE*	Estimate	OR	*SE*	Estimate	OR	*SE*
Intercept	−0.85***		0.11	0.27		0.29	2.11***		0.33	2.17***		0.20	3.64***		0.39	6.85***		1.08
SWPBIS	0.06	1.06	0.15	−0.99***	0.37	0.24	−0.11	0.90	0.28	−0.18	0.84	0.15	0.27	1.31	0.23	–0.16	0.86	0.42
Middle school	−0.77*	0.46	0.30	−0.30	0.74	0.61	−0.26	0.77	0.46	−1.62***	0.20	0.24	−1.88***	0.15	0.31	–2.97**	0.05	1.10
High school	−0.65	0.52	0.43	0.71	2.04	0.78	−0.95	0.39	0.71	−1.09*	0.34	0.43	−1.90***	0.15	0.49	–3.49**	0.03	1.21
Other	−14.02	0.00	566.00	1.71	5.53	1.39	−2.60***	0.07	0.62	−1.90**	0.15	0.69	−0.82	0.44	1.19	–3.97**	0.02	1.33
Total number of students				0.00*	1.00	0.00	0.00***	1.00	0.00	0.00***	0.00	1.00	0.000	0.00	1.00	0.000	0.00	1.00
OSS 2011	0.00***	1.00	0.00	−0.07***	0.93	0.01	0.00	1.00	0.00	0.00***	1.00	0.00	0.00	1.00	0.00	0.00*	1.00	0.00

Note. SWPBIS is a dichotomous indicator for school implementing school-wide positive behavior intervention and supports; Primary school was the reference group for level. ISS = in-school suspension; OSS = out-of-school suspension; OR = odds ratio; SWPBIS = school-wide positive behavior interventions and supports.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 3. Covariate Adjusted Effect Sizes for Discipline Outcomes.

Sample	Discipline outcome	OR	*g*
All students			
	OSS	0.37	−0.55
	ISS	1.06	0.03
	Corporal punishment	0.9	−0.06
	Referral to law enforcement	0.84	−0.10
	School-related arrest	1.31	0.15
	Expulsion	0.86	−0.08
SWD			
	OSS	0.36	−0.56
	one OSS	0.43	−0.46
	more than one OSS	0.40	−0.50
Black			
	OSS	0.57	−0.31
	one OSS	0.63	−0.26
	more than one OSS	0.62	−0.27

Note. OR = odds ratio; *g* = standardized mean difference; OSS = out-of-school suspension; ISS = in-school suspension; SWD = students with disabilities.

(2014) criteria for substantively important ($d > .25$). As noted above, OSS is widely used in Florida and more so than in most other states (Losen et al., 2015; Snyder & Dillow, 2015); therefore, any intervention with evidence of decreasing OSS in Florida is promising and should be considered for expansion.

Although we hoped to find similar patterns for ISS, no differences were found. The significant effect on OSS suggests that schools implementing SWPBIS with fidelity may have used ISS instead of OSS and that there may have been fewer incidents that would typically result in an ISS; however, there is no evidence at this time to confirm this hypothesis. In addition, it is possible that schools could achieve fidelity on the total BoQ, but not effectively implement particular core SWPBIS strategies affecting ISS, such as establishing, teaching, and rewarding behavioral expectations.

The limited findings for contact with law enforcement are not surprising given the rarity of the event in most schools and the potential limited impact of universal interventions on extreme behavioral incidents. The measure of fidelity used in this study is focused on Tier 1; therefore, it is unclear what interventions were in place and the fidelity of those interventions at Tier 2 and Tier 3. Students with the most extreme behaviors may not respond to Tier 1 practices and are in need of Tier 3 supports to decrease the likelihood of extreme behaviors resulting in contact with law enforcement. Furthermore, SWPBIS is not designed specifically to address the presence of illegal drugs and weapons on school campuses, which also can result in law enforcement contact. The same is true for expulsions, which were also used infrequently and are typically the result of extreme behavior or possession of illegal drugs and weapons. With regard to corporal punishment, the limited differences between treatment schools are likely due to the limited use of corporal punishment. That being said, there were recorded incidents of corporal punishment in schools implementing SWPBIS with fidelity. The FLPBIS: MTSS Project discourages the use of corporal punishment when training schools, but school training and support is not contingent upon eliminating corporal punishment in schools. Interestingly, corporal punishment occurred significantly more often in schools with nontraditional grade groups, which appeared to be located in rural Florida settings. Therefore, the data suggest limited use of corporal punishment and very limited use in suburban and urban settings.

In addition to the primary research questions, we examined disproportionate discipline by SWD and for Black students. Both SWD and Black students had statistically significantly fewer OSS in schools implementing SWPBIS with fidelity. Based on our review of this literature, this is the first study to report positive and meaningful differences for SWD for schools implementing SWPBIS with fidelity. Research suggests that SWD, particularly, students receiving special education services for emotional and/or behavioral disorders, are suspended at higher rates than their typically developing peers (Krezmien, Leone, & Achilles, 2006). Therefore, the findings here are encouraging as they suggest implementing SWPBIS with fidelity can reduce the occurrence of OSSs for SWD. Furthermore, the findings suggest SWPBIS may be effective for helping to remedy disproportional discipline and replicate some of the findings of Vincent et al. (2011). Finally, schools implementing SWPBIS with fidelity for 3–5 years had the greatest decreases in OSSs. This supports the contention that schools begin to actualize the benefits of Tier 1 implementation after 3–5 years (Technical Assistance Center on Positive Behavioral Interventions and Supports, 2015). However, additional research is needed to replicate and extend this finding.

Limitations

We worked diligently to ensure a high-quality QED study, however, a number of limitations necessitate discussion. First, this study relied solely on administrative data, including reporting of fidelity of implementation and all outcomes. There is no way to independently confirm the reliability of the BoQ scores provided by schools to the FLPBIS: MTSS Project. Second, there may be unmeasured covariates not included on the PSM that have a relationship with the dependent variables. For example, some schools may have been under state investigation for disproportionate suspension rates or have superintendents or principals with new goals for decreasing suspensions. Future research may consider additional covariates related to school policies correlated

Table 4. Zero-Inflated Poisson Regression Models for Out-of-School Suspension by Years Implementing SWPBIS.

	OSS			Only one OSS			More than one OSS		
Parameter	Estimate	OR	*SE*	Estimate	OR	*SE*	Estimate	OR	*SE*
Intercept	0.32		0.29	2.05		0.28	0.37		0.29
1–2 Years	−0.82	0.44	0.44	−0.75**	1.10	0.20	−0.63	0.53	0.39
3–5 Years	−1.53***	0.22	0.37	−1.00***	1.21	0.25	−1.33***	0.26	0.33
6–10 Years	−0.36	0.69	0.35	−0.63*	1.22	0.28	−0.38	0.68	0.34
Middle school	−0.32	0.73	0.61	0.34	2.50	0.36	−0.44	0.64	0.60
High school	0.78	2.19	0.79	1.14	1.71	0.61	0.62	1.85	0.78
Other	1.93	6.90	1.34	0.80	1.77	0.92	1.62	5.04	1.32
Total number of students	0.00*	1.00	0.00	0.00	1.00	0.00	0.00*	1.00	0.00
OSS 2011	−0.07***	0.93	0.01	−0.04***	1.00	0.00	−0.07***	0.94	0.01

Note. SWPBIS is a dichotomous indicator for school implementing school-wide positive behavior intervention and supports; primary school was the reference group for level. SWPBIS = school-wide positive behavior interventions and supports; OSS = out-of-school suspension; OR = odds ratio.
*$p < .05$. **$p < .01$. ***$p < .001$.

with the likelihood of school suspensions, such as zero tolerance. Furthermore, there is no way to confirm or deny the presence of other behavioral initiatives in the comparison schools. Future research should collect behavioral initiative information from all schools included in the study. Last, this study is a QED relying on administrative data and not a randomized experiment. Although the PSM approach is designed to control for possible confounds, only randomized experiments can rule out all potential confounds.

Conclusion

With the increasing use of SWPBIS in schools across the nation, there is a continued need to assess its efficacy for changing student- and school-level outcomes. More importantly, these evaluations should be conducted such that a true control group (i.e., never trained in SWPBIS) is compared with a trained group. Using a QED, we evaluated the effects of SWPBIS on disciplinary outcomes in Florida. Our results support prior findings that schools implementing SWPBIS with fidelity had fewer OSSs, and that these schools suspended SWD and Black students less often, indicating SWPBIS can have a profound impact on student outcomes.

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