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Brief Report

Disciplinary and Achievement Outcomes Associated With School-Wide Positive Behavioral Interventions and Supports Implementation Level

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Abstract. A positive behavioral interventions and supports (PBIS) framework has been associated with a variety of positive student and school outcomes. However, additional research would be useful to further understand the relationship between school-wide (i.e., Tier 1) PBIS implementation level and student outcomes. This study examined whether there were differences in discipline and academic outcomes based on Tier 1 PBIS implementation fidelity level in 153 Ohio schools when accounting for key covariates. Schools with higher implementation fidelity were found to evidence a significantly lower number of out-of-school suspensions per 100 students than schools with lower implementation fidelity when accounting for demographic covariates. However, a significant trend was not evidenced for the academic achievement outcome variable. Limitations and implications of this study are discussed.

Keywords: PBIS, positive behavior support, Tiered Fidelity Inventory, behavior, implementation

Positive behavioral interventions and supports (PBIS) refers to a system of evidence-based supports designed to enhance all students' prosocial behaviors and academic outcomes while promoting a positive school climate. This multitiered, proactive framework systematically promotes and recognizes desired behavior while using data to make decisions regarding the types and intensity of behavioral supports provided (Sugai & Horner, 2002).

The PBIS framework is typically characterized by three increasingly intensive tiers of behavioral support. At Tier 1, universal behavioral supports are provided to all students in the school. Within this tier, a school identifies three to five positively worded behavioral expectations, operationalizes what those expectations look like in various school-related settings (e.g., classroom, playground, hallway, and bus), models and teaches those expected behaviors, and then consistently acknowledges those behaviors when they occur. At Tier 2, supplemental supports (e.g., social skills groups and homeschool notes) are provided to students at risk for not meeting behavioral expectations, and progress is monitored

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regularly. Finally, at Tier 3, intensive and individualized supports and monitoring are provided to students who are not responding adequately to Tier 1 and Tier 2 supports or are exhibiting significantly concerning problem behaviors that warrant immediate attention. Tier 3 may include an individualized behavior intervention plan based on data from a functional behavior assessment as well as frequent and intensive progress monitoring.

Given its foundational importance in the comprehensive and cohesive PBIS framework, this study focuses on Tier 1 PBIS, which is sometimes referred to as school-wide PBIS, or SWPBIS. Studies have found SWPBIS to be associated with several positive outcomes, including improved student prosocial behavior (e.g., Bradshaw, Waasdrop, & Leaf, 2012), sense of staff affiliation and organizational health (e.g., Bradshaw, Koth, Bevans, Ialongo, & Leaf, 2008), and teacher self-efficacy (e.g., Kelm & McIntosh, 2012) as well as reduced suspensions and disciplinary referrals (e.g., Bradshaw, Mitchell, & Leaf, 2010). Findings on the association between PBIS implementation and academic achievement have been somewhat mixed, with some studies finding significant positive associations (e.g., Pas & Bradshaw, 2012) and others documenting nonsignificant associations (e.g., Bradshaw et al., 2010).

In fact, a recent research synthesis by Noltemeyer, Palmer, James, and Wiechman (2018) found that most studies that performed significance testing on the impact of SWPBIS implementation on office discipline referrals and suspensions found significantly positive effects, whereas most studies that performed significance testing on achievement measures found nonsignificant or mixed results. Perhaps revealing an area for future research, only 25% of the studies included in the synthesis examined the impact of PBIS on both academic and behavioral data. Furthermore, 23.6% of the studies analyzed in the synthesis did not report or consider implementation fidelity data.

PBIS implementation fidelity—the degree to which the core principles of PBIS are implemented as designed and intended—is a particularly important topic in the PBIS literature, considering findings that reveal positive associations between implementation fidelity and positive academic and behavioral student outcomes (Simonsen et al., 2012). Schools consistently implementing the core components of PBIS are more likely to achieve desired changes in student behavior. Although there are several instruments available to assess PBIS implementation fidelity, the Tiered Fidelity Inventory (TFI; Algozzine et al., 2014) is one of the most frequently utilized measures. For example, a review of state PBIS recognition systems (Noltemeyer et al., 2017) found that most states requiring implementation fidelity data for recognition required the TFI. The TFI is a coach-guided self-assessment tool that measures PBIS implementation fidelity across three tiers (Algozzine et al., 2014). Although technical adequacy of the TFI has been established (e.g., McIntosh et al., 2017), it is a recently developed instrument that has not yet been widely used in studies on PBIS outcomes. Further research using the TFI to operationalize implementation may prove useful, particularly since it is being used in practice to assess implementation and guide action planning in many schools.

Although prior research has clearly documented positive outcomes associated with PBIS, more research is needed that uses diverse and robust samples of schools, examines both behavioral and academic outcomes, considers implementation fidelity, and uses the TFI to measure implementation fidelity. The current study contributes to the closing of these research gaps by utilizing data from 153 Ohio schools to examine whether there are differences in discipline and academic outcomes based on SWPBIS implementation fidelity level as measured by the TFI when controlling for key covariates.

METHODOLOGY

The independent variable in this analysis was implementation level. Two groups were created according to their degree of PBIS implementation as measured on the TFI. The development of the TFI was informed by existing PBIS fidelity measures, and the instrument is organized into three scales (Tier 1, Tier 2, and Tier 3). Each item on the TFI is rated using a Likert-type scale and rubric to assess whether the practice described in the item is not implemented (score of 0), partially implemented (score of 1), or fully implemented (score of 2; McIntosh et al., 2017). A percent implementation score can be obtained for each tier, as well as for the overall scale, by dividing the number of points earned by the total number of points possible. The TFI manual (Algozzine et al., 2014) states, "As a general rule, a score of 70% for each tier is accepted as a level of implementation that will result in improved student outcomes" (p. 3).

The TFI has been found to demonstrate strong construct validity, with (a) expert panel ratings suggesting the items, scoring criteria, and factor structure were valid for assessing PBIS implementation; and (b) correlations between the TFI and other PBIS implementation measures being statistically significant (McIntosh et al., 2017). Furthermore, internal consistency of the overall measure (0.96) and Tier 1 scale (0.87), strong test–retest reliability (ICC = 0.99), and interrater reliability across all raters, all tiers, and all items (ICCs = 0.99) have all been documented (McIntosh et al., 2017).

The TFI is not a required assessment in Ohio; thus, schools who complete it often do so to assess their PBIS implementation and inform action planning. We dichotomized schools in our sample based on their TFI scores. The first group consisted of schools that scored below 70% on the Tier 1 TFI, and the second group consisted of schools that scored 70% or above on the Tier 1 TFI. Seventy percent was selected as the cutoff because it is the recommended benchmark at each tier to indicate implementation to criterion (e.g., McIntosh et al., 2017; PBISApps, 2014). Furthermore, Ohio's PBIS recognition system also uses 70% as the cutoff for schools to earn recognition for their PBIS implementation (see Noltemeyer et al., 2017). To summarize, dichotomizing

implementation in this way (i.e., above and below 70% on the TFI) made sense for the current study based on both national implementation recommendations and state-level recognition decision-making criteria.

The study included two dependent variables. The first dependent variable was each school's performance index score during the 2015–2016 school year, which is a score that ranges from 0 to 120 and reflects the achievement of every student on state-wide achievement tests (at the grade levels those tests are required to be administered). The second dependent variable was out-of-school suspensions (OSS) per 100 students during the 2015–2016 school year.

Covariates that were accounted for included the percentage of economically disadvantaged students (i.e., free and reduced-price lunch), the percentage of ethnic and racial minority students, the chronic absenteeism rate, and the percentage of teachers rated accomplished in the teacher evaluation system. These covariates, which were correlated significantly but moderately with the dependent variables, were included in the analysis to reduce their effects on the dependent variable. Independent samples *t* tests revealed no significant differences between the lower and higher implementing groups on the covariates.

Sample

The sample consisted of 153 schools from 55 school districts that completed the TFI during the 2015–2016 academic year, submitted their data using PBISApps, and had available data on the dependent variables. All schools in Ohio that met all three of these criteria were included in the sample. Of these schools, 77 scored less than 70% on the TFI and 76 scored greater than or equal to 70%. Furthermore, 76 of the schools were elementary schools, 31 were middle schools, 19 were high schools, and 27 were other school types (e.g., pre-K–12, pre-K–8, and preschool). There was a mix of urban (n = 84, 54.9%), suburban (n = 42, 27.5%), small town (n = 10, 6.5%), and rural (n = 17, 11.1%) schools represented within the sample. Furthermore, there was one alternative school, which serves educationally at-risk students, in the sample. Chi-square tests revealed no significant differences in the grade level or geographical typology (i.e., urban, suburban, small town, and rural) distribution between the lower and higher implementing PBIS groups.

Analyses

Descriptive statistics were first calculated to learn more about the properties of the variables (such as means, standard deviations, and frequencies). Next, a multivariate analysis of covariance (MANCOVA) was conducted to determine whether the two implementation groups differed on the composite dependent variable (when controlling for the percentage of minority students, percentage of economically disadvantaged students, chronic absenteeism rate, and percentage of teachers rated accomplished). Follow-up univariate analyses of covariance (ANCOVAs) were used to further discern the specific dependent variable(s) that contributed to the overall significant effect.

RESULTS

Descriptive statistics were calculated to understand the properties of the variables. Although the data were variable, on average, schools scored about 66.08% on the Tier 1 TFI, reported about 18.54 suspensions per 100 students, and scored about 63.04 on the performance index. Table 1 highlights the descriptive statistics for these variables by implementation group. Correlations between each variable of interest were also calculated. Most of the variables were significantly associated with each other, except for the relationship between Tier 1 TFI score and percentage of economically disadvantaged students and the relationship between Tier 1 TFI score and percentage of minority students (see Table 2).

When controlling for the covariates, the estimated mean 2015–2016 OSS per 100 students among schools scoring below 70% on the TFI Tier 1 was 22.96, whereas it was 14.05 among schools scoring at or above 70% on the TFI Tier 1. Furthermore, the performance index score among schools scoring below 70% on the TFI Tier 1 was 62.36, whereas the estimated mean for schools scoring at or above 70% on the TFI Tier 1 was 63.73.

Results of the MANCOVA revealed that, when controlling for the demographic covariates, there was a significant main effect for implementation fidelity, $F(2, 146) = 3.23$; $p < .05$. Given the significance of the overall test, the univariate main effects were examined. Follow-up univariate ANCOVAs were conducted on each dependent variable, using Bonferroni adjusted alpha levels of 0.025 per test (0.5 divided by two tests) to minimize the likelihood of Type 1 error. The first ANCOVA revealed that implementation level had a significant main effect on OSS, $F(1, 147) = 6.52$; $p < .025$. Specifically, the higher implementing schools experienced a lower number of OSS per 100 students than lower implementing schools, when controlling for demographic covariates. Follow-up univariate ANCOVAs also revealed that implementation level did not have a significant main effect on the achievement outcome when controlling for the covariates, $F(1, 147) = 1.19$; $p > .05$. These results are summarized in Table 3 and depicted in Figures 1 and 2.

DISCUSSION

Overall, the results suggest higher Tier 1 PBIS implementation is significantly associated with positive student outcomes in this sample, especially those related to student behavior. That is, when controlling for several key demographic covariates, Ohio schools that scored greater than or equal to 70% on the Tier 1 TFI experienced significantly fewer OSS per 100 students compared to schools in Ohio that scored below 70% on the Tier 1 TFI. It is worth mentioning that the higher implementation group had nearly nine fewer

Table 1. Descriptive Statistics

		Sample Characteristics			
		Implementation < 70% TFI Tier 1 Score			
Variable	*n*	Minimum	Maximum	Mean	Std. Dev
2015–2016 OSS per 100 students	77	0.00	162.50	24.8286	32.6570
15–16 Performance Index Score	77	32.40	85.80	60.6195	14.3877
Student Poverty	77	1.00	100.00	57.5844	27.5224
Student Minority	77	1.00	96.00	36.5714	31.7048
Chronic Absenteeism	77	2.20	55.10	17.1701	11.5000
Percent Accomplished Teachers	77	1.90	100.00	52.7338	25.5775
		Implementation ≥70% TFI Tier 1 Score			
Variable	*n*	Minimum	Maximum	Mean	Std. Dev
2015–2016 OSS per 100 students	76	0.00	105.30	12.1632	20.5013
15–16 Performance Index Score	76	33.00	88.80	65.4882	13.4101
Student Poverty	76	1.00	88.00	50.5526	26.3567
Student Minority	76	2.00	100.00	32.2368	30.4358
Chronic Absenteeism	76	1.60	80.90	13.1461	11.6312
Percent Accomplished Teachers	76	0.00	97.10	55.2250	24.8030

Note. OSS = out-of-school suspensions; TFI = Tiered Fidelity Inventory.

Table 2. Correlations

Variable	1	2	3	4	5	6	7
1. Tier 1 TFI Score							
2. 2015–2016 OSS per 100 Students	–.18*						
3. 2015–2016 Performance Index Score	.17*	–.69**					
4. Percent Economically Disadvantaged	.14	.54**	–.80**				
5. Percent Minority	–.08	.61**	–.68**	.80**			
6. Chronic Absenteeism	–.16*	.49**	–.65**	.61**	.60**		
7. Percent Accomplished Teachers	.02	–.38**	.50**	–.44**	–.39**	–.23**	

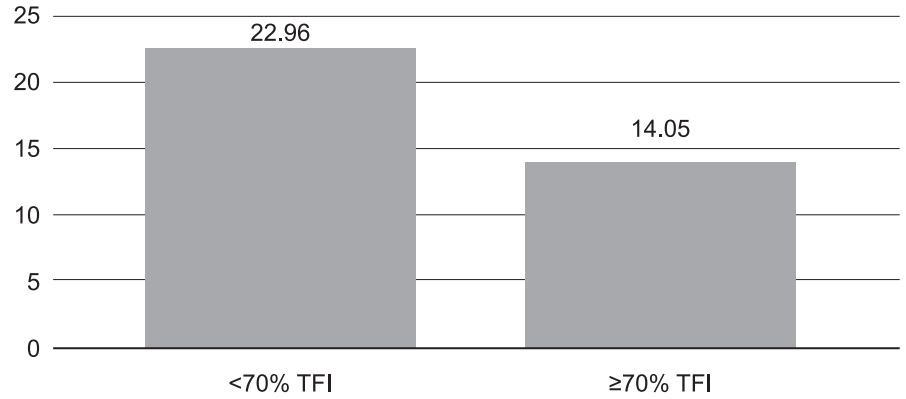
Note. OSS = out-of-school suspensions; TFI = Tiered Fidelity Inventory.
*$p < .05$. **$p < .01$.

Table 3. Multivariate and Univariate Analyses of Variance *F* Ratios for Outcomes by Implementation Level

Variable	MANOVA *F*(2, 148)	2015–2016 OSS per 100 students	2015–2016 Performance Index
Implementation	3.23*	6.52**	1.19

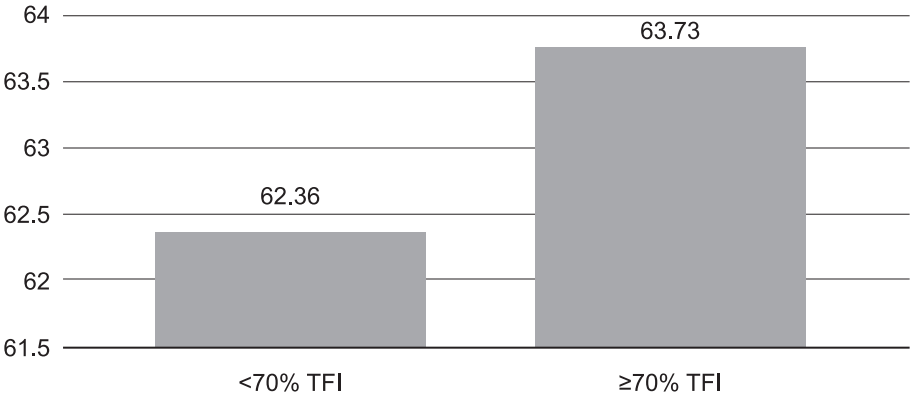
Note. MANOVA = multivariate analysis of variance.
*$p < .05$. **$p < .025$.

Figure 1. OSS per 100 Students



Note. Mean out-of-school suspensions (OSS) per 100 students by implementation group (i.e., Tiered Fidelity Inventory score < 70% or Tiered Fidelity Inventory score ≥ 70%). Covariates appearing in the model are evaluated at the following values: Chronic Absenteeism = 15.1712, Student Poverty = 54.0915, Student Minority = 34.4183, Percent Accomplished Teachers = 53.9712.

Figure 2. Performance Index Score



Note. Mean out-of-school suspensions (OSS) per 100 students by implementation group (i.e., Tiered Fidelity Inventory score < 70% or Tiered Fidelity Inventory score ≥ 70%). Covariates appearing in the model are evaluated at the following values: Chronic Absenteeism = 15.1712, Student Poverty = 54.0915, Student Minority = 34.4183, Percent Accomplished Teachers = 53.9712.

OSS per 100 students on average than the lower implementation group when accounting for the covariates. In contrast to these significant findings related to OSS, implementation fidelity did not have a significant main effect on the academic achievement measure (i.e., performance index scores). Ohio schools that scored greater than or equal to 70% on the Tier 1 TFI did experience higher performance index scores compared to schools in Ohio that scored below 70% on the Tier 1 TFI when accounting for the covariates; however, this difference was not statistically significant and therefore could be due to chance.

Altogether, these findings provide partial support for the importance of PBIS implementation fidelity with regard to student outcomes. Again, previous research suggests greater PBIS implementation fidelity is associated with more positive behavioral outcomes for students (e.g., Freeman et al., 2016; Simonsen et al., 2012). However, significant academic outcomes have been less consistently documented, with some studies identifying positive associations between SWPBIS implementation and achievement (e.g., Pas & Bradshaw, 2012) and others not (e.g., Bradshaw et al., 2010). Largely aligned to prior research, this study found implementation fidelity only had a significant main effect on OSS, not on academic achievement. This finding is not necessarily surprising considering mixed findings with regard to achievement across the extant literature and given that PBIS addresses behavior more directly than academic achievement (Noltemeyer et al., 2018). Future research will benefit from further exploration of these differential effects that PBIS seems to have on academic and behavioral variables and the causal mechanisms through which these effects are exerted.

Given the more indirect relationship between implementation fidelity and academic achievement, it is possible that schools implementing PBIS with greater fidelity will experience significantly more positive academic outcomes over time compared to schools that scored below 70% on the Tier 1 TFI. That is, as classroom behavior improves over time, students have more opportunities to be actively

engaged and receive effective instruction from their teacher. In turn, more instructional time theoretically contributes to more positive academic outcomes in the future (Horner et al., 2009). However, while some research suggests greater implementation fidelity is associated with more positive academic outcomes over time (e.g., Simonsen et al., 2012), other longitudinal research studies have found little or no relationship between PBIS and academic outcomes (e.g., Bradshaw et al., 2010; Gage, Sugai, Lewis, & Brzozowy, 2015). Therefore, future research will benefit from examining the relationship between student behavior and academic achievement to understand when greater academic achievement can be expected to follow increases in positive behavior.

Findings from this study must be considered in light of several limitations. First, this study's design prevents definitive causal conclusions. Because data were collected for all of the variables (i.e., TFI score, OSS, and performance index scores) for the same academic year, one cannot assume that PBIS implementation as reflected by TFI scores necessarily caused changes in the outcome variables. In addition, only about one third of the sample consisted of either middle schools or high schools, whereas nearly half of the schools in this sample consisted of elementary schools. The predominance of elementary schools in this sample limits the generalizability of these findings to older students in other settings. This study was also limited to schools that completed the TFI. However, given the access to these scores through PBISApps, this was the most effective way to gather data from schools implementing PBIS. Additionally, our study used schools in one state as a case study, which may limit generalizability across the wide spectrum of contexts implementing PBIS at Tier 1. Finally, organizing schools into two groups reduced the variability within TFI scores, which could potentially mask any incremental effects of subtle differences in implementation. However, organizing schools into two groups based on a 70% TFI cutoff has practical relevance and aligns to existing practice because many state PBIS recognition systems use 70% on the TFI as a cutoff for implementing with fidelity (see Noltemeyer et al., 2017).

Altogether, findings from this study have important implications for practice. These findings highlight some of the potential benefits associated with implementing core Tier 1 PBIS and regularly assessing fidelity in doing so. Core Tier 1 components include establishing three to five clear behavioral expectations; teaching, modeling, and practicing behavioral expectations; developing a system of meaningful acknowledgment for students and providing consistent consequences when expectations are not met; making decisions using data and regularly monitoring student progress; intervening early with at-risk students by implementing universal interventions that are effective for this population of students; developing a multitiered system of supports by providing interventions to students based on their levels of need; and implementing evidence-based interventions. Students may be more likely to experience positive behavioral outcomes when schools implement these core components with fidelity.

In addition to incorporating the core features of Tier 1 PBIS, schools should also regularly assess their fidelity in doing so. This continual assessment ensures proper implementation, informs necessary changes to the initiative, and increases the likelihood that students will benefit from PBIS. Although the TFI was used to assess implementation fidelity in this study and seems to have accurately differentiated between schools implementing PBIS with fidelity and those that are not, this is not the only assessment tool that can be used by schools. Other instruments that schools can use to measure PBIS implementation fidelity include the School-Wide Evaluation Tool (Sugai, Lewis-Palmer, Todd, & Horner, 2001), Benchmarks of Quality (Kincaid, Childs, & George, 2010), and the Self-Assessment Survey (Hagan-Burke et al., 2005; Safran, 2006).

This study also has important implications for future research. Specifically, as previously mentioned, future research will benefit from exploring changes in the outcome variables over time to better understand the potential indirect effect that PBIS may have on academic achievement through improvements in student behavior. In addition, future research should examine these variables among older students and students in other states to extend the generalizability of these findings. It would also be useful for future researchers to investigate the impact of PBIS implementation on outcomes using different TFI cutoffs to examine whether the 70% cutoff is optimal. To further promote the generalizability of these findings, future research will benefit from examining additional outcome variables (e.g., office discipline referrals, expulsions, and alternative forms of discipline). Finally, future research should also investigate the impact of fidelity at Tier 2 and Tier 3 and determine if these findings hold true across tiers.

Altogether, this study provides some evidence of the importance of PBIS implementation fidelity at Tier 1. Again, Ohio schools that are implementing the core components of PBIS with high levels of fidelity are experiencing fewer disciplinary actions, which may also indirectly impact student achievement in the future. Given the range of desirable outcomes associated with PBIS, it is critical that schools understand the importance of implementing the core features and doing so with fidelity. The findings from this study will hopefully help promote implementation fidelity within schools and contribute to more positive behavioral outcomes for students.

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