

The Impact of School-Wide Positive Behavioral Interventions and Supports (PBIS) on the Organizational Health of Elementary Schools

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Positive Behavioral Interventions and Supports (PBIS) is a universal, school-wide prevention strategy that is currently implemented in over 7,500 schools across the nation to reduce disruptive behavior problems through the application of behavioral, social learning, and organizational behavioral principles. PBIS aims to alter school environments by creating improved systems and procedures that promote positive change in student behavior by targeting staff behaviors. The present study examined the impact of PBIS on school organizational health using data from a large randomized controlled trial of PBIS conducted in 37 elementary schools. Longitudinal multilevel analyses on data from 2,507 staff revealed a significant effect of PBIS on staff reports of the schools' overall organizational health, resource influence, and staff affiliation over a 3-year period. This study indicated that changes in school organizational health are important consequences of the PBIS whole-school prevention model, and might in turn be a potential mediator of the effect of PBIS on student performance.

Keywords: positive behavioral interventions and supports, school-wide prevention, organizational health, school improvement, randomized controlled trial

Local school districts, educational researchers, and policymakers are increasingly turning to school-wide preventive interventions such as Positive Behavioral Interventions and Supports (PBIS; Horner, Sugai, Todd, & Lewis-Palmer, 2005; Sugai & Horner, 2006b) to promote a positive school climate and reduce student behavior problems. Many of these whole-school programs systematically manage student behavior by creating school-wide plans that clearly articulate positive behavioral expectations, pro-

vide incentives to students meeting expectations, and establish a consistent strategy for managing behavior problems. Despite the growing use and acceptance of PBIS and other whole-school interventions, to date, no longitudinal randomized controlled trials have been conducted to determine the impact of PBIS on the school environment. The present study uses a group randomized control trial design to examine the effect of PBIS training on staff perceptions of the school's organizational health, a characteristic of the school environment that has been linked with positive student and staff outcomes (Hoy, Tarter, & Bliss, 1990).

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School-Wide PBIS

School-wide PBIS is a noncurricular universal prevention strategy that aims to alter the school environment by creating improved systems (e.g., discipline, reinforcement, data management) and procedures (e.g., office referral, reinforcement, training) that promote positive change in staff and student behaviors. The program draws upon behavioral, social learning, and organizational behavioral principles (Lewis

& Sugai, 1999; Lindsley, 1992), which were traditionally used with individual students, and extends and applies them to the entire student body consistently across all school contexts (Durand & Carr, 1992; Horner, Albin, Sprague, & Todd, 1999). PBIS aims to prevent disruptive behavior and enhance the school's organizational health by creating and sustaining primary (school-wide), secondary (classroom), and tertiary (individual) systems of support. The three-tiered prevention model follows a public health approach, whereby two levels of targeted and selected programs are implemented to complement the universal school-wide components of the model (for a review, see Carr et al., 2002; Horner et al., 2005; Sugai & Horner, 2006b; Sugai, Horner, & Gresham, 2002).

The current paper focuses solely on the universal school-wide PBIS model that is comprised of the following seven critical features. A *PBIS team* is formed within the school to provide leadership regarding school-wide implementation of PBIS. The team, which is comprised of six to eight staff and an administrator attends annual training events, establishes an action plan for implementing PBIS, develops materials to support program implementation, trains other staff members, and meets monthly to discuss school-wide behavior management. A *behavioral support "coach"* provides on-site technical assistance regarding PBIS. The coach is typically a school psychologist or guidance counselor who has prior experience working with PBIS and conducting functional behavioral assessments. The school team establishes three to five *positively stated school-wide behavioral expectations* regarding student behavior (e.g., "be respectful, responsible, and ready to learn") that are posted in all classrooms and nonclassroom settings, and are known by all students and staff. Plans are developed by the school staff for *defining and teaching the school-wide behavioral expectations* on a regular basis. A *school-wide system is developed to reward students who exhibit expected positive behaviors*. School staff establish and use a school-wide system for reinforcement that includes a tangible reinforcer and is used consistently by all school staff across all settings. Staff and administrators create an agreed upon *system for responding to behavioral violations* that includes definitions about what constitutes a classroom-managed versus an office-managed discipline

problem. Students across all classrooms receive consistent consequences for disciplinary infractions. *A formal system is developed to collect, analyze, and use disciplinary data* (e.g., office discipline referrals, suspensions) to make decisions regarding program implementation.

Initial results from nonrandomized studies indicate that implementation of PBIS is associated with a reduction in office discipline referrals (Taylor-Greene et al., 1997) and suspensions (Sugai & Horner, 2006a). There is also preliminary evidence suggesting that PBIS is associated with sustained changes in schools' internal discipline practices and systems (Bradshaw, Mitchell, & Leaf, in press; Nersesian, Todd, Lehmann, & Watson, 2000; Taylor-Greene & Kartub, 2000) and improved academic performance (Horner et al., in press). However, little is known about the mechanisms through which PBIS has positive effects. By altering the behavior of the adults in the school, we anticipated that PBIS would have a positive impact on staff members' perceptions of the school's overall organizational health, which would likely serve as an important mediator of the effect of PBIS on student outcomes.

Hypothesized Effect of PBIS on Organizational Health

School organizational health is comprised of the following core features: *resource influence, staff affiliation, academic emphasis, collegial leadership, and institutional integrity*. The various facets of organizational health are likely influenced by PBIS through multiple pathways. Specifically, with regard to resource influence, which is defined as the principal's ability to lobby for resources and supports for the school and staff (Hoy & Tarter, 1997), implementation of PBIS is expected to positively affect the school's access to personnel resources (e.g., behavioral support coach), professional development (e.g., booster training sessions), and district-level supports. Furthermore, having connections to district-level staff through PBIS might increase communication between the school and district regarding the school's needs.

With regard to staff affiliation, defined as the sense of warmth, positive interactions between colleagues, and shared commitment to students, we anticipated that the PBIS model's emphasis on collaboration and joint decision-making would likely foster greater feelings of school

bonding, connection, and membership among all staff (Childers & Fairman, 1986; Tsui & Cheng, 1999). More specifically, whereas most school-based programs (e.g., reading initiatives, curriculum-based social emotional programs) only affect a subset of staff, PBIS requires the buy-in of at least 80% of staff and the participation of all staff in program implementation (Horner et al., 2005). Thus, when implementing PBIS, all staff—including those who previously worked with just a subset of students (e.g., guidance counselors, school psychologists), and those less directly involved in discipline (e.g., office staff)—work collaboratively with classroom teachers to develop, plan, and implement school-wide prevention efforts.

We also anticipated that PBIS would have a positive impact on academic emphasis, defined as students' focus on academics, respectfulness of high performing students, and a strong work ethic. Many of the PBIS behavioral expectations include "respect" for other students, which might increase the likelihood that children and staff at trained schools would exhibit respectful behavior toward all students. Furthermore, as noted above, there is preliminary research indicating a link between PBIS and improvements in student academic outcomes (Horner et al., in press), which suggests that PBIS would have a proximal impact on academic focus.

We also anticipated that PBIS would have a positive impact on collegial leadership, defined as the principal's ability to lead the school in a supportive and egalitarian fashion. Specifically, at least one administrator is required to attend the initial training in PBIS (along with the other PBIS team members) and participate in the monthly PBIS team meetings. We expected that the collegial manner in which the program is implemented, along with the increased opportunity for communication between staff and administration regarding school policies and practices would translate into a more positive perception of the principal's leadership style. Finally, we also anticipated a positive impact on the schools' institutional integrity, defined as insulation from unreasonable community and parental demands. Specifically, we anticipated that the PBIS program's emphasis on school/family communication regarding the child's behavior and successes at school would contribute to a more positive collaboration and open communication between the school and community.

Taken together, the extant research along with the PBIS model's emphasis on enhanced organization and altering staff behavior to create improved systems, supports, and practices suggests that PBIS would be associated with significant improvements in staff perceptions of the school's organizational context (Sugai & Horner, 2006b). The present study uses an intent-to-treat approach (Lachin, 2000) to examine the hypothesis that significant changes in the schools' organizational health would occur after training in school-wide PBIS.

Method

Data

Data for the current study come from a large-scale longitudinal group randomized study of PBIS. Thirty-seven Maryland public elementary schools from five school districts (rural and suburban) volunteered to participate in the trial. Because PBIS is implemented universally, a prerequisite for program implementation is that the majority of staff display a willingness and commitment to adopting the program (Horner et al., 2005). The schools were matched on select baseline demographics (e.g., percentage of students receiving free or reduced meals, school enrollment, percentage of students suspended), and then 21 schools were randomized to the intervention condition ("PBIS") and 16 were assigned to the comparison condition ("comparison"). The comparison schools agreed to refrain from implementing PBIS for the duration of the study.

Training

Each of the 21 schools assigned to receive PBIS training formed internal PBIS teams comprised of five to six core members (teachers, administrators) who attended an initial 2-day summer training led by Dr. George Sugai, one of the developers of PBIS. Ongoing support for the schools was provided through local PBIS behavior support coaches, a regional coordinator, and a state leadership team. To ensure and maintain consistently high levels of implementation fidelity, PBIS school teams attended annual 2-day summer booster training events, which were also attended by other PBIS teams from across the state. Additional supports and

professional development were provided to the schools' behavior support coaches through state training events four times each year (see Barrett, Bradshaw, & Lewis-Palmer, 2008) for additional information about the Maryland PBIS training and support infrastructure). All schools randomized to the PBIS condition implemented the program with high fidelity (see Bradshaw, Reinke, Brown, Bevans, & Leaf, 2008).

Participating Staff

Data for the present study were collected from 2,507 school staff members across 37 elementary schools. The participating school staff included general education teachers ($n = 1,387$; 55.33%) and student support staff (e.g., school psychologists, counselors, teaching assistants, office staff, resource teachers) ($n = 1,120$; 44.67%). Of the participating staff, 91.34% were female, 86.48% were White, and 11.21% were African American. Approximately 31.31% of the participating staff were in their 20s, 23.77% in their 30s, 23.53% in their

40s, 18.63% in their 50s, and 2.75% 60 years of age or older.

Participating Schools

The sample of participating elementary schools was diverse and representative of other nonurban elementary schools in the state (Stuart & Leaf, 2007). Baseline school-level demographic characteristics are provided in Table 1.

Measures

Staff Characteristics

Staff members completed a brief demographics questionnaire that included questions regarding their *sex*, *race/ethnicity*, *age group* (20–30, 31–39, 41–49, 51–60, and over 60), and *occupational role* in the school.

School Characteristics

Baseline school-level characteristics were obtained from the State's Department of Edu-

Table 1
School Characteristics and Unadjusted Mean Organizational Health Inventory (OHI) Subscale Scores for PBIS and Comparison Schools at Baseline

	PBIS ($n = 21$ schools)		Comparison ($n = 16$ schools)	
	Mean	SD	Mean	SD
School characteristics				
School enrollment	471.76	132.78	505.50	188.57
Student to teacher ratio	18.48	4.33	18.61	4.69
Free/reduced meals (%)	42.93	19.22	36.25	20.93
Special education students (%)	13.24	4.27	15.08	6.66
Caucasian students (%)	53.81	33.16	67.51	28.99
Student mobility (%)	25.88	8.24	20.51	7.19
Suspension (%)	7.73	7.43	5.06	4.73
Math performance (%) [†]	47.20	22.37	46.96	19.05
Reading performance (%) [†]	50.66	19.32	52.94	16.43
OHI subscale scores				
Resource influence	2.85	.28	2.91	.37
Staff affiliation	3.10	.34	3.19	.28
Academic emphasis	2.42	.32	2.58	.31
Institutional integrity	2.80	.33	2.78	.24
Collegial leadership	3.21	.36	3.21	.43
Overall OHI	2.95	.24	3.01	.26

Note. [†] Percentage of 5th grade students who scored in the "proficient" or "advanced" range on the state's standardized test. An overall MANOVA on the school-level characteristics indicated no significant difference between schools trained in PBIS and the comparison schools at baseline, Wilks' $\Lambda = .674$, $F(9, 19) = 1.022$, $p = .46$. The means for OHI subscale scores were not adjusted for individual- or school-level covariates. A MANOVA on the five OHI subscale scores indicated no overall significant difference between PBIS and comparison schools at baseline, Wilks' $\Lambda = .89$, $F(5, 31) = .76$, $p = .58$.

cation, including student *enrollment*, *faculty turnover*, *student mobility*, and percent of students receiving *free or reduced cost meals*.

Organizational Health

The Organizational Health Inventory for Elementary Schools (OHI; Hoy & Feldman, 1987) is a widely used, previously validated measure of staff reports of the schools' organizational health (Bevans, Bradshaw, Miech, & Leaf, 2007; Hoy & Tarter, 1997; Hoy, Tarter, & Kottkamp, 1991). The OHI consists of 37 items that measure the five aspects of a healthy functioning school: *institutional integrity* (the school's ability to cope successfully with destructive outside forces; teachers are protected from unreasonable community and parental demands), *staff affiliation* (warm and friendly interactions, positive feelings about colleagues, commitment to students, trust and confidence among the staff, and sense of accomplishment), *academic emphasis* (students are cooperative in the classroom, respectful of other students who get good grades, and are driven to improve their skills), *collegial leadership* (principal's behavior is friendly, supportive, open, egalitarian, and neither directive nor restrictive), and *resource influence* (principal's ability to lobby for resources for the school and positively influence the allocation of district resources). Participants responded to all items on a 4-point scale from "rarely occurs" to "very frequently occurs." Items were scored such that a higher score indicated a healthier school environment. An overall OHI score (referred to as "overall OHI") was calculated by averaging the five subscale scores. Prior analyses on the current data revealed a five-factor structure similar to the one originated by Hoy and Miskel (1996) and demonstrated that the subscales had moderate to high internal reliabilities (Cronbach alphas ranged from .73 to .95) (see Bevans et al., 2007).

Procedure

The data for this study were collected on an annual basis, beginning in May before randomization and participation in the initial July PBIS training event, and thereafter in May before the subsequent summer booster July training event. Staff reports of the school's organizational

health were collected via an individually addressed survey packet. The survey packets were mailed in bulk to the school and distributed to the school staff by the principal, school psychologist, or administrative assistant in their faculty mailboxes. Staff participation was voluntary, and participants provided written consent. To ensure confidentiality, staff members completed the study materials on their own time and returned the materials directly to the researchers through the U.S. mail in the self-addressed, stamped envelope provided by the researchers. Each staff questionnaire packet included a small incentive (e.g., disposable ballpoint pen, bookmark [with an approximate value less than one dollar]); no other incentives for staff participation were utilized. The staff response rate ranged from 80% to 86% across the 4 years. Baseline data, along with three subsequent years of data were included in the current paper. The Committee on Human Subjects Research at the researchers' institution provided approval for this study.

Analyses

Preliminary descriptive and multivariate analyses were conducted to confirm that there were no significant differences in the baseline school-level (mean) OHI subscale scores and school-level demographic characteristics between the schools assigned to the PBIS and comparison conditions. To examine our main hypothesis regarding the impact of training in PBIS on the change in different facets of organizational health between baseline and the three subsequent time points, analyses were conducted using a three-level modeling approach in the HLM 6.03 software using maximum likelihood estimation with robust standard errors to estimate the parameters (Raudenbush, Bryk, & Congdon, 2005). A multilevel modeling approach was selected because both the data (staff nested within schools) and hypotheses (the impact of a school-level intervention) are multilevel in nature (Luke, 2004; Raudenbush & Bryk, 2002).

Because the assignment to intervention condition occurred at the school-level, the intervention status variable (comparison vs. PBIS) was modeled as a school-level variable (Murray, 1998). Based on prior research indicating individual-level variations in perceptions of organi-

zational health (Bevans et al., 2007), all models adjusted for the following four staff-level characteristics: sex, race (White vs. non-White), age, and role in school (general educator vs. support staff). Similarly, all analyses controlled for the following school-level variables, which have been linked with variation in staff perceptions of organizational health (Bevans et al., 2007): percent of students receiving free or reduced cost meals, student mobility, faculty turnover, and (the natural log of) school enrollment. Staff and school-level variables were modeled as random effects on both the intercept and slope (i.e., growth) in organizational health, and the error terms for the intercept and slope were freely estimated (Luke, 2004; Raudenbush & Byrk, 2002). The HLM software assumes missing at random (MAR) and allows for missing data at level 1 (repeated observations over time), but uses list-wise deletion for missingness at Levels 2 (individual) and 3 (school) (Raudenbush et al., 2005).

Preliminary Analyses

Descriptive statistics for the baseline OHI subscale scores are presented in Table 1. A MANOVA was conducted in SPSS 15.0 on the unadjusted school-level mean OHI subscale scores and confirmed that there were no significant differences in baseline OHI subscale scores between the schools randomly assigned to the PBIS and comparison conditions, Wilks' $\Lambda = .89$, $F(5, 31) = .76$, $p = .58$. Similarly, there were no significant differences between comparison and intervention schools in the school-level characteristics at baseline (see Table 1) or at any other time point during the study.

Using the HLM software, we calculated the intraclass correlation coefficients (ICCs) of the baseline OHI total score and subscale scores (using an unconditional model without any covariates) and found them to be moderately high (Overall OHI = .32, institutional integrity = .18, staff affiliation = .28, academic emphasis = .29, collegial leadership = .30, resource influence = .26) (Luke, 2004; Raudenbush & Bryk, 2002). This indicated that approximately 18% to 32% of the variability in staff reports of organizational health was attributable to school membership. The average cluster size was 68.49 for overall OHI, 65.84 for institutional integrity,

68.81 for staff affiliation, 67.24 for academic emphasis, 68.65 for collegial leadership, and 67.35 for resource influence.

Results

Three-level longitudinal analyses were conducted to examine the impact of intervention status (PBIS vs. comparison) on staff perceptions of school organizational health (see Table 2). Examination of the coefficients representing the effect of the intervention on the intercept term indicated that the schools in the two conditions did not differ in baseline levels of organizational health. Specifically, the effect of PBIS status on the OHI intercept terms indicated that, adjusting for school- and staff-level characteristics, schools randomized to the PBIS intervention condition did not differ at baseline from schools randomized to the comparison condition in terms of overall OHI or the OHI subscale scores. Inspection of the coefficients representing the effect of the PBIS intervention on growth (slope) in organizational health indicated a significant effect ($p < .05$) of the PBIS intervention status variable (see Table 2). Specifically, our analyses showed a significant impact of the intervention on the slope parameters for overall OHI, resource influence, and staff affiliation ($p < .05$), and a marginally significant effect for academic emphasis ($p = .07$) (adjusted regression equations are displayed in Figure 1). There were, however, no significant intervention effects on collegial leadership ($p = .19$) or institutional integrity ($p = .65$). As noted above, all multilevel analyses adjusted for covariates at the staff- and school-level on both intercept and slope. The coefficients for these effects are reported in Table 2.

We calculated an effect size estimate for each of the significant and marginal intervention effects by dividing the growth parameter estimate by the standard deviation of the change in that subscale score (Hedges, 2007). The effect size of the intervention on the change in overall OHI was .29, .34 for resource influence, .26 for staff affiliation, and .24 for academic emphasis. Lipsey (1998) suggested a cut-off of .20 for "practical significance" (also see Cohen, 1992). Therefore, the intervention effects for these four outcomes met the practical significance level.

Table 2
Multilevel Results Indicating Impact of PBIS on Overall Organizational Health, Resource Influence, Staff Affiliation, and Academic Emphasis

Overall OHI (<i>n</i> = 2187)	Intercept			Growth (slope)		
	Coef.	SE	T-ratio	Coef.	SE	T-ratio
<i>Staff characteristic</i>						
Age	.018 [†]	.011	1.74	.009*	.002	3.08
Minority status	-.003	.036	-.09	.003	.014	.23
Sex	-.082*	.041	-1.99	.026 [†]	.014	1.86
Role	.013	.019	.70	.006	.009	.69
<i>School characteristics</i>						
PBIS intervention status	.003	.095	.03	.057*	.027	2.10
Faculty turnover	-.012*	.004	-2.58	-.001	.002	-.13
Student mobility	-.001	.006	-.07	-.002	.001	-1.64
Free/reduced meals	-.003	.002	-1.10	.001	.001	.62
Enrollment	-.180	.138	-1.31	.067*	.030	2.23
<i>Resource influence</i>						
(n = 2152)	Intercept			Growth (slope)		
	Coef.	SE	T-ratio	Coef.	SE	T-ratio
<i>Staff characteristic</i>						
Age	.014	.013	1.07	-.001	.004	-.16
Minority status	.031	.047	.66	-.013	.019	-.67
Sex	-.074	.054	-1.39	.032	.021	1.57
Role	.014	.030	.49	.015	.017	.88
<i>School characteristics</i>						
PBIS intervention status	-.065	.120	-.54	.086*	.034	2.53
Faculty turnover	-.003	.007	-.42	-.002	.002	-.86
Student mobility	.002	.009	.19	-.002	.002	-1.11
Free/reduced meals	-.005	.003	-1.61	.001	.001	1.14
Enrollment	.011	.166	.07	.081 [†]	.045	1.79
<i>Staff affiliation</i>						
(n = 2202)	Intercept			Growth (slope)		
	Coef.	SE	T-ratio	Coef.	SE	T-ratio
<i>Staff characteristic</i>						
Age	.040**	.013	3.05	.009*	.004	2.28
Minority status	-.117**	.046	-2.52	.016	.020	.80
Sex	-.116*	.057	-2.04	.021	.023	.91
Role	-.027	.020	-1.31	-.002	.010	-.19
<i>School characteristics</i>						
PBIS intervention status	-.024	.085	-.28	.058*	.029	2.00
Faculty turnover	-.018**	.005	-3.42	-.001	.002	.61
Student mobility	.001	.005	.21	.002 [†]	.001	-1.70
Free/reduced meals	-.004*	.002	-2.11	.001	.001	.71
Enrollment	-.310*	.139	-2.23	.050	.037	1.36
<i>Academic emphasis</i>						
(n = 2202)	Intercept			Growth (slope)		
	Coef.	SE	T-ratio	Coef.	SE	T-ratio
<i>Staff characteristic</i>						
Age	.020	.014	1.46	.003	.006	.46
Minority status	.127*	.061	2.09	-.014	.024	-.59
Sex	-.167**	.057	-2.93	.023	.020	1.11
Role	-.090*	.037	-2.46	.015	.013	1.13
<i>School characteristics</i>						
PBIS intervention status	-.026	.092	-.28	.042 [†]	.022	1.88
Faculty turnover	-.014*	.006	-2.44	-.001	.002	-.39

Table 2 (continued)

Academic emphasis (<i>n</i> = 2202)	Intercept			Growth (slope)		
	Coef.	SE	T-ratio	Coef.	SE	T-ratio
Student mobility	-.011	.007	-1.67	-.003**	.001	-2.61
Free/reduced meals	-.004	.002	-1.45	.001	.001	.32
Enrollment	-.256	.154	-1.66	.069**	.025	2.72

Note. Age was coded as an ordinal variable from 0 (age 20–29) to 4 (age 61 and over), minority status was coded 0 (White) and 1 (non-White), sex was coded 0 (female) and 1 (male), and role was coded 0 (general educator) and 1 (student support). PBIS intervention status was coded 0 (comparison) and 1 (PBIS). Free/reduced meals indicates percentage of students in the school receiving free or reduced cost meals. The enrollment variable was calculated as the log of enrollment (i.e., school size) to facilitate interpretation of the estimates.

† $p \leq .10$; * $p \leq .05$; ** $p \leq .01$.

Discussion

As hypothesized, staff in schools randomized to implement PBIS showed significant improvements in several aspects of their school's organizational health, including overall OHI, resource influence, and staff affiliation. A marginally significant effect was observed on academic emphasis. Although the specific mechanisms by which PBIS influenced these facets of organizational health are unknown, the schools' connections with the district, either through the behavior support coach or district liaison, likely contributed to the increased opportunity to leverage resources for the school, thereby influencing resource allocation. Training in PBIS appears to have made the school a more friendly, positive, and collaborative work environment for staff. Although not statistically significant, the tendency of staff in PBIS schools to report positive growth in their perceptions of academic emphasis might be a result of enhanced behavior management, thereby providing more opportunity to focus on academics and greater emphasis on positive behaviors, like academic excellence.

There were, however, no significant intervention effects on growth in collegial leadership or institutional integrity. With regard to collegial leadership, although principal participation in PBIS training and implementation was required, the model did not specifically target principals or their management style. It is possible that the intervention did affect some aspects of principal leadership not assessed through the OHI. Specifically, attributes of effective leadership directly related to the implementation of PBIS or other school-based interventions were not assessed in the current study. Future studies

should examine multiple facets of principal leadership related to high quality implementation of PBIS. Similarly, training in the PBIS model did not appear to influence the schools' sensitivity to unreasonable community demands (i.e., institutional integrity). Although community, particularly parent, involvement in PBIS is strongly encouraged, in the context of increasing accountability, school district and legislative requirements might have greater influence on school policies than do unreasonable community demands. Therefore, the schools in the present sample might be more robust to the community's undue pressures than originally observed by Hoy and Tarter (1997).

Consistent with previous research, we also observed some significant associations among staff- and school-level characteristics and perceptions of the school environment (Bevans et al., 2007; Radenbush, Rowan, & Kang, 1991). The staff-level characteristics tended to be associated with the intercept scores more so than growth (slope) in organizational health, whereas school-level factors tended to be associated with both intercept and slope. Although a thorough evaluation of these associations is beyond the scope of this paper, these findings illustrate the importance of controlling for both staff- and school-level covariates when examining the impact of interventions on changes in organizational health.

Limitations

It is important to note some potential limitations of the current study, including possible threats to internal and external validity. One limitation of the study is the reliance on staff self-report measures, especially since the staff

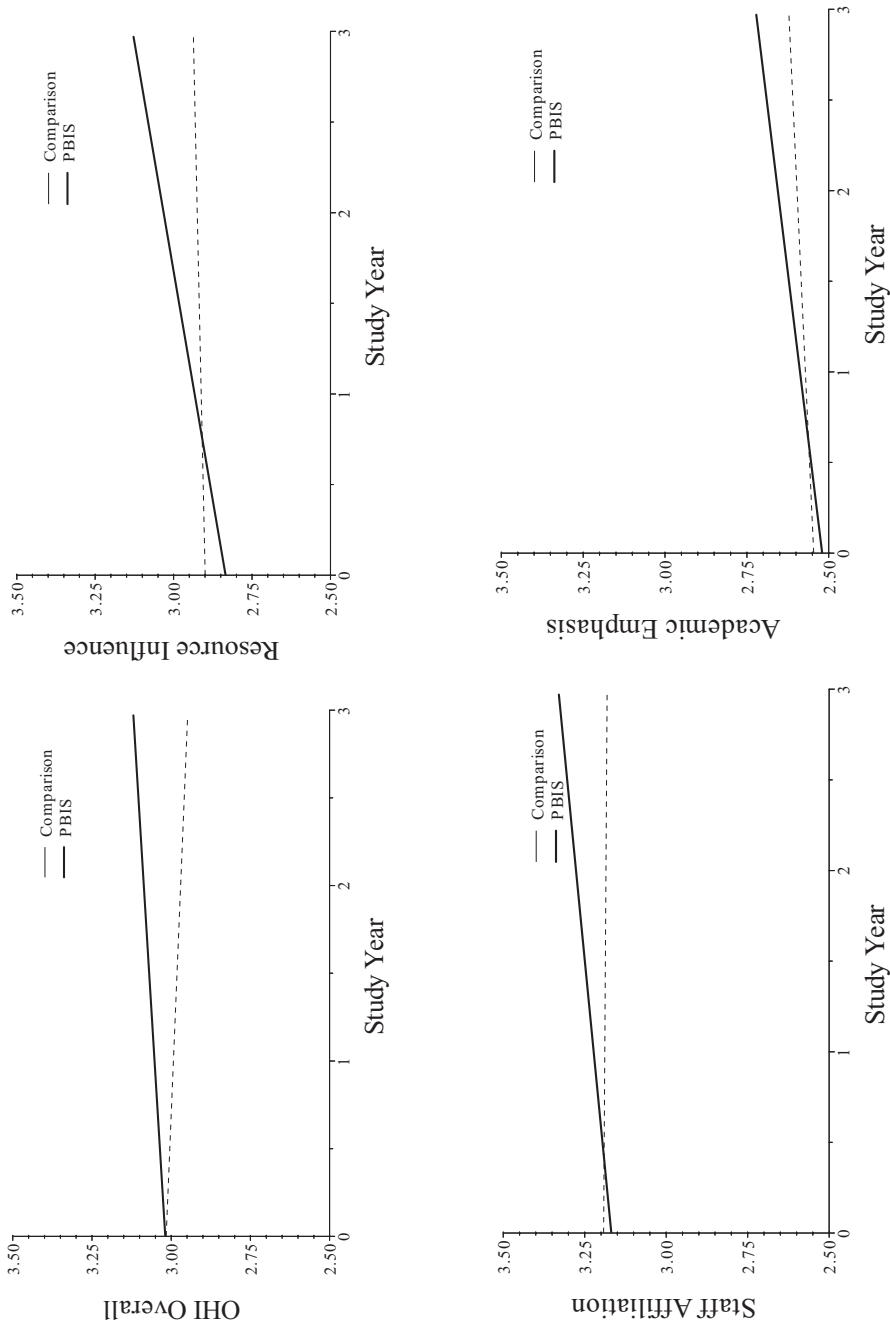


Figure 1. Adjusted regression equations predicting Organizational Health Inventory (OHI) overall and subscale scores across the first 3 years of the study for PBIS and comparison schools. *Note.* Regression equations adjusted for staff- and school-level covariates.

were knowledgeable about the school's intervention status. Although the OHI survey materials were distributed to the staff at school in self-addressed survey packets, it is possible that school administrators or other school staff could have imposed demand characteristics that influenced the participants' responses on the OHI. These factors, coupled with the potential for a more general social desirability, could have influenced the staff in both conditions. Consequently, it is difficult to determine the potential impact or direction of such an effect. Similarly, although it is difficult to rule out the Hawthorne effect as a potential explanation for the positive effects observed, if this were the case, we would expect an overall increase in staff reports of OHI on all subscales across both conditions. However, the positive effects were specific to just the PBIS schools and did not occur for all subscales. Additional research is needed to determine whether the positive effects of PBIS on school health are also reported by students and outside observers who are unaware of the schools' implementation condition, and thus might be less sensitive to demand characteristics and social desirability.

Although the overall response rate was relatively high for a study of this scale, it is possible that the staff who chose to participate in the study differed in some way (e.g., demographic characteristics, perception of the school) from those who did not. Unfortunately, no demographic or OHI information is available on non-consenting staff. Consequently, we are unable to determine if there is a participation bias. The extent to which these findings generalize to all staff in these schools is, therefore, unclear.

The present study followed an intent-to-treat approach (Lachin, 2000), which focuses on examining the main effect of the intervention on the outcomes, irrespective of program fidelity. All schools in the PBIS condition reached the implementation fidelity criteria within the first 4 years of the trial (Bradshaw et al., in press). Future research will explore the association between implementation fidelity and gains in organizational health. The participating schools were diverse with regard to size, location (rural, suburban), and student characteristics, and analyses by Stuart and Leaf (2007) using matching procedures indicated that the schools in the randomized trial did not differ significantly from other elementary schools in the state with regard

to baseline school-level characteristics (e.g., achievement, school size). It was not feasible to randomly select schools from the state or the participating school districts; therefore, we relied on voluntary schools, which could have differed in the level of organizational health from nonvoluntary schools. Different effects might be observed in schools that are resistant to adopting the model, such as schools required to implement PBIS by states or districts. No urban schools were included in this study and, thus, additional research is needed to determine the impact of PBIS in urban schools. Further work is also needed to examine the effect of PBIS on organizational factors in middle and high schools, as implementation of the PBIS model in these contexts might be associated with a different rate of growth in organizational health. Because of the relatively small number of districts participating in the trial, we were not able to empirically examine the impact of district-level factors. The strong PBIS training and sustainability network present in Maryland is not available in all states (see Barrett et al., 2008); thus, it is unclear whether similar effects will occur in other contexts where the training and support network is less extensive.

General Conclusions and Implications

The present study is an initial effort to understand the effects of PBIS on the school environment. The findings indicate that training in school-wide PBIS is associated with improvements in several aspects of organizational health. Couching the intervention effects in terms of effect size estimates, the impact of training in PBIS on change in overall OHI, resource influence, and staff affiliation reached practical significance (Lipsey, 1998). It is possible that the methodological limitations of the current study influenced the observed effects sizes, thus additional research is needed to determine the generalizability of these findings. It is noteworthy, however, that these intervention effects emerged within the first 3 years of implementation, as the program developers hypothesized that the intervention would require at least 3 to 5 years to evince significant and sustainable changes in the school environment (Sugai & Horner, 2006a). Consequently, we anticipate that larger effect sizes will emerge

when the program is sustained over a longer period of time. Whereas the current study focused on organizational health as the primary outcome, we anticipate that these improvements in organizational health will prove to be an important mediator of the effect of PBIS on academic performance and student behavior problems. Additional research is underway to explore whether the improvements in organizational health observed through PBIS translate into gains in academic achievement and reductions in student behavior problems (Bradshaw et al., in press). Although the overall “cost” (i.e., time, money, staffing) of implementing school-wide PBIS is relatively modest compared to the cost of implementing other school-wide prevention programs, further research is needed to determine the actual cost/benefit ratio of PBIS, given the amount of time required for the intervention effects to emerge (Blonigen et al., 2008).

The findings of the current study also have important implications for building-level administrators and school psychologists. For example, staff who are in the minority within the school (i.e., male or non-White) tend to report lower levels of organizational health, which might be related to reduced job satisfaction, efficacy, and performance. Thus, administrators and school psychologists might want to provide additional supports to these individuals to enhance their perceptions of the school environment. These findings also suggest that administrators interested in enhancing their schools’ overall organizational health should consider adopting a school-wide program like PBIS that improves the perception of the school context held by both teaching and nonteaching staff. Although it is difficult to determine which elements of PBIS were responsible for the changes in organizational health, it is likely that participation in high quality training, convening regular PBIS team meetings, promoting consistency among staff regarding student discipline, and receiving ongoing technical assistance from the PBIS coach contributed to the observed outcomes (Barrett et al., 2008). Building-level administrators and staff interested in implementing PBIS will need to allocate sufficient time and resources to ensure high quality implementation of the model.

References

- Barrett, S., Bradshaw, C. P., & Lewis-Palmer, T. (2008). Maryland state-wide PBIS initiative: Systems, evaluation, and next steps. *Journal of Positive Behavior Interventions, 10*, 105–114.
- Bevans, K. B., Bradshaw, C. P., Miech, R., & Leaf, P. J. (2007). Staff- and school-level predictors of school organizational health: A multilevel analysis. *Journal of School Health, 77*, 294–302.
- Blonigen, B., Harbaugh, W. T., Singell, L. D., Horner, R. H., Irvin, L. K., & Smolkowski, K. S. (2008). Application of economic analysis to School-Wide Positive Behavior Support (SWPBS) programs. *Journal of Positive Behavior Interventions, 10*, 5–19.
- Bradshaw, C. P., Mitchell, M. M., & Leaf, P. J. (in press). Examining the effects of School-wide Positive Behavioral Interventions and Supports on student outcomes: Results from a randomized controlled effectiveness trial in elementary schools. *Journal of Positive Behavior Interventions*.
- Bradshaw, C. P., Reinke, W. M., Brown, L. D., Bevans, K. B., & Leaf, P. J. (2008). Implementation of school-wide Positive Behavioral Interventions and Supports (PBIS) in elementary schools: Observations from a randomized trial. *Education and Treatment of Children, 31*, 1–26.
- Carr, E. G., Dunlap, G., Horner, R. H., Koegel, R. L., Turnbull, A. P., Sailor, W. et al. (2002). Positive behavior support: Evolution of an applied science. *Journal of Positive Behavior Interventions, 4*, 4–16.
- Childers, J. H., & Fairman, M. (1986). The school counselor as facilitator of organizational health. *The School Counselor, 33*, 332–337.
- Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155–159.
- Durand, V. M., & Carr, E. G. (1992). An analysis of maintenance following functional communication training. *Journal of Applied Behavior Analysis, 25*, 777–794.
- Hedges, L. V. (2007). Effect sizes in cluster-randomized designs. *Journal of Educational and Behavioral Statistics, 32*, 341–370.
- Horner, R., Albin, R. W., Sprague, J. R., & Todd, A. W. (1999). Positive behavior support for students with severe disabilities. In M. E. Snell & F. Brown, (Eds.), *Instruction of students with severe disabilities* (5th ed., pp. 207–243). Upper Saddle River, NJ: Merrill-Prentice Hall.
- Horner, R. H., Sugai, G., Smolkowski, K., Eber, L., Nakasato, J., Todd, A. W., et al. (in press). A randomized, wait-list controlled effectiveness trial assessing School-wide Positive Behavior Support in elementary schools. *Journal of Positive Behavior Interventions*.

- Horner, R. H., Sugai, G., Todd, A. W., & Lewis-Palmer, T. (2005). School-wide positive behavior support. In L. Bambara & L. Kern (Eds.), *Individualized supports for students with problem behaviors: Designing positive behavior plans* (pp. 359–390). New York: Guilford Press.
- Hoy, W., & Feldman, J. (1987). Organizational health: The concept and its measure. *Journal of Research and Development in Education*, 20, 30–38.
- Hoy, W. K., & Miskel, C. G. (1996). *Education administration: Theory, research, and practice* (5th ed.). New York: McGraw-Hill.
- Hoy, W. K., & Tarter, C. J. (1997). *The road to open and healthy schools: A handbook for change, Elementary Edition*. Thousand Oaks, CA: Corwin Press.
- Hoy, W. K., Tarter, C. J., & Bliss, J. R. (1990). Organizational health, school climate, and effectiveness: A comparative analysis. *Educational Administration Quarterly*, 26, 260–279.
- Hoy, W. K., Tarter, C. J., & Kottkamp, R. B. (1991). *Open schools/healthy schools: Measuring organizational climate*. Beverly Hills, CA: Sage.
- Lachin, J. M. (2000). Statistical considerations in the intent-to-treat principle. *Controlled Clinical Trials*, 21, 167–189.
- Lewis, T. J., & Sugai, G. (1999). Effective behavior support: A systems approach to proactive school-wide management. *Focus on Exceptional Children*, 31, 1–24.
- Lindsley, O. R. (1992). Why aren't effective teaching tools widely adopted? *Journal of Applied Behavior Analysis*, 25, 21–26.
- Lipsey, M. W. (1998). Design sensitivity: Statistical power for applied experimental research. In L. Bickman & D. L. Rog (Eds.), *Handbook of applied social research methods* (pp. 39–68). Thousand Oaks, CA: Sage.
- Luke, D. (2004). *Multilevel modeling*. Thousand Oaks, CA: Sage.
- Murray, D. M. (1998). *Design and analysis of group-randomized trials*. New York: Oxford Press.
- Nersesian, M., Todd, A., Lehmann, J., & Watson, J. (2000). School-wide behavior support through district-level system change. *Journal of Positive Behavior Interventions*, 2, 244–246.
- Radenbush, S. W., Rowan, B., & Kang, S. J. (1991). A multilevel, multivariate model for studying school climate with estimation via the EM algorithm and application to U.S. high-school data. *Journal of Educational Statistics*, 16, 295–330.
- Raudenbush, S. W., Bryk, A., & Congdon, R. (2005). *HLM Statistical Software: Version 6*. Lincolnwood, IL: Scientific Software International, Inc.
- Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: Sage.
- Stuart, E., & Leaf, P. (2007, May). *Moving from efficacy to effectiveness in school-based prevention research: Case study of PBIS*. Poster presented at the Society for Prevention Research, Washington, DC.
- Sugai, G., & Horner, R. (2006a, March). *Adoption, implementation, durability, & expansion of SW-PBS*. Paper presented at the Third Annual International Association for Positive Behavior Supports Convention. Reno, NV. Retrieved April 7, 2006, from <http://www.pbis.org/pastconferencepresentations.htm>
- Sugai, G., & Horner, R. (2006b). A promising approach for expanding and sustaining school-wide positive behavior support. *School Psychology Review*, 35, 245–259.
- Sugai, G., Horner, R., & Gresham, F. (2002). Behaviorally effective school environments. In M. Shinn, H. Walker, & G. Stoner (Eds.), *Interventions for academic and behavior problems II: Prevention and remedial approaches*. (pp. 315–350). Bethesda, MD: NASP.
- Taylor-Greene, S., Brown, D., Nelson, L., Longton, J., Gassman, T., Cohen, J., et al. (1997). School-wide behavioral support: Starting the year off right. *Journal of Behavioral Education*, 7, 99–112.
- Taylor-Greene, S., & Kartub, D. T. (2000). Durable implementation of school-wide behavior support: The high five program. *Journal of Positive Behavior Interventions*, 2, 233–235.
- Tsui, K. T., & Cheng, Y. C. (1999). School organizational health and teacher commitment: A contingency study with multi-level analysis. *Educational Research and Evaluation*, 5, 249–268.