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Predicting Latency of Reaching Adequate Implementation of Tier I Schoolwide Positive Behavioral Interventions and Supports

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Abstract

In this study, longitudinal data from 708 schools across five states in the continental United States were analyzed to measure the time between initial training and adequate implementation of Tier I Schoolwide Positive Behavioral Interventions and Supports over 5 years and the extent to which it varied by school characteristics. Results indicated that, all else constant: elementary schools were more likely to reach adequate implementation before middle and high schools, non–Title I schools were more likely to reach adequate implementation before Title I schools, and suburban schools were more likely to reach adequate implementation before city schools. The findings provide empirical documentation of the average length of time required for adequate implementation of a systems-level intervention, as well as how that length differs across nonmalleable school characteristics.

Keywords

schoolwide positive behavioral interventions and supports, sustainability, evidence-based practices, implementation science

The process of implementing evidence-based practices in schools is often complex, relying on supports from a variety of resources to make the adoption of a new practice possible. In recent years, research has documented that the likelihood of practice adoption and fidelity of implementation increases with specific types of external training and coaching supports by district- or state-level networks (Bradshaw & Pas, 2011; McIntosh, Mercer, Nese, Strickland-Cohen, & Hoselton, 2015). Furthermore, numerous empirical studies have now identified predictors of intervention sustainability in schools, including but not limited to commitment and support from school administrators, the use of team-based implementation, and sharing data with all school staff (Hunter, Han, Slaughter, Godley, & Garner, 2015; Sanford DeRousie & Bierman, 2012). Less, however, is known about the typical length of time from initial training to adequate implementation, the length of time that can be reasonably expected for different types of schools (e.g., high schools vs. elementary school), or how other school characteristics (e.g., enrollment) influence this time frame.

Schoolwide Positive Behavioral Interventions and Supports (SWPBIS) and Implementation Science

SWPBIS is a multitiered, systems-level framework for preventing problem behaviors and increasing prosocial skills for all students by (a) organizing the school environment to support student learning with varying needs of support and (b) providing school staff with the tools to implement supports effectively. Rooted in behavioral science and based on the three-tiered public health model (Sugai et al., 2010), SWPBIS has sustained in some schools for more than 20 years, while many other educational initiatives have been quickly been abandoned (McIntosh et al., 2013). The continued implementation of SWPBIS may be because it is not a singular intervention; rather, it provides a framework for selecting and implementing evidence-based interventions that match to the intensity of student needs. Furthermore, SWPBIS is a low-cost investment for schools and results in numerous valued outcomes for students and staff (Swain-Bradway, Lindstrom, Johnson, Bradshaw, & McIntosh, 2017).

Tier I SWPBIS, or universal supports, focuses on providing behavior interventions to all students across all settings in a school building. Implementation is done in a proactive and

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preventive manner, whereby all students are explicitly taught schoolwide behavior expectations and reinforced for demonstrating appropriate behaviors in an effort to create a positive school climate while reducing the likelihood that problem behaviors will arise. Tier II, or targeted supports, provides more intensive behavior supports for students whose behaviors are not responsive to Tier I interventions, whereas Tier III, or individualized supports, are provided to students whose behaviors are not responsive to Tier I or Tier II interventions. Although implementation of all three tiers of SWPBIS is critical for ensuring a continuum of supports for all students, this article will focus specifically on Tier I implementation. Several randomized control trials have documented that implementation of SWPBIS at Tier I resulted in (a) increased academic performance and prosocial skills (Bradshaw, Mitchell, & Leaf, 2010; Horner et al., 2009), (b) decreased discipline referrals for problem behaviors (Bradshaw et al., 2010), and (c) improvements in the overall climate of the school (Algozzine & Algozzine, 2009; Bradshaw, Koth, Thornton, & Leaf, 2009; Horner, Sugai, & Anderson, 2010; Horner et al., 2009). Although documentation of valued outcomes is critical for the implementation of practices, the feasibility of implementing systems of support, training staff, and selecting and installing practices, as well as time and effort needed to implement systems, are also crucial for stakeholders to understand prior to implementation. Implementation science provides practical steps for adopting, implementing, and sustaining research-based practices, all the while monitoring the accuracy of implementation through the use of fidelity measures (Eccles & Mittman, 2006). Given the number of steps for effective implementation of SWPBIS, determining if the process of SWPBIS implementation at Tier I varies across different characteristics of schools is needed.

Predictors of Adequate Implementation

To identify predictors of adequate SWPBIS Tier I implementation, studies have focused on the large-scale and sustained implementation of school-based practices. Predictors include practice and demographic variables at the school level (Forman, Olin, Hoagwood, Crowe, & Saka, 2009; Forman et al., 2013; Payne, 2009; Sanford DeRousie & Bierman, 2012), and external supports at the state and district levels (Bradshaw et al., 2009; Coffey & Horner, 2012; Horner et al., 2014). In addition, a limited number of studies have explored the speed with which adequate implementation is reached (Buzhardt, Greenwood, Abbott, & Tapia, 2006; McIntosh, Merceret, al., 2015).

Practice-Level and School-Level Predictors

Practice-level factors are specific activities that schools or school teams engage in regularly in an effort to improve their ability to deliver interventions, make strategic decisions about school supports, and sustain implementation of evidence-based practices. Research suggests that practice-level as well as school-level factors, such as school demographic characteristics, can affect the quality of implementation of school practices. Payne (2009) defined implementation quality as (a) the intensity with which staff use a practice in their schools and (b) the frequency with which students participate in the practice. Using a series of structural equation models with a sample of over 500 schools, Payne found implementation quality, for both individual- and systems-level practices, to be positively and significantly related to a number of school-level factors, including school enrollment, locale, and principal support. In addition, schools in which staff participated in the selection, training, and integration of standardized practices into their regular school systems had higher quality implementation. In studies of SWPBIS implementation at Tier I, Bradshaw and Pas (2011) found lower implementation in schools with high enrollment, and Molloy, Moore, Trail, Van Epps, and Hopfer (2013) found that implementation was lower in high schools, schools with high enrollment, and schools in low socioeconomic status (SES) communities. However, in a study of sustainability, McIntosh, Kim, Mercer, Strickland-Cohen, and Horner (2015) found sustainability was not predicted by the proportion of students in schools eligible for free or reduced price lunch (FRL), with lower sustainability only in middle and high schools.

In a qualitative interview study on factors perceived to be important for the successful implementation and sustainability of evidence-based practices, Forman et al. (2009) interviewed 24 developers of evidence-based school interventions. Similar to Payne (2009), the authors found that principal support, high quality training and technical assistance, use of standardized practice materials and procedures, and alignment of the interventions with existing systems or practices were perceived as influential. However, additional factors were found to be influential, including (a) teacher and administrator support, (b) visibility of the intervention's effects on important outcomes, and (c) use of schoolwide teams to ensure implementation and continuation of the intervention (Forman et al., 2009).

State- and District-Level Supports

External supports (e.g., technical assistance and staff training, district- and state-level initiatives) can influence schools' capacity to implement evidence-based practices. For example, Bradshaw and colleagues (2009) examined the effects of formal SWPBIS trainings by a state-led SWPBIS leadership team. Training was associated with significant improvements in the schools' overall organizational health, comprised of five factors: (a) institutional integrity, (b) staff affiliation, (c) academic emphasis, (d) collegial leadership, and (e) resource influence (Bradshaw et al., 2009).

In another large-scale study, Horner and colleagues (2014) examined the effects of state-level coordination on the scaling-up of SWPBIS in seven U.S. states. Findings indicated that state leadership teams had significant roles (e.g., political and fiscal, policy, building state and local capacity) in terms of scale-up implementation efforts.

Previous Implementation Speed Research

Buzhardt and colleagues (2006) noted that the speed of implementation, or the length of time between adopting a practice and implementing it with fidelity, is an important yet understudied area of implementation science. Their research documented that practices that can be implemented quickly have a higher probability of large-scale implementation. In a recent study examining different school characteristics as predictors of sustainability, McIntosh, Mercer, et al. (2015) found that rapid implementation of Tier I SWPBIS was a strong predictor of its sustained implementation. Specifically, schools that met adequate criterion for implementation in Year 1 were more likely to sustain SWPBIS at Years 3 and 5 after initial implementation. However, contextual factors may produce considerable variation in implementation, even for schools within the same district or state (Adelman & Taylor, 1997; Nese, McIntosh, Nese, Ghemraoui, et al., 2016). Depending on what factors impede adequate implementation, district and state networks charged with supporting school-level implementation may need to provide differentiated supports to their schools for them to implement to criterion as quickly as possible.

It is commonly stated that schools can expect to take a minimum of 3 to 5 years to fully implement SWPBIS (Sugai & Horner, 2009), but less is known empirically about how long it takes for schools to reach adequate implementation. Furthermore, research has indicated that the length of time can vary based on nonmalleable factors (factors that cannot be changed, such as the grades a school serves and the location of the school), with high schools, for example, taking longer to adequately implement than elementary schools (Bohanon et al., 2006; Flannery, Sugai, & Anderson, 2009). Unfortunately, school and district teams have little empirical guidance regarding realistic time frames for implementation. For example, Bradshaw and colleagues (2009) found that schools were more likely to reach fidelity at Tier I in their first year of implementing SWPBIS when district support and strong organizational systems were present. However, Nese, McIntosh, Nese, Bloom, et al. (2016) found that many schools report abandoning SWPBIS in their second year of implementation because they felt a lack of support from their school administrator. Past research on implementation science has focused on the practice-adoption process and predictors of abandoning practices or reaching adequate fidelity of implementation. However, fewer studies have measured the time between training and reaching adequate implementation or organizational and contextual predictors of this length of time.

Purpose of the Study

In the previously mentioned Nese et al. (2016) study, schools that were not successful at implementing SWPBIS were examined to gain a better understanding of when they abandoned SWPBIS, the reasons for abandoning, and nonmalleable predictors of abandonment. This study aimed to examine similar questions, but with a population of schools that successfully implemented Tier I SWPBIS. In this study, we utilized longitudinal school-level data over 5 years to measure the time between training and adequate implementation of Tier I SWPBIS and the influence of school characteristics for schools that were successful at meeting and maintaining Tier I SWPBIS implementation. We sought to identify average time frames between SWPBIS new team training and implementation of the core features with fidelity across school types. In addition, we sought to identify nonmalleable barriers to rapid implementation of Tier I SWPBIS so that district and state teams can provide differentiated supports to their schools. The research questions for the current study included the following:

> **Research Question 1:** What is the average latency from training to adequate implementation of Tier I SWPBIS across different school characteristics (i.e., proportion of students eligible for FRL, student enrollment, school level, school locale, Title I status)?
>
> **Research Question 2:** To what extent do school characteristics predict latency to reaching adequate Tier I SWPBIS implementation?

Method

Participants and Settings

A sample of 708 public elementary, middle, and high schools across five states in the United States were included in this study. The participating schools were primarily elementary (73%), suburban (49%), and Title I eligible (61%), with the mean percentage of children receiving free or reduced price meals at 42%, mean enrollment at 539 students, and student bodies that were predominantly White (57%). Complete demographic data are summarized in Table 1.

Each of the five participating states had a state-level network responsible for training and supporting implementation of SWPBIS in schools. SWPBIS initiatives had been in place for 11 to 19 years in the five participating states

Table 1. Sample School Demographics (N = 708).

Variable	Frequency	%
Level		
Elementary schools	516	73
Middle schools	156	22
High schools	36	5
Locale		
Schools in rural area	113	16
Schools in town	82	12
Schools in suburb	348	49
Schools in city	165	23
Title I status	430	61
High Enrollment	354	50
⩾50% FRL	274	39
	Mean	*SD*
Ethnicity		
African American/Black	22%	25%
American Indian/Alaskan Native	>1%	1%
Asian/Pacific Islander	5%	7%
Hispanic/Latino	15%	21%
White	57%	30%
Students eligible for FRL	42%	25%

Note. FRL = free or reduced price lunch.

(median = 15 years), with training and coordination provided by their respective state departments of education. State-level leadership teams were developed to oversee several aspects of their state's SWPBIS initiative, including training, coaching, data collection, evaluation, dissemination activities, and sustainability efforts at both the district and school levels. Each of the states used a standardized training curriculum that included a 2-day training that took place over 2 consecutive days over the summer. Hence, the training duration (and dose) was consistent for each school. The state training model also included assigning an external coach to each of the participating schools; however, data on the frequency of coaching sessions or the focus of those meetings were not available.

Measures

School characteristics. School demographic data were collected from the National Center for Education Statistics (NCES; https://nces.ed.gov/ccd/pub_overview.asp) for grade levels served (i.e., elementary, middle, high; see Note 1), Title I classification see (Note 2), percentages of students receiving FRL (see Note 3), school enrollment (see Note 4), and locale (i.e., city, suburb, town, rural; see Note 5). The demographic data used in this study represent each school's first year of implementation so that analyses would test the prediction of implementation from characteristics at initial training.

Fidelity of implementation. Four measures with research evidence of validity were used by state networks to assess each school's fidelity of Tier I SWPBIS implementation.

The Schoolwide Evaluation Tool (SET; Sugai, Lewis-Palmer, Todd, & Horner, 2001) is a 28-item external evaluation tool, with criteria for adequate implementation at a dual criterion of both 80% overall and 80% on the *Expectations Taught* subscale (Horner et al., 2004). A psychometric evaluation of the SET indicated an overall coefficient α of .95 to .96 (Horner et al., 2004; Mercer, McIntosh, & Hoselton, 2017). The Schoolwide Benchmarks of Quality (BoQ; Cohen, Kincaid, & Childs, 2005), is a 53-item tool with a criterion for adequate implementation at 70%. A psychometric evaluation of the BoQ indicated an overall coefficient α of .96 to .98 (Cohen et al., 2007). The Self-Assessment Survey (SAS; Sugai, Horner, & Todd, 2000) is a 43-item self-assessment tool with a criterion for adequate implementation at 80%. A psychometric evaluation of the SAS indicated an overall α of .85 to .97 (Mercer et al., 2017; Safran, 2006). The Team Implementation Checklist (TIC; Sugai, Horner, & Lewis-Palmer, 2001), is a 22-item progress monitoring tool with a criterion of 80% for adequate implementation. A psychometric evaluation of the TIC indicated an overall α of .91 to .95 (Mercer et al., 2017; Tobin, Vincent, Horner, Dickey, & May, 2012).

Reported convergent validity evidence for these four assessments was moderate, with Pearson correlations ranging from .59 to .71 (Mercer et al., 2017), and construct validity research has shown that these measures all load onto a single latent factor of Tier I SWPBIS fidelity of implementation with strong model fit (Turri et al., 2016), indicating that the measures assess the same construct of fidelity of SWPBIS Tier I implementation. The criteria for meeting adequate implementation varies by measure, which enables the measures to have roughly similar classification rates to the other measures, enabling comparable scores and summative decisions regarding adequate implementation across measures (Mercer et al., 2017). Thus, these findings generally suggest that the four measures are related to one another and that the total scores can be used relatively interchangeably to indicate level of Tier I SWPBIS implementation (Mercer et al., 2017).

Fidelity measures were administered by individuals trained by their respective state networks. As per state network participation agreements, at least one internal member of the schools' SWPBIS team and at least one external assessor were trained on the fidelity measures used. The four measures were either completed by an external assessor with staff and student interviews (SET), an external assessor from the district or state along with the SWPBIS team (BoQ), the entire school staff via self-assessment (SAS), or the SWPBIS team (TIC). Schools were identified as having "adequate implementation" of SWPBIS when their fidelity score met or exceeded the specified criterion for the measure. If schools reported multiple measures per year, the measure with the strongest rigor and psychometrics was used via a cascading logic model, whereby the fidelity tools were selected in the order of most to least rigorous: SET, BoQ, SAS, and then TIC (McIntosh et al., 2013). For example, if a school reported scores for both the SET and the BoQ, and scored below the dual criteria for the SET (< 80% overall and/or < 80% on the Expectations Taught subscale), and above criteria for the BoQ (> 70%), that school was classified as meeting adequate implementation that year. All sample schools (a) implemented Tier I SWBPIS for at least 5 years, (b) reported implementation fidelity score(s) each year from at least one of the four measures, (c) met adequate implementation criteria during that time span, and subsequently maintained adequate implementation through the time span regardless of when it initially occurred. In the first occurrence of meeting adequate implementation, approximately 50% of schools (n = 351) met fidelity with the SET, 20% (n = 140) with the BoQ, 28% (n = 205) with the SAS, and 2% (n = 12) with the TIC.

Procedures

Through ongoing research partnerships between the state networks and the National Technical Assistance Center on PBIS, the authors of this study obtained lists of schools trained in SWPBIS, their initial training year, and their implementation status for each school year from 2001-2002 to 2013-2014 using a sequential cohort design. These data were then merged with school demographic data from the NCES (Spira, Bracken, & Fischel, 2005). As a condition of the training and implementation supports provided by the state SWPBIS training teams, schools were required to submit fidelity data to their respective state networks annually. The selected sample of 708 schools had provided fidelity data for each of the first 5 years following the initial year of training, met and maintained adequate fidelity within these first 5 years of SWPBIS implementation, and had complete NCES data. These schools represent 67% of the overall sample in the data set, with the remaining 33% (n = 349) removed because they did not meet or maintain adequate implementation.

Analyses

To answer the first research question, descriptive statistics were used to calculate the latency from training to adequate implementation across different school characteristics. To address the second research question, an ordinal logistic regression analysis was applied to predict the number of years to reach adequate fidelity of implementation at Tier I (1-5 years). Ordinal logistic regression is a special case of logistic regression (appropriate when the dependent variable is categorical, or noninterval), where the dependent variable is ordered in a meaningful way. The following categorical predictors were used: grade levels served (elementary, middle, or high school), Title I classification (non–Title I or Title I); locale (rural, town, suburb, or city); free and reduced lunch status (< 50% FRL, with less than 50% of student receiving free/reduced lunch, or ⩾50% FRL, with 50% or more students receiving free/reduced lunch); enrollment (low enrollment, below the median enrollment separately for elementary [median = 433], middle [median = 653], and high [median = 1,289] schools, or high enrollment, at or above the median enrollment, separately for elementary, middle, and high schools). Dummy vectors of value 0 or 1 to indicate the absence or presence a category were created to represent the multiple categories, such that, for example, three dummy variables (rural, town, and suburb) were created to represent school locale and the fourth category (city) served as the reference. The reference group for the ordinal logistic regression analysis was suburban, non–Title I elementary schools with <50% FRL and low enrollment. The ordinal regression analysis was conducted with M*plus* version 7.4 (Muthén, & Muthén, 1998-2015), using maximum likelihood estimation with robust standard errors, which is robust to dependent variable nonnormality.

To determine whether our model would not be affected by multicollinearity among predictors, we calculated the variance inflation factor (VIF; Fox & Monette, 1992) for each predictor with the "car" package (Fox & Weisberg, 2011) in *R* (R Core Team, 2017). The VIF for predictor i is $1 / (1 - R_i^2)$, where R_i^2 R_i is the R^2 from a regression of predictor i on the remaining predictors (Heiberger & Holland, 2004). Values of VIF exceeding five are considered evidence of collinearity (Heiberger & Holland, 2004), and all predictor VIF values were less than 1.63, indicating that multicollinearity was not an issue.

Results

Time to Adequate Implementation

Table 2 displays the descriptive information for the latency from training to adequate implementation across different school characteristics, separately for elementary, middle, and high schools. There were strong variations in latencies across school levels. On average, elementary schools reached adequate implementation after 2 years, middle schools reached adequate implementation after 2.4 years, and high schools reached adequate implementation after 3 years.

Among elementary schools, non–Title I elementary schools had the shortest mean latencies for adequate implementation (1.82 years), followed by elementary schools in suburbs (1.88 years) and towns (1.93 years), and <50% FRL elementary schools (1.96 years). In fact, these were the lowest means across all groups, as no middle or high school group had an average latency less than 2 years. Elementary

Table 2. Descriptive Information by School Level About the Latency Between Training and Adequate Implementation Across Different School Characteristics.

	Elementary schools			Middle schools			High schools		
Variable	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Title I	369	2.14	1.08	53	2.75	1.39	8	2.38	1.06
No Title I	147	1.82	0.93	103	2.22	1.07	28	3.18	1.06
⩾50% FRL	234	2.16	1.14	37	2.62	1.40	3	2.00	1.00
<50% FRL	282	1.96	0.95	119	2.34	1.14	33	3.09	1.07
Rural	139	2.30	1.11	26	2.88	1.37	0	—	—
Town	255	1.93	0.99	78	2.41	1.21	15	3.80	1.01
Suburb	52	1.88	0.78	25	2.04	1.06	5	2.80	0.84
City	70	2.11	1.19	27	2.26	1.10	16	2.31	0.70
High nroll	258	2.05	1.10	78	2.59	1.26	18	3.44	1.15
Low enroll	258	2.05	1.00	78	2.22	1.14	18	2.56	0.86
Total	516	2.05	1.05	156	2.40	1.21	36	3.00	1.10

Note. The mean (*M*) and *SD* represent latency in years. Title I indicates the school was elibible to recieve Title I services. ⩾50% FRL indicates that 50% or more students received FRL, and <50% FRL indicates that less than 50% of student received FRL. Rural, town, suburb, and city indicate the locale of the school (see Note 5). High enroll and low enroll indicates enrollment was above or below, respectively, median enrollment separately for elementary, middle, and high schools. FRL = free or reduced price lunch.

schools in rural locales had the longest latency to adequate implementation, with an average of 2.3 years, followed by ⩾50% FRL (2.16 years) and Title I (2.14 years) elementary schools. A somewhat similar pattern was observed among middle schools, where suburban middle schools had the lowest mean latency to adequate implementation (2.04 years), and rural middle schools had the longest mean latency (2.88 years), followed by Title I middle schools (2.75 years) and ⩾50% FRL schools (2.62 years).

The mean latencies for high school groups were generally different from elementary and middle schools. High schools in towns had the longest mean latency to adequate implementation (3.8 years), followed by high schools with high enrollment (3.44 years), non–Title I high schools (3.18 years), and <50% FRL high schools (3.09 years). In fact, these were the lowest means across all groups, as no elementary or middle school group had an average latency more than 3 years. Among high schools, ⩾50% FRL schools had the shortest mean latency to adequate implementation (2.00 years), less than any middle school group. It should be noted that the sample sizes also decreased from elementary to middle to high schools, and that the small high school cell sizes (e.g., Title I, ⩾50% FRL, and suburban schools) suggest that caution should be exercised when interpreting results based on these sample sizes.

Table 3. Ordinal Regression Results.

Variable	Estimate	*SE*
Threshold, Year1	0.01*	0.20
Threshold, Year2	1.82*	0.21
Threshold, Year3	2.94*	0.22
Threshold, Year4	3.89*	0.26
Middle	0.93*	0.21
High	2.11*	0.31
Title I	0.63*	0.18
City	0.65*	0.18
Town	−0.22*	0.21
Rural	−0.08*	0.21
⩾50% FRL	−0.06*	0.17
High enroll	0.24*	0.15

Note. The Thresholds represent the logit of meeting adequate implementation at or before that year for the reference group. The logit regression coefficient for each covariate in the regression model represents the difference in predicted logits between the covariate group and the reference group. With the parameter estimates and thresholds, separate regression models can be written for the reference and comparison groups (i.e., $\tau_j - \beta_x$). These models can be transformed to odds (i.e., $e^{\tau_j - \beta_x}$) or cumulative probabilties, odds / (1 = odds), which represent the odds/cumulative probabilites of meeting adequate implemention at or before that *j* year. FRL = free or reduced price lunch.
*$p < .05$.

Prediction of Latency

Of the 708 schools, 30% reached adequate Tier I implementation after 1 year, 40% after 2 years, 17% after 3 years, 7% after 4 years, and 6% after 5 years. Table 3 shows the results of the ordinal regression analysis, where the threshold estimates represent the logit of meeting adequate implementation at or before that year for the reference group, and the regression coefficient estimates for each covariate in the regression model estimates the difference in predicted logits between the covariate group and the reference group. There were four statistically significant predictors of the latency to meet adequate implementation: middle schools, high schools, Title I schools, and city schools. That

Table 4. Cumulative Probabilities of Meeting Adequate Implementation at or Before Each Year by School Characteristics.

Variable	Year 1	Year 2	Year 3	Year 4
Reference	.50	.86	.95	.98
Middle	.28	.71	.88	.95
High	.11	.43	.70	.86
Title I	.35	.77	.91	.96
City	.35	.76	.91	.96
Town	.56	.89	.96	.98
Rural	.52	.87	.95	.98
⩾50% FRL	.52	.87	.95	.98
High enroll	.44	.83	.94	.97

Note. The "Reference" group represents suburban, non–Title I elementary schools with <50% FRL and low enrollment. Each subsequent subgroup represents the difference between the subgroup and the "Reference" group, and probabilities should be interpreted with these conditions (e.g., "Middle" represents suburban, non–Title I *middle* schools with <50% FRL and low enrollment, "Rural" represents *rural*, non–Title I elementary schools with <50% FRL and low enrollment, ⩾50% FRL represents suburban, non–Title I elementary schools with ⩾50% FRL and low enrollment). Year 5 cumulative probabilities are equal to 1.0 as all sample schools met adequate implementation at or before Year 5. FRL = free or reduced price lunch.

is, all else constant, elementary schools were 2.5 times more likely to reach adequate implementation before middle schools ($e^{0.93} = 2.5$) and more than 8 times more likely to reach it before high schools ($e^{2.11} = 8.2$). All else constant, non–Title I schools were nearly 2 times more likely to reach adequate implementation before Title I schools ($e^{0.63} = 1.9$). Finally, all else constant, suburban schools were about 2 times more likely to reach adequate implementation before city schools ($e^{0.65} = 1.9$).

Table 4 shows the cumulative probabilities of meeting adequate implementation at or before that year for each group. The estimated cumulative probabilities show that, all else constant, only 11% of high schools met adequate implementation at Year 1, compared with the other groups where about one third (middle, Title I, city) to one half (reference, town, rural, ⩾50% FRL, and high enrollment) of schools met adequate implementation at Year 1. All groups showed an increase of at least 32 percentage points in schools meeting adequate implementation from Year 1 to 2; all else constant, middle schools, Title I schools, and city schools made the largest gains in percentage points, and only 43% of high schools met adequate implementation after 2 years. By Year 3, and all else constant, over 95% of schools in towns and ruralities, ⩾50% FRL schools, and the reference group met adequate implementation, followed closely by schools with high enrollment (94%), city and Title I schools (91% each), and then middle schools (88%) and high schools (70%). By Year 4, only 5% or less of each group had not yet reached adequate implementation, except for high schools, where 14% remained. Because all schools in the analytic sample met adequate implementation at or before 5 years, the Year 5 cumulative probabilities are equal to 1.0 (100%).

Discussion

Given the evidence base for SWPBIS, its widespread adoption, and the importance of systems for supporting implementation, it is of value to identify specific timelines for implementation. These timelines are helpful in that the support provided by district and state teams is informed by both realistic estimates of implementation speed and an understanding of needs for support in reaching adequate implementation. Implementing the core features of SWPBIS is the mechanism by which student outcomes improve, and these outcomes further reinforce implementation by school personnel (Andreou, McIntosh, Ross, & Kahn, 2014), and reaching implementation early is a strong predictor of sustained implementation (McIntosh, Mercer, et al., 2015). Hence, identifying trajectories for various types of schools could be of use to practitioners and technical assistance providers so that they can assess how the progress of implementation in a given school relates to that of similar schools. This study sought to identify average latency from initial training to adequate implementation of SWPBIS at Tier I for different types of schools. Given that previous research explored the phenomenon of abandoning SWPBIS as well as predictors of abandonment, this study sought to examine data from schools that were successful at implementing Tier I SWPBIS. As such, the results shared in this study are relevant for schools that eventually implement SWPBIS.

Timelines for Implementation

Most schools reached adequate implementation at Tier I during their second year of implementation following training. The information in Table 2 is useful for practitioners and policy makers in that it provides empirical guidance that is more specific than the common 3 to 5 years cited in the literature. The average latency for schools was faster than these estimates, although the recommendations typically describe the 3 to 5 years not specifically as the time to reach full implementation, but rather a 3-to-5 year commitment to ensuring that SWPBIS implementation becomes embedded into the daily routines and work of the school (Sugai, Horner, & McIntosh, 2008). Such a process of routinization may take longer than simply implementing the critical features of the practice (Adelman & Taylor, 2003). Moreover, the initial years of implementation can be seen as a fragile period of implementation, when the initiative may be threatened with barriers such as administrator or team turnover that could lead to abandonment (Nese, McIntosh, Nese, Bloom, et al., 2016; Rogers, 2003). Hence, this study provides evidence that most schools reach adequate implementation of SWPBIS at Tier I before this window, but the recommended 3 to 5 years of commitment to SWPBIS may still be prudent for implementation to be sustained in the long term.

Although average implementation latency was shorter than 3 years, it is worth noting that the latency to implementation was longer than 1 year for most schools, particularly middle and high schools. This point is critical to district and state teams planning timelines for training. Some training schedules provide training for Tier I systems in Year 1 of the initiative, Tier II systems in Year 2, and Tier III in Year 3. These findings demonstrate that although some schools implement Tier I systems to criterion within the first year, most schools do not reach adequate Tier I implementation until their second year. These schools would, therefore, not have been given adequate time to implement the critical features of Tier I SWPBIS before having to implement Tier II systems simultaneously. As such, moving too quickly from Tier I to Tier II or III trainings may be suboptimal at best, and a substantial barrier to adequate implementation at worst.

Nonmalleable Predictors

Given previous case-study research showing longer latency for implementation in high schools (Bohanon et al., 2006), it was not surprising to see that grade levels served was the most salient predictor of implementation speed, with middle and high schools taking longer to reach adequate implementation than elementary schools. High schools in particular have larger groups of both faculty and administrators, requiring more time to reach consensus and possibly more time to establish commitment to a collaborative, instructional approach to supporting student behavior (Flannery et al., 2009). Thus, it makes sense that implementation speed would be slower. As such, trainers and coaches can expect high schools to take longer to implement to criterion, as well as a longer period of time implementing without realizing visible improvements in student outcomes. Hence, it could be useful for trainers to communicate more realistic expectations for implementation timelines and provide artificial reinforcement for implementation efforts (e.g., verbal praise for incremental increases in fidelity) in the fragile period between training and adequate implementation.

In addition to grade levels served, Title I status and locale were also significant predictors of latency. These findings were consistent with research showing that schools serving lower SES communities and city schools implemented with lower fidelity than other types of schools (Gottfredson, Jones, & Gore, 2002; Molloy et al., 2013). It seems that these barriers to strong fidelity of implementation also affect the speed by which implementation occurs. Yet in contrast with previous research (Bradshaw & Pas, 2011; Payne & Eckert, 2010), school enrollment was not a significant predictor of latency. It is possible that school size acts as a barrier to initial implementation but if schools eventually achieve adequate implementation, it does not appreciably affect implementation speed.

Limitations and Future Research

Some key aspects of the sample and analyses are useful to consider when interpreting these results. First, although the sample spanned five states, these states were unique in that there was state-level coordination of SWPBIS implementation and consistent use of fidelity of implementation measures and a standard approach for entering and analyzing them (PBIS assessment). It is unclear whether the same latencies would be observed in samples without strong state coordination, although we would hypothesize that latencies could be longer, or at least more varied. This study could be replicated with samples in other states with less coordination. In addition, there were few high schools in the sample, especially when the sample was further divided by other school characteristics. The cell sizes were particularly small, and they were characterized by larger standard deviations. As such, readers should interpret the results for high schools with caution, as they may not generalize, particularly to high schools that are Title I designated, have ⩾50% FRL populations, or are in rural or suburban settings. Replication with a larger, more diverse sample would add confidence to readers in applying the results to their schools.

Moreover, the states did not document the precise dosage of coaching or follow-up trainings that would be likely to affect the speed of reaching adequate fidelity. The literature base is clear that coaching enhances implementation of practices such as SWPBIS (Massar, Bastable, & McIntosh, 2018; Mathews, McIntosh, Frank, & May, 2014; McIntosh et al., 2013). Hence, it seems likely that providing additional supports would accelerate implementation, especially for high schools and schools located in cities and rural settings, which had the longest latencies to adequate implementation. More research is needed to understand what types and dosages of additional training, coaching, and school release time (for planning) can improve both the quality and speed of implementation for schools at risk of slow implementation or abandonment.

This study assessed implementation of Tier I at each single year of implementation, with years and not months as the metric. Given that some fidelity of implementation tools (e.g., TIC, TFI) are intended to be administered multiple times per year, it may be possible to obtain more precise estimates of latency with a sample that would include a consistent measure of fidelity administered at regular intervals (e.g., quarterly). Future research of this sort could provide even more guidance regarding latency from training to adequate implementation. It is also important to note that the fidelity measures used in this study are all appropriate for establishing Tier I SWPBIS; they do not evaluate implementation fidelity of advanced tiers of SWPBIS. Therefore, the results of this study apply to Tier I SWPBIS alone and should not be applied to Tier II or III implementation. A bedrock of SWPBIS is that it is multitiered, and although installation of Tier I SWPBIS is necessary, it is not a sufficient indicator that the entire SWPBIS framework has been implemented. Therefore, future research should examine latency of implementing Tier II and III supports with a psychometrically sound tool designed to examine each tier of SWPBIS, such as the Tiered Fidelity Inventory (Algozzine et al., 2014).

Authors' Note

The opinions expressed are those of the authors and do not represent views of the institute or the U.S. Department of Education.

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Notes

1. National Center for Education Statistics (NCES) School Level is defined by the highest or lowest grade level taught in the school, where elementary (or primary) school low grade is prekindergarten through Grade 3, and the high grade is up to Grade 8; middle school low grade is Grade 4 through 7, and the high grade is Grade 4 through 9; and high school low grade is Grade 7 through 12, and the high grade is Grade 12 only.
2. A Title I eligible school is a school designated under appropriate state and federal regulations as being high poverty and eligible for participation in programs authorized by Title I of P.L. 107-110. A Title I eligible school is one in which the percentage of children from low-income families is at least as high as the percentage of children from low-income families served by the LEA as a whole or that the LEA has designated as Title I eligible because 35% or more of the children are from low-income families.
3. The percentage of students receiving free or reduced price lunch (FRL) was the number of students who were eligible for the FRL Program under the National School Lunch Act, which provides cash subsidies for FRLs to students based on family size and income (NCES total FRL), divided by the annual headcount of students enrolled in school on October 1 or the school day closest to that date (NCES student membership).
4. School enrollment was the annual headcount of students enrolled in school on October 1 or the school day closest to that date (NCES student membership).
5. The NCES locale (urban-centric) code categories are defined as follows. City, large: Territory inside an urbanized area and inside a principal city with population of 250,000 or more. City, mid-sized: Territory inside an urbanized area and inside a principal city with population less than 250,000 and greater than or equal to 100,000. City, small: Territory inside an urbanized area and inside a principal city with population less than 100,000. Suburb, large: Territory outside a principal city and inside an urbanized area with population of 250,000 or more. Suburb, mid-sized: Territory outside a principal city and inside an urbanized area with population less than 250,000 and greater than or equal to 100,000. Suburb, small: Territory outside a principal city and inside an urbanized area with population less than 100,000. Town, fringe: Territory inside an urban cluster that is less than or equal to 10 miles from an urbanized area. Town, distant: Territory inside an urban cluster that is more than 10 miles and less than or equal to 35 miles from an urbanized area. Town, remote: Territory inside an urban cluster that is more than 35 miles of an urbanized area. Rural, fringe: Census-defined rural territory that is less than or equal to 5 miles from an urbanized area, as well as rural territory that is less than or equal to 2.5 miles from an urban cluster. Rural, distant: Census-defined rural territory that is more than 5 miles but less than or equal to 25 miles from an urbanized area, as well as rural territory that is more than 2.5 miles but less than or equal to 10 miles from an urban cluster. Rural, remote: Census-defined rural territory that is more than 25 miles from an urbanized area and is also more than 10 miles from an urban cluster.

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