Identifying and Predicting Distinct Patterns of Implementation in a School-wide Behavior Support Framework

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Abstract

The purpose of this study was to examine the extent to which distinct patterns of fidelity of implementation emerged for 5,331 schools over a five-year course of implementing school-wide positive behavioral interventions and supports (SWPBIS). We used latent class analysis to classify schools based on their likelihood of implementing SWPBIS with fidelity each year, then assessed school and district predictors of classifications. A four-class solution fit the model well, with two patterns of sustained implementation (Sustainers and Slow Starters) and two patterns of practice abandonment (Late Abandoners and Rapid Abandoners). Significant predictors of group membership included grade levels served, enrollment, proportion of schools implementing SWPBIS in the district ("critical mass"), and size of the implementation cohort ("community of practice"). Elementary schools, larger schools, schools in districts with more schools already implementing SWPBIS, and those starting within a larger initial district cohort were more likely to be in the sustaining classes. Results are discussed in terms of understanding patterns of implementation in schools to enhance sustained implementation of school practices.

Keywords: positive behavioral interventions and supports, implementation science, sustainability, prevention, school-based intervention.

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Many researchers have proposed theoretical models for understanding how school practices are implemented and sustained (e.g., Adelman & Taylor, 2003; Domitrovich et al., 2008; Han & Weiss, 2005), and over the past decade, implementing and sustaining practices at a large scale has become an attainable ultimate goal (Greenberg et al., 2015; Horner & Sugai, 2015; Slavin, 2004). An area of promising research to meet this goal is identifying factors that promote or inhibit sustained implementation of evidence-based practices at adequate fidelity (Cook & Odom, 2013). Recent studies have examined and identified specific predictors of sustained implementation of interventions in schools, such as administrator support, consistent funding, ongoing professional development, practice efficiency, staff stability, teaming, and use of data for decision making (Baker, Gersten, Dimino, & Griffiths, 2004; Hunter, Han, Slaughter, Godley, & Garner, 2015; McIntosh et al., 2013; Sanford DeRousie & Bierman, 2012).

Speed and Patterns of Implementation

One understudied area of implementation science is factors that affect the speed of implementation (i.e., the length of time required to reach an acceptable level of fidelity of implementation; Buzhardt, Greenwood, Abbott, & Tapia, 2006). A general common guideline used by implementers is that it takes three to five years for a school to achieve adequate implementation of a systems-level intervention (Rimm-Kaufman, Fan, Chiu, & You, 2007; Sugai & Horner, 2009). But recent randomized controlled effectiveness trials of school-wide practices have shown more rapid implementation (i.e., the vast majority of schools meeting criteria for implementation in their first year) when there is strong organizational health and district support (Bradshaw, Koth, Thornton, & Leaf, 2009; Horner et al., 2009). Research has also shown that

holding other things constant, a practice that can be implemented more rapidly has a higher probability of being implemented at a large scale (Buzhardt et al., 2006; Saldana, Chamberlain, Wang, & Brown, 2012).

Related to speed of implementation, researchers have proposed that practices are adopted, implemented, and sustained through predictable stages of implementation (Adelman & Taylor, 1997; Bertram, Blase, & Fixsen, 2015). Although the various models appear to be linear, their developers note that progress may be recursive, as staff or administrators turn over and practices are adapted or elaborated (McIntosh & Goodman, 2016). However, there may be distinct patterns of progress through these stages. For example, there is evidence to suggest that fidelity growth is faster in the second year of implementation than the first (Schaper, McIntosh, & Hoselton, in press). In addition, the patterns seen across schools in a given district may vary considerably, with implementation in some schools moving rapidly (i.e., moving through stages quickly or skipping stages altogether), whereas others remain in an initial installation stage for prolonged periods (Bradshaw, Debnam, Koth, & Leaf, 2009). Likewise, there may be distinct patterns of initiative abandonment, in which some schools abandon the practice after a few years of implementation when competing initiatives emerge (Adelman & Taylor, 2003; Chiapa et al., 2015; Latham, 1988), and others rapidly abandon the practice, often before full implementation (Nese et al., in press). The result is that some schools that begin implementation during the same year may rapidly be in different stages of implementation, presenting different needs to the district and state systems charged with supporting them. Hence, it would be important to identify these patterns for both theoretical and practical reasons (Schwartzbeck, 2002).

Potential Predictors of Patterns of Implementation

Although few studies have examined implementation patterns, theory and research

regarding practice sustainability and abandonment indicate possible predictors. These predictors could be categorized into school characteristics (e.g., demographic features of the school) and implementation characteristics (e.g., features resulting from district or state decisions regarding how to implement a practice) that could enhance or impede implementation.

School characteristics. Much research has examined the effects of specific features of schools on implementation, with mixed results. Common school characteristics that have been studied include grade levels served, school enrollment, racial/ethnic diversity of the student body, community poverty, and locale (e.g., urban, suburban, rural). Results suggest that elementary schools have an easier time reaching adequate implementation (Molloy, Moore, Trail, Van Epps, & Hopfer, 2013), whereas high schools take longer (Bohanon et al., 2006; Flannery, Fenning, Kato, & McIntosh, 2014). Lower enrollment (i.e., fewer students in the school) has been related to higher implementation (Bradshaw & Pas, 2011; Buzhardt et al., 2006; Molloy et al., 2013), although when enrollment and grade levels served have been examined together, grade levels served has been the stronger predictor (McIntosh, Kim, Mercer, Strickland-Cohen, & Horner, 2015; McIntosh, Mercer, Nese, Strickland-Cohen, & Hoselton, in press). Some studies have found that the percentage of non-White students and the percentage of students receiving free or reduced price meals reduced the quality of implementation (Gottfredson, Jones, & Gore, 2002; Molloy et al., 2013; Payne & Eckert, 2010), although others have found no significant effect of these variables on quality of implementation (McIntosh et al., 2015). In contrast, studies have shown urban schools have been uniformly less likely than schools in other locales to implement to criterion (Nese et al., in press; Payne & Eckert, 2010).

Implementation characteristics. Although school characteristics have often been the focus of study in implementation science studies, other variables may also play a role in schools'

patterns of implementation. For example, district administrators make certain decisions regarding implementation that likely affect schools participating in the initiative (Bradshaw & Pas, 2011). Two characteristics worthy of new study are the number of schools implementing in the district and the number of schools in the implementation cohort.

Number of schools implementing in the district. According to theory, whole-district initiatives are thought to create both top-down accountability and grass-roots "near-peer" dissemination (McLaughlin & Mitra, 2001; Rogers, 2003). Regarding top-down support, educators are reluctant to invest in a given practice when district support could be removed (Andreou, McIntosh, Ross, & Kahn, 2015). When more schools are involved in the initiative (e.g., a "critical mass" that theoretically makes the initative self-sustaining; Rogers, 2003), school personnel may perceive a higher degree of district administrative support, which may lead to increased willingness to implement and sustain the practice (Coburn, 2003; McLaughlin & Mitra, 2001). Theory suggests that after 10 to 20% of the schools in a district adopt a practice, it may reach a "tipping point" of sustainability (Rogers, 2003), although little research has been conducted to test it. In addition, diffusion theory may help explain the potential effects of implementing schools on patterns of implementation (Rogers, 2003; Schwartzbeck, 2002). Building a critical mass of schools in the district may persuade resistant school teams (i.e., late adopters) to join in the district initiative.

Regarding grass-roots dissemination, having existing examples of local schools implementing a practice may make it seem more feasible for those considering it (Rogers, 2003). These local examples provide evidence that it matches the local context and can be implemented with existing resources, as well as examples of adaptation that can be copied. School personnel can commit more readily if they perceive that their neighboring schools have implemented with

success and have worked any bugs out (Rogers, 2003; Schwartzbeck, 2002). In addition, having existing schools implementing may enhance site selection, a characteristic identified as critical by Elliott and Mihalic (2004). When schools have a better sense of the practice, they can make a better judgment about how it might meet their particular needs, eliminating false starts that lead to practice abandonment.

Number of schools in the implementation cohort. There is also little research or theory to guide how cohort size could affect patterns of implementation. A larger number of schools in the cohort could enhance implementation by establishing a community of practice, which may generate more enthusiasm among schools and allow more peer-to-peer support for problem solving (McLaughlin & Mitra, 2001). There is some evidence that implementing school practices though a deliberate cohort model enhances practice sustainability (Hall, 2015). Conversely, implementation with too large of a cohort could negatively affect implementation, as resources are stretched too thin. For example, a larger number of schools to support, particularly when they are early in implementation, could decrease the amount of district coaching, slowing each school's speed of implementation and increasing the risk of abandonment.

Purpose of the Study

As noted, there is research indicating specific predictors of sustained implementation, as well as anecdotal information regarding stages of implementation, but there is little empirical research validating different trajectories of implementation in schools and the extent to which these trajectories can be predicted. In this study, we attempted to address some of these research gaps through an extant analysis of schools implementing school-wide positive behavioral interventions and supports (SWPBIS; Horner & Sugai, 2015). SWPBIS is a framework for implementing evidence-based practices in schools through elements such as teaming, data-based

decision making, and systems for supporting staff. Previous SWPBIS research has examined effects on student outcomes (Bradshaw, Koth, et al., 2009; Bradshaw, Waasdorp, & Leaf, 2012), active ingredients (Molloy et al., 2013), or factors related to dissemination and sustained implementation (Bradshaw & Pas, 2011; McIntosh et al., 2013). SWPBIS represents a prime opportunity to examine patterns of implementation because of its widespread adoption (implemented in over 23,000 schools; Horner, 2016) and the availability and common use of research-validated fidelity of implementation measures. As such, there is an opportunity to examine how implementation occurs outside of the context of intensive researcher involvement, to understand the extent to which theories of implementation science are reflected in real-world implementation. We examined the following research questions:

1. To what extent can schools be categorized into groups with similar patterns of fidelity over their first five years of SWPBIS implementation?
2. To what extent do school and implementation characteristics predict classification in the identified implementation groups?

Method

Settings

Schools (n = 5,331) were included in the study if they were located in the U.S. and reported at least one year of SWPBIS data to the OSEP National Technical Assistance Center on PBIS between the 2005-2006 and 2008-2009 school years. We used a sequential cohort design in which the first year of reported data served as the first year of implementation in our analyses. Of the sample, 19.7% of schools reported their first year of SWPBIS data in 2005-2006, 25.6% in 2006-2007, 24.9% in 2007-2008, and 29.8% in 2008-2009. The schools were located in 1,420 districts across 37 states.

Measures

Fidelity of implementation. In light of the studied context of real-world implementation, school or district personnel were free to select one of three measures to assess fidelity of SWPBIS implementation at any given year of implementation. The first measure, the School-wide Evaluation Tool (SET; Sugai, Horner, & Lewis-Palmer, 2001), is a 28-item external evaluation assessment that requires schools to attain a minimum score of 80% on all items and on a critical subscale (i.e., teaching behavior expectations) to be considered implementing adequately. Analyses of the SET indicate that the assessment has strong internal consistency (α = .96), test-retest reliability (mean = 97%) and inter-rater reliability (mean agreement = .99; Horner et al., 2004). The second measure, the Schoolwide Benchmarks of Quality (BoQ; Kincaid, Childs, & George, 2005) is a 53-item assessment that may be conducted by either an internal school member or an external evaluator, such as a district coach. The BOQ requires a minimum score of 70% for adequate implementation on SWPBIS. The BOQ has also been found to have strong internal consistency (α = .96), test-retest reliability (r = .94), interrater reliability (r = .97), and convergent validity (correlation with the SET, r = .63; Cohen, Kincaid, & Childs, 2007; Mercer, McIntosh, & Hoselton, 2016). The third measure, the PBIS Self-Assessment Survey (SAS; Sugai, Horner, & Todd, 2000) is a 43-item measure with a 80% fidelity criterion that is conducted by members of the school team. Its correlations with the SET and BoQ have been documented as .65 and .68, respectively (Mercer et al., 2016). Similar to the SET and BOQ, analyses of the SAS have shown that the measure has strong internal consistency for subscale and total scores of the measure (α range = .85 to .94; Hagan-Burke et al., 2005; Safran, 2006). Sample convergent validity between the measures at Year 1 was strong, with r = .72 (SET and BoQ), r = .61 (SET and SAS), and r = .69 (SAS and BoQ).

Participating schools were identified as either sustaining or non-sustaining at each of the five years of implementation based on the following procedures by McIntosh et al. (2013): if schools completed multiple measures during a school year, the measure with the strongest external evaluation component was used (i.e., SET, then BoQ, then SAS). Schools that did not report any fidelity of implementation data to their district or the Center on PBIS were coded as not adequately implementing. Given that schools had previously used the free and user-friendly system to enter and analyze data and fidelity assessment plays a central role in SWPBIS implementation, the lack of fidelity data makes adequate implementation unlikely.

The implementation variable was calculated for the following measures, with the percentage of schools at or above the fidelity criterion reported in parentheses: Year 1 (74% at or above criterion): 39% SET and 62% SAS; Year 2 (55% at or above criterion): 37% SET, 3% BOQ, 29% SAS, and 31% no fidelity data; Year 3 (51% at or above criterion): 31% SET, 7% BOQ, 22% SAS, and 40% no fidelity data; Year 4 (45% at or above criterion): 21% SET, 13% BOQ, 17% SAS, and 49% no fidelity data; and Year 5 (40% at or above criterion): 16% SET, 19% BOQ, 11% SAS, and 55% no fidelity data.

School characteristics. Data on school characteristics were obtained from the National Center for Educational Statistics (NCES) Common Core of Data. The following variables were used in the analyses: state, district, grade level (elementary, middle, or high), school enrollment, percentage of students of color, percentage of students receiving free or reduced lunch, school location (i.e., rural area, town, suburb, or city), and number of schools in the district.

Implementation characteristics. The following district-level characteristics were recorded from data reported to the national center: the percentage of schools in the district implementing SWPBIS the year prior to the school's first year of SWPBIS implementation (i.e.,

the percentage of schools already implementing SWPBIS in the district), and the percentage of schools in the district beginning implementation in the school's first year of implementation (i.e., the size of the cohort of new schools in the district receiving SWPBIS training).

Procedures

Data were retrieved from PBIS Assessment, an extant database housed at the University of Oregon (pbisapps.org, 2014). PBIS Assessment is a free online application system available to any school in the U.S. For a school to receive access to an account, they need to identify a coordinator in their district, region, or state and agree to the use of their data for research purposes. PBIS Assessment allows users to enter and access scores from the fidelity tools used in this study. It allows users to track fidelity of implementation, aggregated and disaggregated student behavior data, and systems-level supports for the purposes of data-based decision making and accountability. SWPBIS fidelity data used in this study (SET, BOQ, and SAS) were entered by school or district personnel into PBIS Assessment and extracted by the researchers.

Data Analysis

To address Research Question #1 (categorizing schools into groups), we conducted a latent class analysis of the binary school implementation variables for five years of SWPBIS implementation. Models with 1 to 5 latent classes were fit using robust maximum likelihood estimation, with the optimum number of latent classes determined by identifying the model that yielded the lowest Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and sample-size adjusted BIC (SABIC) values (Samuelsen & Dayton, 2010). Although not used as a selection criterion, entropy values ranging from 0 to 1, with values of 1 indicating perfect classification, were examined to characterize classification quality and the distinctiveness of the latent classes.

To address Research Question #2 (predicting group membership), means and standard deviations on school and district characteristics by latent class were estimated using a model-based method (Asparouhov & Muthén, 2014; Lanza, Tan, & Bray, 2013). Next, a multinomial logistic regression analysis, using the three-step method (for technical details, see Asparouhov & Muthén, 2014), was conducted with latent class membership as the criterion and the school and implementation characteristics as predictors. In the three-step method, the latent class model is first fit, then the most likely class membership for each school and uncertainty in classifications are determined based on the posterior distribution of the latent class model, and last the predictors of latent class membership are evaluated while adjusting for uncertainty in the classifications.

Results

Patterns of Implementation Fidelity

AIC, BIC, SABIC, and entropy values for models with one to five latent classes are presented in Table 1. On all information criteria, the 4-class model yielded the best fit. For this reason, the 4-class solution was retained. The model-predicted probabilities of meeting or exceeding the fidelity criterion by year for each latent class (ranging from 0 to 1, with higher values indicating a greater probability of adequate implementation), with model-estimated percentages of schools in each latent class, are presented in Figure 1.

Overall, two latent classes tended to sustain SWPBIS implementation, and two latent classes largely abandoned SWPBIS after initial implementation. The first latent class (29% of sample) had a high likelihood of meeting the fidelity criterion across all years of implementation; thus, we labeled this latent class as Sustainers. The second latent class (13% of sample) had an inconsistent pattern of reaching the fidelity criterion across the first three years of

implementation that then increased to nearly the level of the Sustainers in the fourth and fifth years; thus, we labeled this latent class as Slow Starters. The third latent class (24% of sample) was more likely than not to reach the fidelity criterion in the first three years of implementation, but then was very unlikely to reach the criterion in the fourth and fifth years; we labeled this latent class as Late Abandoners. The fourth latent class (34% of sample) had a high probability of reaching the fidelity criterion in the first year that dropped off rapidly and remained low in subsequent years; we labeled this latent class as Rapid Abandoners.

Predictors of Implementation Patterns

Model-estimated means and standard deviations on the school and implementation characteristics by latent implementation group are presented in Table 2. Results for the multinomial logistic regression predicting latent implementation group classifications from school and implementation characteristics are presented in Tables 3 and 4. One multinomial logistic regression model including all predictors was fit—the tables differ only in the reference groups used for reported parameter estimates (Table 3: Sustainers, Table 4: Slow Starters and Rapid Abandoners). Because all predictors were entered into the same model, the test statistics for the predictors indicate their unique associations with class membership, controlling for the other predictors.

As displayed in Table 3, the most consistent predictor that differentiated Abandoners from Sustainers was school level—middle and high schools, compared to elementary schools, were more likely to be Late Abandoners (middle: $p = .017$, OR = 1.39; high: $p = .002$, $OR = 2.49$) or Rapid Abandoners (middle: $p < .001$, $OR = 1.51$; high: $p < .001$, $OR = 6.81$) than Sustainers. Schools with larger student enrollments were less likely to be Late ($p = .028$, $OR = 0.95$) or Rapid Abandoners ($p = .009$, $OR = 0.95$) than Sustainers. Schools in districts with more

schools already implementing SWPBIS were less likely to be Rapid Abandoners (p = .009, OR = 0.28) than Sustainers. In addition, schools in a larger cohort of new schools implementing SWPBIS were less likely to be Late (p = .048, OR = 0.54) or Rapid (p = .009, OR = 0.43) Abandoners than Sustainers. No school or implementation characteristics differentiated Slow Starters from Sustainers.

Table 4 presents results with alternate reference implementation groups (Slow Starters and Rapid Abandoners). In general, the results parallel the findings reported above. High schools were more likely to be Rapid Abandoners than Slow Starters (p = .009, OR = 2.86) and were less likely to be Late Abandoners than Rapid Abandoners (p < .001, OR = 0.37). Schools with larger enrollments were less likely to be Late (p = .043, OR = 0.95) or Rapid Abandoners (p = .028, OR = 0.95) than Slow Starters. Regarding implementation characteristics, schools in districts with more schools already implementing SWPBIS were less likely to be Rapid Abandoners than Slow Starters (p < .001, OR = 0.72) and were more likely to be Late than Rapid Abandoners (p = .002, OR = 4.87). Also, schools with larger initial SWPBIS district cohorts were less likely to be Rapid Abandoners than Slow Starters (p = .004, OR = 0.23).

Discussion

Although a number of theories of implementation have been proposed, few empirical studies have examined actual patterns of implementation over time. We examined fidelity of implementation data for a large, national sample of schools implementing SWPBIS and found two patterns of sustained implementation (Sustainers and Slow Starters) and two patterns of practice abandonment (Late Abandoners and Rapid Abandoners). Predictors of implementation patterns generally mirrored predictors of sustained implementation in the existing literature, but the proportion of implementing schools in the district and size of the implementation cohort were

novel variables that significantly predicted group membership.

Patterns of Implementation

The patterns found in this sample provide an empirical illustration of trajectories described in theory. Of the two abandoning classes, the largest group was unlikely to be implementing to criterion after the first year of implementation. This group of rapid abandoners is generally thought not to implement well at all, so it was somewhat surprising to see that this group was 73% likely to be implementing to criterion in Year 1. Literature indicates that many schools in this pattern would not sustain because they abandon before implementing enough of the intervention to see improved outcomes (Fixsen, Naoom, Blase, Friedman, & Wallace, 2005; Vernez, Karam, Mariano, & DeMartini, 2006). The other abandoning group is more reflective of the literature. The trajectory associated with the Late Abandoners supports the concepts of project mentality, in which practices are abandoned after initial funding and external support end (Adelman & Taylor, 2003), implementation drift, in which slight decreases in fidelity over time lead to worse outcomes and hasten abandonment (Chiapa et al., 2015), and competing initiatives, in which new district initiatives are implemented in regular 2-3 year intervals that take focus and resources away from implementation of existing practices (Latham, 1988; McIntosh et al., 2014).

Of the sustainers, the implementation trajectories also provide some evidence of patterns described in theory. The Slow Starters started with moderate levels of implementation, with an implementation dip in Year 2 but by Years 4 and 5 were nearly as likely as the Sustainers to be implementing to criterion. This pattern aligns well with the 3 to 5 year implementation timeframe cited by many researchers, and the dip in Year 2 provides further evidence that the implementation process is not necessarily linear (Bertram et al., 2015; Schwartzbeck, 2002).

In contrast, the Sustainers (the larger group of the two) showed strong implementation in

Year 1 that continued through Year 5, with the likelihood of implementation close to 80% throughout. Such a pattern goes against the conventional 3 to 5 year timeframe, especially considering that the vast majority of these schools were supported by state networks and unlikely to be implementing as part of an implementation trial. Some variables that are specific to SWPBIS could account for this pattern. First, the lack of advanced training needed to implement SWPBIS compared to more complex interventions may make SWPBIS easier to install more quickly and more resistant to the threat of staff turnover (Hunter et al., 2015; Schwartzbeck, 2002). Second, the focus on fidelity measurement as a core feature of the framework likely enhances implementation (Becker & Domitrovich, 2011). Third, the readiness requirements that states or districts put in place for SWPBIS (e.g., existing team, administrator and staff commitment) may minimize false starts (e.g., moving forward before staff commits to implementation; Elliott & Mihalic, 2004). In addition, Domitrovich et al. (2008) hypothesized that the common training procedures for PBIS (i.e., multi-day trainings, coaching, booster trainings) may make the implementation process more rapid and complete.

Characteristics Predicting Patterns

School characteristics were more likely to distinguish abandoners from sustainers than predict membership in the specific classes identified. In keeping with previous findings (McIntosh et al., 2015; Molloy et al., 2013), abandoners (either rapid or slow) were more likely to be middle or high schools than elementary schools. In contrast with some existing research (Bradshaw & Pas, 2011; Molloy et al., 2013), when controlling for grade levels served and district size, schools with higher enrollment were more likely to be in the sustaining classes. It is possible that these results could be due to the level of resources that larger schools can devote to specific practices or resistance to the effects of staff turnover because there are more staff.

There is less research to guide interpreting the findings for implementation characteristics. Schools in districts with more schools already implementing SWPBIS and those starting within a larger initial district cohort were less likely to be abandoners. The critical mass of schools already implementing a practice as a protective factor aligns with diffusion theory, in that schools that are hesitant to implement may be more likely to do so when more and more nearby schools implement successfully (Rogers, 2003). The existence of successful near peers, exemplar schools to visit, more refined training materials, and examples of adaptations to fit the local context can all increase schools' willingness to implement (McIntosh, Kelm, & Canizal Delabra, 2016; Schwartzbeck, 2002). Likewise, implementation with a larger number of peer schools in a cohort predicted more sustained implementation. This larger community of practice may have encouraged school personnel to continue implementing through barriers and allowed for horizontal problem-solving in addition to any district coaching (Hall, 2015; McLaughlin & Mitra, 2001). It could also reflect more district resources provided for implementation. These findings require further study.

Limitations and Future Research

The extant nature of the dataset used in this study presents some limitations. First, the measures used were completed by school teams or coaches, not the researchers. Second, because the type of measures varied within and between schools across years, we used each measure's criteria for implementation to indicate implementation. Using the same measure may have allowed more granularity in analyses. Third, each of these schools were collecting and reporting fidelity data to a national technical assistance center, and as such, the sample may not be representative of all schools in the population. More research is needed to replicate these classes.

Implications for Practice

The findings provide some possible implications for technical assistance providers. This study identified Years 1 and 3 as especially fragile periods for risk of abandonment (i.e., when abandonment is most likely). Although this study did not assess it, the literature underlying these stages of implementation would indicate the importance of supporting schools to achieve adequate fidelity of implementation during Year 1 (e.g., to increase likelihood of visible improvement in student outcomes; Andreou et al., 2015) and identify sustainable funding sources (e.g., budget line items instead of grants) and build local capacity to implement and sustain without external support by Year 3 (Adelman & Taylor, 2003; Han & Weiss, 2005). Likewise, it is important not to assume that schools that do not achieve adequate implementation in the initial years will never do so. Although some schools may achieve rapid implementation, others may require the theorized 3 to 5 years.

Compliance with Ethical Standards

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Research involving human participants. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. For this type of study formal consent is not required.

Informed consent. For this type of study, informed consent is not applicable.

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Table 1

Model Fit for Latent Class Analyses

Number of Latent Classes	AIC	BIC	SABIC	Entropy
1	35335	35368	35352	--
2	31358	31430	31395	.76
3	31135	31247	31193	.72
4	**31042**	**31193**	**31120**	.64
5	31044	31235	31143	.66

Note. n = 5,331. The lowest AIC, BIC, and SABIC values are in bold.

Table 2

Means (or Mean Proportions) and Standard Deviations of School and District Characteristics by Implementation Group

	Sustainers	Slow Starters	Late Abandoners	Rapid Abandoners
% Elementary Schools	0.77 (0.02)	0.65 (0.05)	0.70 (0.02)	0.61 (0.01)
%Middle Schools	0.19 (0.01)	0.23 (0.03)	0.22 (0.02)	0.22 (0.01)
%High Schools	0.04 (0.01)	0.12 (0.04)	0.08 (0.01)	0.17 (0.01)
Student Enrollment	506.08 (7.66)	599.73 (15.78)	496.24 (8.44)	560.41 (9.75)
%Ethnic Minority Students	0.35 (0.01)	0.50 (0.01)	0.42 (0.01)	0.43 (0.01)
%Students Eligible for Reduced Price Meals	0.46 (0.01)	0.52 (0.01)	0.50 (0.01)	0.49 (0.01)
Location				
% Rural	0.30 (0.02)	0.16 (0.03)	0.29 (0.02)	0.29 (0.01)
% Town	0.16 (0.01)	0.07 (0.02)	0.14 (0.02)	0.16 (0.01)
% Suburb	0.31 (0.02)	0.42 (0.05)	0.31 (0.02)	0.27 (0.01)
% City	0.20 (0.03)	0.37 (0.03)	0.27 (0.04)	0.28 (0.03)
Number of Schools in District	31.68 (1.29)	57.95 (3.15)	64.46 (2.79)	48.58 (2.23)
% of Schools in District Implementing SWPBIS in Year Prior	0.10 (0.00)	0.22 (0.01)	0.11 (0.01)	0.08 (0.00)
% of New Schools in District Implementing SWPBIS in Year One	0.41 (0.01)	0.32 (0.01)	0.33 (0.01)	0.34 (0.01)

Note. n = 5,331

Table 3

Multinomial Logistic Regression Predicting Latent Implementation Group

	Slow Starters vs. Sustainers			Late Abandoners vs. Sustainers			Rapid Abandoners vs. Sustainers		
Predictor	*b*	*SE*	OR	*b*	*SE*	OR	*b*	*SE*	OR
Middle School	0.41	.26	1.51	0.33*	.14	1.39	0.41***	.12	1.51
High School	0.87	.52	2.38	0.91**	.29	2.49	1.92***	.26	6.81
Student Enrollment	0.00	.03	1.00	-0.06*	.03	0.95	-0.05*	.02	0.95
%Ethnic Minority Students	0.98	.65	2.68	-0.06	.40	0.94	0.69	.42	1.99
%Students Eligible for Reduced Price Meals	0.26	.65	1.29	0.49	.48	1.63	-0.05	.51	0.95
School Locale									
Rural	-0.45	.58	0.64	0.27	.23	1.31	0.29	.25	1.34
Town	-0.53	.63	0.59	0.09	.25	1.10	0.30	.28	1.34
Suburb	0.16	.57	1.17	0.22	.25	1.25	0.05	.29	1.05
Number of Schools in District	0.00	.00	1.00	0.00	.00	1.00	0.00	.00	1.00
% of Schools in District Implementing SWPBIS in Year Prior	1.63	.84	5.12	0.31	.45	1.36	-1.28**	.49	0.28
% of New Schools in District Implementing SWPBIS in Year One	0.62	.52	1.85	-0.62*	.31	0.54	-0.84**	.31	0.43

Note. n = 5,331. *OR* = Odds Ratio. For grade levels served and locale, elementary schools and city schools served as the reference categories, respectively.

Table 4

Multinomial Logistic Regression with Alternative Reference Groups

	Late Abandoners vs. Slow Starters			Rapid Abandoners vs. Slow Starters			Late Abandoners vs. Rapid Abandoners		
Predictor	*b*	*SE*	OR	*b*	*SE*	OR	*b*	*SE*	OR
Middle School	-0.08	.25	0.92	0.00	.23	1.00	-0.08	.14	0.92
High School	0.05	.43	1.05	1.05**	.40	2.86	-1.01**	.21	0.37
Student Enrollment	-0.06*	.03	0.95	-0.05**	.02	0.95	-0.01	.02	0.99
%Ethnic Minority Students	-1.04	.61	0.35	-0.30	.58	0.74	-0.75	.41	0.47
%Students Eligible for Reduced Price Meals	0.23	.61	1.26	-0.31	.63	0.73	0.54	.54	1.72
School Locale									
Rural	0.72	.53	2.05	0.74	.51	2.10	-0.02	.24	0.98
Town	0.63	.61	1.87	0.83	.58	2.28	-0.20	.27	0.82
Suburb	0.07	.51	1.07	-0.11	.50	0.90	0.18	.24	1.19
Number of Schools in District	0.00	.00	1.00	0.00	.00	1.00	0.00	.00	1.00
% of Schools in District Implementing SWPBIS in Year Prior	-1.33	.74	0.27	-2.91***	.72	0.05	1.58**	.52	4.87
% of New Schools in District Implementing SWPBIS in Year One	-1.23*	.56	0.29	-1.46**	.51	0.23	0.23	.34	1.25

Note. n = 5,331. *OR* = Odds Ratio. For grade levels served and locale, elementary schools and city schools served as the reference categories, respectively.

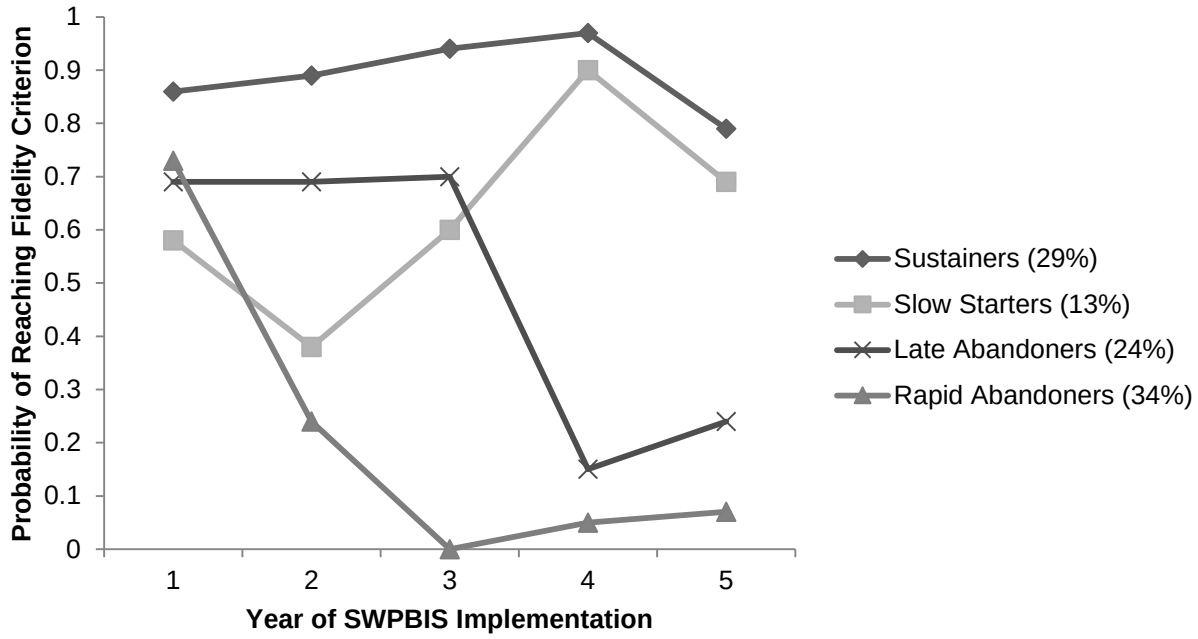

Figure 1. *Model-predicted probabilities of meeting or exceeding the SWPBIS fidelity criterion by year of implementation for each latent class. Percentages presented in parentheses are the model-estimated percentages of the sample in each latent class.*