Adoption of PBIS Within School Districts

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Abstract

Recent research in implementation science has focused on identifying factors that predict adoption of evidence-based practices in schools. Less attention has focused on examining the adoption of practices within districts. This study included a sequential cohort of 552 districts in 25 U.S. states adopting an evidence-based framework, school-wide positive behavioral interventions and supports (PBIS). We examined schools within districts reporting on PBIS fidelity during their first five years of PBIS initiatives. Latent change score and multi-level growth modeling were used to examine and predict the percent of district adoption of PBIS over time. Results showed a significant increase in the rate of district adoption over the first 4 years of the initiative, with a decrease in growth between years 4 and 5. District size, proportion of students receiving free or reduced lunch, and districts located in cities and towns were found to be significant predictors of the percent of schools adopting PBIS. Implications for future implementation research and strategies for increasing the adoption of PBIS are discussed.

Keywords: positive behavioral interventions and supports, PBIS, district, adoption, implementation science

Adoption of PBIS within School Districts

Evidence-based practices are routinely adopted and abandoned within districts and schools (Detrich, 2014). This phenomenon occurs partly because complex school-wide initiatives can take several years to fully adopt and achieve adequate fidelity (McIntosh, Mercer, Nese, & Ghemraoui, 2016). Adoption (also known as uptake) refers to the decision of an organization or provider to use an evidence-based practice (Proctor et al., 2011). After an adoption decision (i.e., to use or keep using the practice), implementing practices with fidelity (i.e., to use or keep using with high quality) requires careful attention to factors such as establishing leadership support, building capacity, providing effective professional development, and addressing systems barriers (Fixsen, Naoom, Blase, Friedman, & Wallace, 2005; Metz & Bartley, 2012; Oakes, Lane, & Germer, 2014).

With the recent emergence of the field of implementation science, there has been a body of research in the fields of general and special education examining how evidence-based practices are adopted, implemented with fidelity, and sustained (Cook & Odom, 2013). Some of the early work related to studying and identifying characteristics related to the adoption of practices came from Rogers (2003). From Rogers' diffusion of innovations theory, he asserted that non-malleable and malleable factors can impact the rate of adoption of a practice (i.e., how quickly the practice spreads across nearby organizations). Some of these factors include non-malleable characteristics (i.e., socioeconomic characteristics) that influence the adoption process (2003). In recent years, researchers have identified a number of additional factors found to significantly affect the adoption of school practices in educational settings. For example, Ball, Ogletree, Asunda, Miller, and Jurkowski (2014) examined factors likely to influence health education faculty decisions to adopt distance education. Characteristics of the practice itself (e.g., become an educational norm, increased student enrollment) and social networks (e.g., advocate for distance education at my university) were found to significantly predict the adoption of distance education among health education faculty respondents (Ball et al., 2014). In another study, Little, Pokhrel, Sussman, and Rohrback (2015) examined the extent to which district non-malleable variables, including district locale (e.g., suburban, rural) and district size (number of schools in the district or districts) and organizational variables (i.e., program champion, organization support) influenced the adoption of evidence-based tobacco use prevention programs in 268 school districts and 58 county offices of education in California. Organizational mandate and district/ county offices of education size were directly and significantly related to the adoption of tobacco prevention programs, with increased adoption when practices were mandated and when implemented in larger districts/county offices of education (Little et al., 2015).

Positive Behavioral Interventions and Supports

One of the most widely adopted evidence-based frameworks in schools and districts is Positive Behavioral Interventions and Supports (PBIS; Horner & Sugai, 2015). Adopted in over 25,000 schools (Center on Positive Behavioral Interventions and Supports, 2018), PBIS is a three-tiered preventive framework (primary prevention, secondary prevention, and tertiary prevention) associated with improved student behavior and academic outcomes (Bradshaw, Waasdorp, & Leaf, 2012; Freeman et al., 2016; Horner et al., 2009). At the school level, recent studies have identified several non-malleable variables found to predict adoption and sustainability (i.e., extent that a program is maintained; Proctor et al., 2011) of Tier 1 (i.e., universal, school-wide) systems (McIntosh, Mercer, Nese, Strickland-Cohen, & Hoselton, 2016; McIntosh et al., 2018; Nese, Nese, McIntosh, Mercer, & Kittelman, 2018). For example, Nese and colleagues (2018) recently examined the average length of time from adoption decision to reaching adequate fidelity of implementation of Tier 1 systems and which non-malleable variables (i.e., school characteristics) predict this latency period. Using a sample of 708 schools within five U.S. states, the authors found that elementary schools were more likely to reach adequate fidelity before middle and high schools, non-Title I schools were more like to reach adequate fidelity before Title I schools, and suburban schools were more likely to reach adequate fidelity before schools in cities. . McIntosh and colleagues (2018) also recently investigated several non-malleable school variables that predicted sustained, adequate implementation of Tier 1 PBIS systems, three years after initial adoption, using a sample of 860 schools. Non-malleable school variables included school grade levels, school enrollment, school urbanicity, and proportion of non-white students. Results suggested that school grade level was the only significant non-malleable predictor of sustained implementation in Year 3, with elementary schools more likely than middle or high schools to have adequate implementation after 3 years.

Implementation of PBIS within school districts. Although several implementation studies have identified malleable and non-malleable variables critical to implementation and sustainability of PBIS in schools (McIntosh et al., 2013; Nese et al., 2018), fewer have examined district-level variables (George, Cox, Minch, & Sandomierski, 2018). This area of research is particularly important, as districts play a significant role in enhancing the systems capacity to adopt PBIS within schools (Horner & Sugai, 2018; McIntosh et al., 2018). Recently, George and colleagues (2018) conducted an exploratory study to identify variables associated with high-implementing districts and positive student outcomes. Using semi-structured interviews and qualitative analysis, the authors identified that the presence of district coordinators, district teaming, district team activities, district buy-in and support, as variables perceived to be associated with high PBIS implementation (George et al., 2018). McIntosh and colleagues (2018) also found district variables, proportion of schools within the districts adopting PBIS (critical mass) and proportion of schools within districts adopting or abandoning PBIS, to significantly predict sustained implementation of Tier 1 systems in schools.

In addition, in a state-wide implementation study related to the focus of the current research, Bradshaw and Pas (2011) investigated the extent that school and district contextual factors predicted adoption and fidelity of implementation of PBIS in elementary schools in the state of Maryland. The authors found that the percent of schools within districts actively implementing PBIS, was a significant district predictor of school-level adoption of PBIS; however, district size (number of elementary schools within a district), per student expenditures, support from district coordinators, and percent of Title I schools were not significantly associated with adoption. Interestingly, none of the school factors (school size, students per teacher, percent of teacher certified, rates of students in special education, student achievement, student mobility) predicted adoption of PBIS within elementary schools. Such findings provide additional support for the need to study districts as the unit of analysis in implementation research and identify other district factors that predict adoption of PBIS.

This literature includes a number of research gaps. First, the previous research has overwhelmingly studied fidelity of implementation of PBIS among schools that had already adopted PBIS, but not patterns of the adoption process itself. Second, considering the influence districts have on the adoption of evidence-based practices within schools, research examining the rate of PBIS adoption over time and what variables predict the adoption of PBIS could be especially meaningful to state and district personnel. Likewise, identifying what non-malleable variables predict adoption could help district personnel promote and increase adoption of PBIS.

For example, understanding how the rate of adoption of PBIS varies based on district locale (e.g., cities versus towns) could help state and district personnel to identify specific implementation strategies (e.g., intensive training) to increase early adoption efforts. Based on existing research on the broader context of adoption (Rabin, Brownson, Haire-Joshu, Kreuter, & Weaver, 2008; Rogers, 2003), many factors are likely to influence the decisions of district organizations to actively adopt PBIS. For example, the size of the school district, district funding available to implementers, and the number of students needing supports may influence district personnel's decisions to adopt a district-wide initiative.

Purpose

To our knowledge there is no research examining the rate of adoption of PBIS within school districts. Accordingly, there is no research examining district variables predicting this rate. Given the lack of research in this implementation domain, the purpose of this study was to examine the rate of adoption of PBIS within districts during the first 5 years of their PBIS initiatives. In addition, we sought to identify district non-malleable variables that significantly predicted the percent of district adoption of PBIS over time. Specifically, we examined the following research questions: (1) to what extent does the rate of adoption of PBIS within districts vary over the first five years of a PBIS initiative and (2) to what extent do district non-malleable variables predict the percent of district adoption of PBIS over time? Our hypotheses for this preliminary study were that (a) adoption of PBIS within districts would increase exponentially over the first few years and then level off upon reaching widespread adoption in a majority of schools (e.g., 80%), resembling the S-shaped curve observed in other fields (Rogers, 2003) and (b) that larger districts would be associated with lower rates of adoption of PBIS (Nese et al., 2016).

Method

Sample

The sample was a sequential cohort of 552 public school districts (containing 8,319 schools), located in 25 U.S. states. Of these districts, 341 (61.8%) were from 8 states in the Midwest region, 74 (13.4%) were from 6 states in the South region, 72 (13%) were from 5 states in the Northeast region, and 65 (11.8%) were from 6 states in the West region. Based on information from the National Center for Educational Statistics (NCES), 196 (35.5%) of the districts were located in rural areas, 134 (24.3%) were in suburban areas, 132 (23.9%) were in towns, and 90 (16.3%) were in cities. The total number of schools within these districts (district size) ranged from 2 to 235 (M = 15.07, SD = 25.86). On average, 4.4% of students within these districts were identified as Limited English Proficient (LEP)/English-Language Learners (ELLs), 14.7% had Individualized Educational Plans (IEPs), and 40% of students received free and/or reduced-price lunch (FRL).

Districts were included in the sample if they met the following criteria: (a) contained at least two schools (to examine variability in adoption), (b) included at least one school that collected and reported on any PBIS fidelity data to the OSEP National Technical Assistance Center on PBIS between the 2004-05 and 2009-10 school years, (c) included at least one school reporting PBIS fidelity data for the following 4 years (between 2004-05 and 2009-10) to ensure 5 continuous years of measurement of the percent of schools within each district adopting PBIS, and (d) did not have any schools reporting PBIS fidelity data in the previous year (to identify the first year of PBIS adoption in the district). In the first year of the study (2004-05), there were 4,915 districts with at least two schools; thus, the sample of 552 represents 11% of eligible districts. Additional demographic information was retrieved from the NCES Common Core of Data and is provided in Table 1 for each district's first year of PBIS adoption.

Measures

Adoption. Adoption of PBIS within districts was measured by calculating the percent of schools in each district reporting PBIS fidelity of implementation data to the Center on PBIS. Schools reporting data were counted as adopting regardless of whether they were implementing PBIS with adequate fidelity (i.e., to criterion). Adoption is often defined as the initial decision or action to implement an innovation (Proctor et al., 2011), therefore it is likely many of the schools within the districts were not yet implementing PBIS with fidelity. Separate percentages were calculated for years 1 to 5 of each district's PBIS initiative. To identify adoption, schools needed to have reported on PBIS fidelity data using one of the following four empirically-validated PBIS fidelity of implementation measures: the *School-Wide Evaluation Tool* (SET; Sugai, Lewis-Palmer, Todd, & Horner, 2001), *Schoolwide Benchmarks of Quality* (BoQ; Kincaid, Childs, & George, 2005), *PBIS Self-Assessment Survey* (SAS; Sugai, Horner, & Todd, 2000), and the *Team Implementation Checklist* (TIC; Sugai, Horner, & Lewis-Palmer, 2001). It is common for school teams to self-assess what core PBIS features and systems are already in place at least annually (Horner & Sugai, 2015; Sugai et al., 2010). Because the aim of this study was to examine the adoption of PBIS at any phase (e.g., installation, full implementation), schools did not need to meet a PBIS fidelity criterion (e.g., 70% total score on BoQ) to be included in this study. Moreover, many other PBIS studies (e.g., McIntosh et al., 2018) have used adequate fidelity as the dependent variable, making the study of adoption unique.

District predictors. District predictors were obtained from the NCES Common Core of Data for each district during its first year of PBIS adoption. These predictors were selected because they were readily available to school districts and technical assistance providers, making the results more practical for decision-making. In addition, we posited that these contextual variables may influence district leadership teams to adoption PBIS and because several of these variables were found to be associated with reaching adequate and sustained implementation of PBIS at the school level (McIntosh et al., 2018; Nese et al., 2018). District predictors included: (a) district size (i.e., total number of schools within each district), (b) district locale (i.e., city, suburb, town, or rural), (c) proportion of students identified as LEP/ELLs, (d) proportion of students with IEPs, and (e) proportion of students who received FRL. All variables were treated as continuous, except for district locale, which was treated as a dummy-coded variable, with suburb as the reference group. Table 1 includes the means, standard deviations, percent of missing NCES data, and intercorrelations for the district predictor variables.

Procedure

PBIS fidelity data was obtained from an extant database, PBIS Assessment (http://www.pbisapps.org), maintained by the Educational and Community Supports research unit at the University of Oregon. PBIS Assessment is a free online application where schools implementing PBIS can report and access their fidelity data. Prior to using this system, schools needed to (a) identify a local facilitator to assist school teams with entering and accessing fidelity data and (b) agree to allow their fidelity data to be used for potential research and evaluation studies. District or regional PBIS implementation teams typically assist schools by providing technical assistance (e.g., training, coaching) to ensure PBIS fidelity measures are accurately completed and reported at least annually (Horner & Sugai, 2015). School may complete the measures more often for more frequent progress monitoring and decision-making processes (Mercer, McIntosh, & Hoselton, 2017).

Data Analysis

Analyses for research question 1. We first calculated mean scores across each district's first 5 years of PBIS adoption. We then used M*plus* 7.4 (Muthén & Muthén, 2015) to conduct latent change difference score (LCS) modeling to empirically and sequentially examine the extent to which there were differences in the rate of district adoption scores over time. We followed McArdle and Prindle's (2008) approach, by modeling change over time as latent change scores using a standard regression model, where the proportion of adoption scores, after accounting for initial baseline scores at Time 1 (fixed to 1), were parceled out into four change scores, representing each of the intercept values for the rate of district adoption from Years 2 to 5. We evaluated model fit of the linear and quadratic models by comparing the Tucker-Lewis Index (TLI), the Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA). Scores of .95 or greater on the TLI and CFI, and a score of .06 or less on the RMSEA indicate acceptable model fit (Hu & Bentler, 1999).

Analyses for research question 2. To examine the extent that district variables predicted the percent of schools adopting PBIS over time, we conducted multi-level modeling using R (R Core Team, 2017; Rstudio, 2016). We included three levels of random variation: time (level 1) nested within districts (level 2), and districts nested within states (level 3; Raudenbush & Bryk, 2002). Level 1 (time) was centered at Year 5 to examine intercept values for the 5th year, so that we could examine the mean percent of schools within districts adopting PBIS in the final year. District predictor variables in Year 1 (level 2) were individually added to the model uncentered [1]. As each district-level predictor variable was included, we conducted a deviance test to determine whether to allow predictor variables to vary at random or be treated as fixed effects (Raudenbush

[1] In preliminary analyses, we examined whether first year of adoption (2004-05 to 2009-10) predicted the outcome (i.e., a cohort effect). As it was not a significant predictor, we did not include it in the main analyses.

& Bryk, 2002). If deviance tests were statistically significant (equal to or less than 0.05), then we allowed district predictor variables to vary at random at the district, state, or both levels. After individual deviance tests were completed, the effects of all predictor variables on the outcome were evaluated in a single model, (see Table 2, models 4 - 10).

Preliminary analyses for research question 2. Before completing analyses to predict the percent of schools within districts adopting PBIS by district predictors, we conducted preliminary analyses. We assessed the extent to which it was necessary to account for (a) nesting at the district and state levels and (b) different growth curves within the model. Prior to estimating the full, 3-level model to investigate the effect of district variables on the rate of adoption over time, we first conducted a one-way ANOVA to determine the null model to estimate the proportion of variance (intraclass correlation; ICC) at each level. The proportion of variance was 52.4% at the district level (level 2) and 8.4% at the state level (level 3), indicating the need to include both levels in the model. We then developed a random coefficient regression model (level-1 model) to estimate intercept and slope values for the unconditional linear model. The level-1 predictor variable added to the model was Time (centered at Year 5). Based on the deviance test, Time was allowed to vary randomly at the intercepts across district and states. The Level-1 intercept was 0.57 (standard error = 0.02; $p < .001$) and linear slope was -0.05 (standard error = 0.002; $p < .001$). Table 2 demonstrates each of the steps taken in the model building process and the standardized estimates of the predictor variables.

We then added a level-1 Quadratic Time predictor variable (centered at Year 5) to the growth model. From the deviance test, this intercept was statistically significant at the district level (allowed to vary at random) and found to be non-significant at the state level and treated as fixed (intercept = - 0.02, standard error = 0.002, $p < .01$). Pseudo r^2 was then calculated to estimate the amount of variance explained by adding the linear and quadratic time predictors at level 1. The conditional linear growth model and quadratic growth model explained 43% and 5% of the variance, respectively.

Results

Rate of Adoption of PBIS within Districts

Table 2 and Figure 1 show the percent of mean change in the proportion (Figure 1) of schools within districts adopting PBIS during their first five years of adoption. Overall, there was an increase in the percent of schools adopting over time from Year 1 ($M = 0.37$, $SD = 0.30$) to Year 5 ($M = 0.58$, $SD = 0.30$). Results yielded strong model fit when we conducted a simple growth model examining linear and quadratic patterns across the 5 years of adoption of PBIS within districts: x^2 (6) = 25.34, $p < .001$, TLI = .98, CFI = .99, RMSEA = .08, and SRMR = .01. Results from the latent change score model provided empirical support for statistically significant mean differences on intercept values from Year 1 to Year 2 ($b = 0.09$, $p < .001$), Year 2 to Year 3 ($b = 0.075$, $p < .001$), and Year 3 to Year 4 ($b = 0.032$, $p < .001$), but not from Years 4 to 5 ($b = 0.005$, $p = 0.57$). An alternative view of the rate of adoption is provided in Figure 2, which shows rates of adoption by counts of schools instead of proportion. The patterns are similar, except for districts in cities, which showed the lowest mean proportion but highest mean count of adopting schools for each of the five years. In comparison to other groups, districts in cities also had a mean increase from years 4 to 5.

Predictors of the Adoption of PBIS with Districts

As shown in the far right column of Table 2, district size, proportion of students who received FRL, and location with cities and towns were found to be significant predictors of the percent of adoption of PBIS within districts. District size was found to have a small negative effect, suggesting that the percent of schools adopting PBIS was smaller in larger districts over time (intercept = -0.004, *df* = 23, $p < .05$). According to pseudo r^2, district size explained 1% of the variance of adoption. Proportion of students who received FRL within districts was found to have a significant positive effect (intercept = 0.18, *df* = 23, $p < .05$), indicating the percent of adoption was higher in districts with more students who received FRL. The proportion of students who received FRL accounted for 6% of the variance. In addition, in comparison to suburban districts, districts located in cities and towns had significantly lower percentages of adoption over time, with districts located in cities explaining less than 1% of the variance and districts located in towns explaining 8.5% of the variance.

Discussion

Numerous studies have acknowledged the district context as being critical in supporting the adoption of evidence-based practices within schools (Cook & Odom, 2013; Horner et al., 2014; Nese et al., 2016). Recent studies have also identified district factors critical to fidelity of implementation of PBIS within schools (McIntosh et al., 2013; McIntosh et al., 2018; Nese et al., 2018). This study is novel and important for the fields of PBIS and implementation science because it examined the rate of adoption of PBIS within districts and identified district non-malleable variables that predicted the percent of adoption of PBIS over time (Bradshaw & Pas, 2011). We found that there was a significant increase in the percent of schools adopting PBIS for the first four years of the initiatives. In addition, we also found the proportion of students who received FRL to be a statistically significant and positive predictor of the percent of adoption of PBIS, whereas district size, districts within cities and towns were statistically significant negative predictors of the percent of adoption of PBIS over time. All level-2 district predictors were found to vary at random, indicating the adoption of PBIS within districts varied significantly across the 552 districts.

As seen in the figures, the most significant change in rate of adoption occurred between Years 1 and 4. On average, 37% of the schools within districts were adopting PBIS during the first year of the district initiative. By Year 5, 58% of schools within districts were adopting PBIS. The overall increase in the rate of adoption of PBIS was smaller than we anticipated and did not reach widespread adoption (e.g., 80% or more schools). Due to there being a significant quadratic slope in the rate of adoption of PBIS over time, results suggest that the rate of adoption leveled off, or even decreased, between Years 4 and 5. Results were in contrast to the “tipping point” S-shaped adoption curve seen in other fields (e.g., agriculture), in which once a critical mass of adopters was reached, nearly complete adoption occurred rapidly (Rogers, 2003). S-shaped curves have been observed in studies examining individual decisions (e.g., farmers adopting clearly superior agricultural innovations; Rogers, 1976) or individual social opinions (Centola, Becker, Brackbill, & Baronchelli, 2018). However, it is possible that whole-school initiatives have lower rates of adoption because of the consensus needed to select a practice (i.e., multiple key individuals need to change their opinions).

A variety of structural variables could also be preventing districts from reaching higher rates of adoption. For example, McIntosh and colleagues (2013) found the extent to which districts have the capacity to support ongoing implementation of PBIS (i.e., ongoing professional development) to be a significant predictor of sustained implementation of PBIS in schools. Likewise, Bradshaw and Pas discovered that the percent of elementary schools in district actively implementing PBIS predicted PBIS adoption (2011), which could also attest to the district or state capacity to support ongoing implementation of PBIS. It is possible that once districts have over 50% of schools adopting, they have reduced capacity to support newly adopting schools. In addition, many of the schools that began adopting PBIS in Years 1 and 2 could are also be working towards adopting Tier 2 and 3 systems by Years 4 or 5, which also requires additional resources and support from district personnel. It is also possible that the early adopting schools were more ready for change, whereas it can take more years for schools at lower levels of readiness to decide to adopt (Bohanon et al., 2006).

The district variables found to predict the percent of adoption of PBIS within districts are consistent with recent literature examining the fidelity of implementation of PBIS within schools. For example, Nese and colleagues (2018) found that schools located in suburban areas were nearly twice as likely to achieve adequate fidelity, before schools located within cities. In another large-scale study, Nese and colleagues (2016) examined the extent that schools abandoned PBIS within five years of adoption. School urbanicity was found to significantly predict abandonment, indicating that schools located within cities were nearly 13 more times as likely to abandon PBIS than rural schools (Nese et al., 2016). Results from the current study and previous studies indicate that districts and schools may take longer to adopt PBIS in cities, more due to the characteristics of cities than district size. Bradshaw and Pas (2011) provide some support this by finding that district size (number of elementary schools in Maryland districts) was not found to significantly predict adoption of PBIS. According to Rogers (2003), some initiatives are likely to take longer to reach “critical mass,” perhaps due to variables associated with the context or innovation. The adoption of PBIS within cities could take longer to reach critical mass, perhaps due to population density (e.g., looser social networks) or organizational complexity (e.g., initiative siloing, city politics; Nese et al., 2016).

Perhaps surprisingly, proportion of students who received FRL was a significant and positive predictor of the rate of adoption of PBIS within school districts. This finding appears to be mixed in the PBIS implementation literature. For example, other studies found that the proportion of students who received FRL in schools not to a significantly predict schools reaching adequate PBIS fidelity (McIntosh et al., 2018; Nese et al., 2018). Furthermore, Nese and colleagues (2018) found that it took longer on average to reach adequate PBIS fidelity, after initial adoption, for elementary and middle with higher proportions of students who received higher FRL, compared to schools with fewer students who received FRL; however, FRL was not found to be a statistically significant predictor. In addition, McIntosh and colleagues (2018) found the proportion of students who received FRL not to be a significant predictor of sustained implementation using a large sample of schools at various stages of PBIS implementation. Relatedly, Bradshaw and Pas (2011) found that percent of schools receiving Title I funding within a district was not significantly associated with adoption of PBIS. Based on the current study and previous studies, more research is needed to determine if the proportion of students who received FRL may be animportant factor for why schools choose to adopt PBIS than how well they implement it.

Limitations and Future Research

We suggest the findings of this study be interpreted when considering several limitations related to the current sample and the predictors used. To be included in the study, districts needed to have had at least two schools, with at least one school reporting on PBIS fidelity for each of the five years of the study. These requirements were necessary to address the research questions related to the rate and variance of adoption of PBIS within districts and states. For these reasons, we were not able to examine factors that may have contributed to all schools abandoning PBIS within a district. For example, it is possible that districts that had at least one school adopting PBIS for each of the first five years were more likely to have higher rates of adoption, compared to districts in which schools may have stopped and restarted adopting PBIS during their first five years of adoption. In addition, a study of districts completely abandoning their PBIS initiatives may have resulted in different findings.

Another limitation of this study is the dependent variable was the proportion of schools adopting PBIS at any level of fidelity, as opposed to adequate PBIS fidelity. However, this limitation is also a strength, given the existing research base on predicting PBIS fidelity. Future research could examine the extent these variables also predict the proportion of schools adopting PBIS with fidelity. Further, our use of proportion instead of count data for measuring adoption can present challenges in interpretation. For example, 33% of schools could represent 1 of 3 schools in a rural school district or 100 of 300 schools in a city school district, two distinctly different contexts. The use of proportion is common in implementation research (Rogers, 2003), and more closely aligns with our research questions and hypotheses regarding tipping points for institutionalization. For comparison purposes, it seems more useful to study and discuss proportion when assessing rates of adoption. Moreover, our inclusion of both urbanicity and district size (number of schools) provides some evidence that school locale (explaining up to 9% of the variance) appears to be more influential in adoption than district size (explaining 1% of the variance).

Another limitation includes the predictors included and variance these predictors explained. The predictors (e.g., proportion of students who received FRL, proportion of students with IEPs) explained only a small amount of the variance. Considering ICCs showed that 52.4% of the variance was at the district level and 8.4% was at the state level, there are clearly other unmeasured variables that would account for more of the variance in the rate of district adoption of PBIS. For this preliminary study, we used district variables obtained from the NCES database, which limited our research analyses to examining only non-malleable predictors of district adoption of PBIS. Future research is needed to identify other malleable and non-malleable predictors at both the district and state levels. For example, at the school level, Bradshaw and Pas (2011) found the higher suspensions, student mobility, and higher student academic performance predicted the odds of PBIS training for elementary schools. These variables could be important factors of adoption at the district and state levels. In addition, as Nese and colleagues (2018) reported, many districts are supported in the adoption of PBIS by regional technical assistance centers and state departments of education. Factors such as technical assistance, funding, visibility and impact of PBIS initiatives, and policy changes to support PBIS adoption within districts and states would be meaningful to examine in future adoption research (Horner et al., 2014).

Implications for Practice

As there is limited research examining PBIS adoption at the district level, findings from this study provide implications for school personnel focused on scaling-up PBIS within districts and states. First, demonstrating that there was a positive and significant increase in the rate of districts adopting PBIS in the first four years of adoption, followed by a leveling off pattern, may help state and regional school personnel understand adoption patterns and not assume a tipping point leading to rapid and nearly full adoption. Although 100% adoption of PBIS within districts over a short period of time (i.e., the S-shaped curve; Rogers, 2003) is likely unrealistic, and district mandates might not be realistic reflections of practice, state and regional personnel could work to ensure continued funding for districts to support schools to adopt PBIS. Also, developing district policies that publicly support PBIS adoption and aligning incoming initiatives with PBIS adoption efforts, could also assist school personnel in increasing the percent of schools adopting PBIS and addressing barriers to adopting PBIS over time (Barrett, Bradshaw, & Lewis-Palmer, 2008; George & Kincaid, 2008). For example, some districts have invested considerable resources to address child and adolescent mental health problems as part of their PBIS framework (Weist et al., 2018). Adopting PBIS could be one way to link mental health practices to the data, practice, and organizational PBIS systems to ensure these practices are universally adopted by school personnel (Weist et al., 2018).

Second, although districts adopting PBIS in cities had lower rates of PBIS adoption, compared to districts located within towns and rural areas, the average number of schools adopting PBIS within these city districts was higher (see Figure 2). There could be less capacity at the district level to support PBIS adoption efforts within these larger districts, due to number of schools, competing initiatives, and fewer resources (Bohanon et al., 2006; Netzel & Eber, 2003). Therefore, it may be helpful for district personnel to develop cohorts within these larger districts focused on adopting PBIS within different regional areas in these districts. Within these smaller regional areas, district personnel may choose to begin adopting PBIS with specific school types (e.g., elementary, middle schools) and develop individual school exemplars showing the demonstrating positive outcomes associated with PBIS adoption.

Conclusion

The rate of adoption of PBIS within districts appears to significantly vary across districts in the U.S. The results of this longitudinal study also indicate that several district predictors, such as district locale, affect the percent of schools within districts adopting PBIS. In continuing with this line of implementation research, additional research is needed to identify other, malleable and non-malleable district predictors of the adoption of PBIS. Future research should also re-assess the adoption of PBIS using other districts beginning adoption efforts in more recent years, to assess whether the rates and patterns of adoption change over time as districts, states, and regions focus on scaling up PBIS efforts.

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