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A Mixed-Methods Approach for Embedding Cost Analysis Within Fidelity Assessment in School-Based Programs

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Abstract

This mixed-methods study describes a framework for conducting cost analyses of school-based programs leveraging fidelity data and applying the ingredients method. We illustrate this approach by applying it to Positive Behavioral Interventions and Supports (PBIS), drawing on multiple sources of data from a sample of U.S. 77 schools that were trained in PBIS. We concluded that the average per school cost of PBIS was US$53,216.00 (median = US$36,698), with an average per-pupil cost of US$90.00 (median = US$58.00), which is considerably less than other school-based prevention models. The cost did, however, differ by implementation level, such that high-fidelity implementation tended to cost more than low-fidelity implementation. We provide a case illustration to elucidate some of the cost drivers of PBIS implementation. Specifically, these data highlight the variability in the amount of training and coaching by the specific evidence-based program implemented within the tiered PBIS framework. Through this case illustration, we demonstrate the utility of tracking costs of school-based program within the context of fidelity data collection. The findings also suggest the potential cost savings of PBIS, both when compared with other evidence-based interventions as well as the known costs of negative school outcomes like dropout.

Keywords

Positive Behavioral Interventions and Supports, cost, school-based programming

Schools are increasingly held accountable for achieving a range of academic and behavioral outcomes, and thus are often turning to school-based prevention and early intervention programs to meet some of these goals (Lloyd et al., 2019). Yet, such programs often require additional resources and may place a financial burden on schools, districts, and states, particularly given the push for the use of evidence-based programs (McIntosh, Filter, et al., 2009). Although the number of programs identified as promising or effective by federal agencies, such as the U.S. Department of Education's What Works Clearinghouse or Blue Prints for Healthy Youth Development is growing (Lloyd et al., 2019), there has been less consideration of the costs associated with implementing these and other prevention programs (Crowley et al., 2018). Moreover, many of the "true costs" may well exceed the price of the program materials or training, and include considerable personnel time, space, and in-kind (e.g., donations, volunteer) costs, which are typically underestimated or unaccounted for by program implementers.

Given the increasing number of effective school-based prevention programs, an understanding of the true cost of each program, or the cost to achieve effects, becomes increasingly relevant. Few stakeholders have the expertise or tools to track the range of costs associated with program implementation and adoption, or the infrastructure needed to implement the program with fidelity (Fagan et al., 2019; McIntosh, Filter, et al., 2009; McIntosh, Horner, et al., 2009). Moreover, many granting agencies (e.g., Institute of Education Sciences, 2020) now require the tracking of program costs. Yet, the education field presently lacks efficient methodological approaches for calculating these costs prospectively.

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To address these gaps, the current mixed-methods study offers an approach for understanding, tracking, and analyzing the costs associated with implementation of school-based programs, utilizing the ingredients method (defined below; Levin, 1975; Levin & Belfield, 2015; Levin et al., 2018). Specifically, the first aim of this study was to summarize the process by which a program fidelity assessment tool was adapted and augmented to also capture data on program costs. Leveraging a sample of 77 schools implementing Positive Behavioral Interventions and Supports (PBIS), we summarize the average cost data collected, contrasting high and low fidelity implementation. We then provide a case illustration of PBIS implementation and the related costs (Penkunas et al., 2020), so that readers can see how these data were collected in practice and have utility at the school level. We collected data from multiple sources, including multi-informant interviews, document review, and observations. We report findings from both a quantitative data collection of the cost-related data through fidelity assessments and a case illustration of a single school. We begin with a brief overview of the PBIS model, given it serves as the focal school-based program examined in this study; however, the approach utilized is flexible enough to be adapted to track costs associated with other school-based programs.

Brief Overview of PBIS and Its Core Elements for Cost Analysis

The PBIS framework draws upon behavioral, social learning, and organizational behavior principles (Lewis & Sugai, 1999) that have been traditionally used with individual students, and extends and applies them to the entire student body consistently across all school contexts. PBIS is whole-school strategy that aims to prevent disruptive behavior and enhance the school's organizational climate by creating and sustaining universal (Tier 1), secondary (Tier 2), and tertiary support systems (Tier 3; Horner et al., 2010; Walker et al., 1996).

We considered the tiered implementation structure to include additional (a) schoolwide programming (e.g., targeting specific concerns such as bullying); (b) foundational procedures (e.g., process for referring students for additional supports; (c) targeted interventions (e.g., Tier 2 supports); and (d) intensive interventions (e.g., Tier 3 supports). With the PBIS framework in mind, we now consider a number of unique aspects of determining the cost of school-based programming which are applicable to the cost analyses of other school programs.

Cost in School-Based Programming

Cost is often equated with the budget for a program; however, this is not the case, as there are often additional activities such as staff time and opportunity costs (McEwan, 2002). Although budget information on expenditures is informative, it does not capture the total cost associated with program implementation. From an economic perspective, costs are defined as "the full economic value of the resources required to implement an intervention" (Crowley et al., 2018, p. ESM1). One aspect of school-based programming that makes it especially challenging to estimate costs is that many programs are multicomponent and involve the time of multiple school staff and students (Domitrovich & Greenberg, 2000).

In an effort to tease apart the specific elements of multicomponent programs, it is helpful to use approaches such as the ingredient method (Levin et al., 2018). This approach to cost analysis conceptualizes the specific elements or "ingredients" of program, which are isolated and added to create an aggregate school-level and/or district-level cost. It is a rigorous approach to conducting cost analyses (McEwan, 2002), which leverages standard cost-accounting practices and the economic concept of opportunity cost (Levin, 1975; Levin & Belfield, 2015; Levin et al., 2018). The main steps in the ingredient method process are (1) identification of ingredients; (2) ingredients data collection; (3) quantifying and pricing; (4) estimating total and average costs; and (5) pairing costs with impacts or benefits (Levin & Belfield, 2015; Levin et al., 2018; McEwan, 2002). These steps can be used for a variety of types of economic evaluations, including cost analysis, cost-feasibility analysis, cost-benefit analysis, and cost-effectiveness analysis. For the purpose of this article, we focused on the first four steps. This type of analysis determines the total cost to implement a program and is useful to inform resource allocation independent of effectiveness data (Levin et al., 2018).

Common Costs in School-Based Programs

Some of the most obvious ingredients in school-based programs are the core activities performed by staff charged with implementing the program and the direct program-related purchases. Some examples of these costs include training (e.g., a trainer's fee), program materials (e.g., purchase of handouts or a curriculum, software program/site license), and money and/or time spent creating these and other program materials or handouts. There also are costs that may not appear on a typical budget. For example, facilities costs for training as schools often use an existing school or district location for conducting staff training. Travel for trainings and technical assistance can be tracked, both for the trainer and for the staff who receive training. Another cost is for materials the school already has, such as facilities, donated funding and supplies, as well as volunteered time (e.g., Parent–Teacher Association [PTA] resources or staffing at events).

Less obvious are the personnel costs associated with the time spent by school staff preparing for or attending training sessions and attending meetings to support implementation. In fact, the largest cost associated with many programs is typically personnel (Blonigen et al., 2008; Crowley et al., 2018). In the case of PBIS, this may include staff and administrator time completing and processing office discipline referrals, entering data into a discipline data tracking system (e.g., office disciplinary referrals), and time spent by the PBIS team members attending meetings to review data or plan program-related events or activities. As most schools implementing a program do not typically hire new staff to support their implementation, these costs can be overlooked as they do not appear on a budget. However, these reflect opportunity costs; these are an estimate of alternative activities that could be performed during the time when the focal program was implemented. For example, instead of reviewing the PBIS behavioral expectations with students or holding a PBIS team meeting, the school personnel could have been working on another program (e.g., delivering a social-emotional learning lesson) or providing direct instruction. This concept of opportunity cost can also be applied to student time costs, particularly related to losses to academic instruction (e.g., doing bully prevention activities instead of math).

There also may be ongoing implementation support costs, which may shift in nature over time. For example, the costs may be higher in the early years of program adoption, when initial investments in coaching after training and the creation of evaluation systems are needed, but shift as the program matures into a more advance phase of implementation (e.g., maintenance; Bradshaw et al., 2009). Similarly, the costs may vary as the number of schools receive training in the model, as there may be some efficiency with scale (Blonigen et al., 2008). Moreover, there may be ongoing implementation support costs, such as evaluation to inform the implementation process, coaching supports, and ongoing technical assistance that vary across time or level of need.

Just as we would expect the benefits of a program to vary by fidelity of implementation, it is possible that the level of costs vary as a function of fidelity. For example, a school that receives an initial training in a program, but never actually implements the program will likely have fewer costs than a school that achieves high fidelity. In fact, although there is a growing body of research demonstrating that higher fidelity of an evidence-based program (EBP) is associated with better outcomes (Dane & Schneider, 1998; Domitrovich et al., 2008), high fidelity might come at a higher cost because more elements are in place and more time is spent implementing the program. As such, it is helpful to consider both the costs and fidelity jointly, as doing so may provide insight on the potential for benefits of the program and complement the corresponding discussion on benefits of fidelity.

Despite the potential utility of cost data, it can be challenging to inventory all the relevant program components and systematically track them. One possible efficient approach for tracking program activities is by costing out the various program ingredients using other data collection systems, such as fidelity inventories and related tracking systems (e.g., contact logs for coaching, training attendance logs). Fidelity is often defined as the extent to which the model is implemented as intended (Fixsen et al., 2005), and includes a range of quality indicators as well as dosage data (Domitrovich et al., 2008). Although not all school-based programs have a well-developed means for capturing fidelity data, or logging all program activities, the program's fidelity assessment likely serves as a good starting point for tracking program ingredients (Pas, Johnson, et al., 2019), and mapping them onto cost data.

Overview of the Current Study

The overarching goal of this mixed-methods study was to provide a framework and case illustration of an innovative application of the ingredients approach to cost analysis to the collection of fidelity of school-based programming. Specifically, we describe the process by which cost-tracking was embedded within a PBIS fidelity assessment (Molloy et al., 2013). After describing this process and the multiple sources of data collected from a set of 77 U.S. PBIS schools at different levels of implementation, we provide a case illustration of PBIS implementation (Dopp et al., 2019; Onwuegbuzie, 2012). Specifically, we used a convergent parallel research design in which raw qualitative data from the PBIS fidelity assessment were used to create a case illustration, whereas quantitative data from the PBIS fidelity assessment were used to identify the costs associated with PBIS implementation (Leech & Onwuegbuzie, 2009; Penkunas et al., 2020).

Although there have been some prior efforts to apply cost-benefit analysis to PBIS and various activities within the framework (e.g., Blonigen et al., 2008; Swain-Bradway et al., 2017), this study was novel in that it used a mixed-methods design in which a case illustration of a single school's cost data in relation to the multi-informant fidelity data is used (Creswell & Clark, 2011; Tashakkori & Teddlie, 2010). This also serves as one of only a few examples of such an approach in the field of education, whereas there is a longer history of such approaches in other fields, such as medicine (e.g., Penkunas et al., 2020). Although this article focused on PBIS, we anticipate a similar approach could be leveraged to track the costs associated with other school-based programs.

Method

Sample and Participants

Data come from a larger evaluation of one state's implementation and scale-up of the PBIS model and related

school-based programming (see Pas, Ryoo, et al., 2019). Specifically, we summarize data from 77 schools implementing PBIS in five districts within this mid-Atlantic state collected in the 2017–2018 school year. All schools were public K–12 schools, of which 18 served elementary students with the remainder serving secondary students. The average student enrollment was 782.21 (SD = 358.98) with an average free and reduced meals status of 48.56% (SD = 17.77).

Data Collection Measures and Procedures

PBIS fidelity measures

Schoolwide Evaluation Tool (SET). The SET is the most commonly used PBIS implementation measure in practice and research (Sugai et al., 2001). It assesses seven core components of the universal, schoolwide, components of PBIS. For this study, the SET was completed by an external evaluator hired and trained by the research team who conducted used a structured interview guide with administrators, school staff, and student support team leads; toured the school; and reviewed materials during a one day visit to the school. To generate the SET subscales scores, the resulting data were coded by the evaluator using a scoring rubric rating the extent to which each of the 58 items that load onto seven subscales were in place (i.e., not implemented = 0, partially implemented = 1, fully implemented = 2; see Horner et al., 2004, for additional details on the SET). An overall summary score is computed by averaging all seven scale scores (referred to as Overall SET score), ranging from 0% to 100% (α = .93). For additional information on the interviews and other data collection procedures, see Debnam et al. (2012).

Individual Student Systems Evaluation Tool (ISSET). The ISSET (Lewis-Palmer et al., 2005) was administered simultaneously by the external observer with the SET in a single administration format. The ISSET used brief interviews at the school and the reviewing of materials developed and used for intervention planning and implementation for EBPs (Debnam et al., 2012; Lewis-Palmer et al., 2005). The ISSET includes 46 items organized into four subscales on a 3-point scale (i.e., 0–2), and a percentage for all scales is typically calculated. An Overall ISSET score is created by averaging the four subscale scores (α = .91). The procedures for the administering and scoring the ISSET were similar to the SET, as described above. For additional information on the interviews and other data collection procedures, see Debnam et al. (2012).

Training of SET/ISSET assessors. SET/ISSET observers were trained in nonstudy schools and completed a practice SET/ISSET, alongside a trainer. The extensive 2 days of training included procedures for collecting qualitative and quantitative data using a written protocol and script to ensure consistency in procedures; the training also included an in-school practice session with a certified trainer. Trainer and trainee subscale scores were compared for interobserver agreement (i.e., IOA; proportion of agreement on subscale scores) and was 0.86 on average, with scale IOAs ranging from 0.67 to 1.00 on subscales. For additional information on these measures, including psychometrics properties and training, see Debnam et al. (2012) and Pas, Johnson, et al. (2019).

Administration of the SET/ISSET. After training, the assessor independently conducted the SET/ISSET at each participating school. Both measures were completed during a single school visit by the assessor. Brief interviews were conducted with an administrator (approximately 30 min) and the student support team leader (approximately 20 min) regarding the types of programs and supports provided to students not responding adequately to schoolwide PBIS (SWPBIS). The assessors also collected information about the PBIS procedures, policies, and positive behavior standards by interviewing a minimum of eight teachers and four support staff members for approximately 3 to 5 min each, and a minimum of 12 students from each grade level for approximately 1 to 2 min each.

Cost-tracking additions to the SET/ISSET. To track costs of implementing SWPBIS, items were embedded in the SET/ISSET protocol. These items were developed in collaboration with the study economists to solicit information needed for the cost analysis. Seven items were embedded within the SET. As shown in Table 1, the items were collected during the administrator interview of the SET assessment. The items probed the administrator on the specific resources needed to implement PBIS and the procedures used to sustain implementation. Approximately 20 items were embedded within the ISSET. As shown in Table 2, these data were collected during the student support team leader interview of the ISSET. The items solicited from the student support team leader, the personnel involved with implementation of school interventions, training procedures, and the time needed to implement.

Data Analyses

Cost components. To calculate the costs of PBIS, we considered the additional outlays of financial resources and personnel time that were incurred. In other words, we considered only the costs that would not have accrued had the school not implemented PBIS. Lacking a comparison group of schools not implementing PBIS, we made some assumptions about what costs were incurred. Each component and the relevant assumptions are described below.

Table 1. SET Administrative Interview.

Tier 1: SET interview questions	Examples of added questions to capture costs
Do you collect office discipline referral information?	• *What is the approximate number of office discipline referrals you have a year?*
What do you do with the office discipline referral information?	• *Does your school pay for a data system that stores office discipline referral information?* • *If no, who pays (e.g., district, project)?*
Does your school have written school rules or a motto?	• *Do you have any of your postings professionally printed? If so, how much does it cost?*
What are the social acknowledgements/ activities/routines called (student of month, positive referral, letter home, stickers, high 5's)?	• *How are these distributed to the students (both method and people responsible; e.g., school store or teacher distributes at end of each week)?* • *How often does this happen?*
Does your school have an annual action plan to address schoolwide behavior support?	• *Record job role of all the team members identified (i.e., special educator, school counselor).*
Do you have a team that addresses school wide discipline?	
Does the school budget contain an allocated amount of money for building and maintaining schoolwide behavioral support?	*Does this annual budget include tangible rewards (items that you give the students or staff)?*
Where does the money come from? How much money is allocated?	• *If no, where does the money for these come from (please include any donations and note approximate amount)?* • *Does this annual budget include money for events (e.g., celebrations, parties, activities)?* • *If no, where does the money for these come from (please include any donations and note approximate amount)?*

Note. SET = Schoolwide Evaluation Tool.

Table 2. ISSET Student Support Team Leader Interview.

Tiers 2 and 3: ISSET interview questions	Examples of added questions to capture costs
Intervention results in students receiving direct instruction in the skill development.	• *On average, how much time does each student spend doing this program each school year?* • *Who provides this direct instruction (note job role)?*
Intervention has a process for monitoring whether it is being implemented as designed.	• *Who oversees this process (note job role)?* • *How much time does each person involved with administering the program spend monitoring implementation?*
All staff implementing the intervention have received initial training in the intervention.	• *How many current staff received training (note job role[s])?* • *When and where did the training take place (include length of time)?* • *Who paid for the cost of training?*
Trained staff receive ongoing coaching on how to implement the intervention.	• *Who provides the coaching?* • *What is the structure of the coaching (include frequency, manner of delivery, and amount of time)?*
Intervention requires no more than 10 min per day from any instructional/supervisory staff to monitor.	• *On average, how much direct instruction in this program does an individual student participant receive in a school year?* • *Who provides this direct instruction (note job role)?*
Intervention has a process for monitoring whether it is being implemented as designed.	• *Who oversees this process (note job role)?* • *Who provides this direct instruction (note job role)?* • *How much time does each person implementing the EBP spend monitoring implementation?*
All staff implementing the intervention have received initial training in the intervention.	• *How many staff received training (note job role[s])?* • *When and where did the training take place (include length of time)?* • *Who paid for the cost of the training?*
Trained staff receive ongoing coaching on how to implement the intervention.	• *Who provides the coaching?* • *When and where did the training take place (include length of time)?* • *What is the structure of the coaching (include frequency, manner of delivery, and amount of time)?*

Note. ISSET = Individual Student Systems Evaluation Tool; EBP = evidence-based practice.

PBIS costs are calculated according to the ingredient method (Levin et al., 2018) in which the separate ingredients for PBIS implementation were described, quantified, priced, and added to create an aggregate school-level cost. The core ingredients in our analysis were PBIS team meeting time costs, training time costs, implementation costs, money spent for PBIS incentives and rewards, and referral time costs. It should be noted that in the process of understanding the costs of PBIS, we focused on the costs borne by the schools to deliver the program. Thus, identified costs (e.g., signage creation/printing, cost of data system) that were borne by other stakeholders (e.g., the district and state) are not included in this study.

Personnel costs. Teachers are typically expected to participate in training activities without receiving additional compensation. It may be tempting to assume the costs are zero as they do not appear on accounting ledgers. However, teachers who are participating in PBIS activities are not doing other things during that time, such as preparing for lessons, which might require them to work additional hours from home. In addition, administrators are often involved in PBIS efforts and likewise could spend their time in other activities or work overtime. We consider the costs imposed on school personnel to be relevant to understanding the costs of PBIS, and we calculate the cost of their time on an hourly basis as follows:

$$\text{Hourly school personnel cost} = \frac{\text{Annual salary}}{\text{Annual hours}}.$$

We estimated the annual teacher salary to be US$65,685, based on the annual salary of a teacher with an undergraduate degree and 10 years of experience on a representative district salary schedule from within this sample of districts. Annual teacher hours were calculated as 185 contract days $\times$ 8 hr = 1,520. The resulting hourly teacher cost was estimated to be US$44.38. To generate administrator time costs, we assumed an administrator salary of US$112,035 based on the district's administrator salary schedule and a total annual workload of 2,000 hr.

For PBIS cost estimates, we considered only teacher/administrator time that was spent in addition to their usual responsibilities. This included time in PBIS planning meetings and training. We did not consider teacher time in the classroom as they would be spending that time in the classroom in the absence of PBIS. We did not account for student instruction time as PBIS does not require students to spend additional time beyond what is typically required.

PBIS meetings. Consistent with the PBIS model, teams of teachers and administrators met together in regular meetings to discuss PBIS. When schools did not report the length of meetings, we assumed 1-hr meetings. If schools reported having meetings but did not report their frequency, we assumed they took place monthly, which was the median response reported.

Training. Teachers participated in training to orient them to PBIS and its implementation. The total cost of training was calculated as follows:

$$\text{Total training cost} = \text{Total hours} \times \text{number of teachers} \times \text{hourly teacher cost}.$$

When a school reported "all" teachers having been trained but did not report the actual number, we assumed 30 teachers had been trained.

Coaching, management, and implementation. We considered costs of two levels of interventions occurring based on ISSET data: schoolwide and targeted/intensive. Schoolwide refers to interventions with the entire student population. Targeted/intensive interventions refer to interventions with specific students. The implementation of these interventions is supported with coaching and management. We calculated the total coaching cost as follows:

$$\text{Total coaching cost} = \text{Hours per coach} \times \text{number of coaches} \times \text{hourly teacher cost}.$$

Monitoring costs were calculated in the same way.

PBIS budget. Schools were asked to report the school's budget for PBIS activities, including funds used for events and recognitions. The sources of these funds varied, with some reporting income from donors and others reporting that the budget was provided by the district. We included all budgetary expenses for PBIS as a cost to the school regardless of the source as these are funds that could have been used by the schools for other activities in the absence of PBIS. This is a conservative assumption as the schools might not have been able to collect some of the donations and budget from the district in the absence of PBIS.

Referrals. One critical feature of PBIS is the monitoring of student disciplinary referrals. Disciplinary referrals would exist in the absence of PBIS, possibly in greater numbers than they do with PBIS, so we do not want to include all the time costs associated with referrals such as administrative time spent working with students and parents to resolve the discipline referral. Lacking a comparison group, we did not have a reliable estimate of the net change in referrals under PBIS. As a conservative estimate of the additional referral cost due to PBIS, we estimated the cost of entering the discipline referrals into the system as 5 min per referral of staff time. Although some of the referral entry may be done by administrative staff that has a lower

Table 3. Mean and Median Cost of Each PBIS Element (in US dollars).

Element	Mean cost	Median cost
PBIS team meeting cost	$4,132	$3,273
Total training cost	$20,983	$11,538
Schoolwide training cost	$14,481	$9,330
Targeted/Intensive training cost	$6,502	$1,065
Total management and implementation cost	$21,847	$8,520
Schoolwide monitoring cost	$11,897	$1,797
Targeted/Intensive monitoring cost	$9,950	$2,795
Total coaching cost	$2,076	$399
Schoolwide coaching cost	$966	$0
Targeted/intensive coaching cost	$1,110	$0
PBIS activity budget	$2,387	$1,000
Referral cost	$1,792	$1,105
Total cost (school-level)	$53,216	$36,698
Per-pupil cost (average cost per student)	$90	$58

Note. Some subcategories (e.g., total coaching costs) do not sum to totals because the within-category mean or median was provided. PBIS = Positive Behavioral Interventions and Supports.

implied hourly rate, as a conservative estimate, we used the US$44.38/hr rate for staff time.

Total costs. Using the above information, we estimated the average school-level cost of the program by adding each of the above elements. To account for varying school size, we calculated the costs on a per-pupil basis by dividing the school-level totals by the total school enrollment. We then explored differences in total average cost by PBIS implementation level using SET and ISSET Total Scores as well as specific subscales in which implementation level might produce an effect on cost. The analyses included 16 separate contrasts. As the analyses were exploratory and the goal here was to understand cost factors that do and do not appear to drive fidelity, we did not make multiple comparison corrections (see Perneger, 1998). All contrasts met typical assumptions required of the *t* test, including comparison of mean values using a *t* test. Groups were formed by whether a high-fidelity threshold of 80% was met for each measure's total score and subscale.

Case Illustration

Using qualitative data collected during the SET/ISSET assessment, we provide an illustrative description of PBIS implementation. As a typical part of the SET/ISSET administration, the external evaluator took meticulous notes during the interviews conducted with the administrator (30 min) and student support team leader (20 min). During the interviews, the administrator and student support team leader were asked to provide information about the school's discipline system, behavioral expectations, reward system, PBIS team functions, and details regarding the targeted and intensive interventions available for students. In addition, as a typical part of the SET/ISSET administration, the evaluator conducted (a) a review of PBIS documents and materials (60–90 min), (b) 10 brief interviews with teachers and staff (3–5 min each), and (c) 12 interviews with students (2–3 min each) to understand their PBIS implementation. Although these data were ultimately used to create quantitative scores for the SET/ISSET as described above, for the current study, it also served as raw data for the case illustration. The interview notes collected during the SET/ISSET were not coded for analysis. Rather, the raw interview notes were used here to create a case illustration to provide a deeper understanding of the approach to cost-tracking using fidelity tools (see Dopp et al., 2019). Consistent with the cost data collected, PBIS implementation depiction, which illustrates school-level training time, implementation resources, monies spent for PBIS incentives/ rewards, office disciplinary referral time, and PBIS team meeting time, is provided.

Results

Cost Data

Total cost. We calculated the total cost of the program for each school by adding each component. The average total cost for all elements was US$46,185. Total cost ranged from US$6,236 to US$183,300. The average per-pupil cost of PBIS in all schools was US$90. Specific costs varying by components are described below and can be found in Table 3.

PBIS meeting costs. Schools had an average of one administrator on their PBIS team and six teachers and staff members. The average cost of PBIS meeting time was US$4,132.

Table 4. Cost by High- and Low-Implementation PBIS Fidelity (in US dollars).

Subscale by fidelity measure	Average costs (*SE*)		
	High fidelity: 80% or greater	Low fidelity: Less than 80%	*t*-test coefficient with corresponding *p*-value
SET Total Score	$52,176 ($4,971)	$53,811 ($11,725)	–0.13 ($p = .90$)
SET: Management Subscale	$61,838 ($7,018)	$34,178 ($4,982)	–3.21 ($p < .001$)
SET: District Support Subscale	$50,946 ($12,933)	$52,125 ($5,339)	–0.27 ($p = .28$)
ISSET Total Score	$56,743 ($5,411)	$48,514 ($9,993)	–0.77 ($p = .44$)
ISSET: Schoolwide Interventions Subscale	$58,426 ($6,256)	$45,892 ($9,074)	–1.18 ($p = .23$)
ISSET: Foundations Subscale	$56,177 ($6,780)	$49,664 ($8,708)	–0.61 ($p = .54$)
ISSET: Targeted Interventions Subscale	$57,851 ($5,916)	$40,859 ($10,902)	–1.37 ($p = .15$)
ISSET: Intensive Individualized Interventions	$53,160 ($5,558)	$53,650 ($17,224)	0.03 ($p = .96$)

Note. SET = Schoolwide Evaluation Tool; ISSET = Individual Student Systems Evaluation Tool.

Training costs. The average school in our sample spent 473 total teacher hours training teachers for schoolwide and targeted/intensive interventions. There was a substantial distribution in the number of hours—ranging from 103 to more than 4,000. The average cost for teacher training was US$20,983. The average cost for training was higher for schoolwide training (US$14,481) than for targeted/intensive interventions (US$6,502).

Coaching costs. The average school spent 47 hr on average on coaching which translates to approximately US$2,000 on coaching, although the range was large (from US$0 to US$19,704). The average cost for schoolwide coaching (US$966) was similar to the average coaching cost for targeted/intensive coaching (US$1,110).

Management and implementation costs. This was an area of substantial cost in terms of time required. The mean school reported nearly 493 hr of time managing and implementing interventions at a cost of US$21,847. Two schools reported monitoring costs greater than US$100,000. The average monitoring cost was higher for schoolwide interventions (US$11,897) than for targeted/intensive interventions (US$9,950).

PBIS activity budget. The average budget for PBIS activities was US$2,387. Schools reported the source of the budget to come from the district, private donations, and fundraisers.

Referral costs. Schools varied substantially in the number of referrals. The average annual number of referrals was 486, with a range from 0 to 5,400. The average cost of time spent on referrals was US$1,792.

Cost variability by implementation. Cost of PBIS was explored by level of fidelity on both the SET and ISSET (see Table 4). Specifically, schools were classified as high fidelity based on an overall score of 80% on the SET and ISSET (Pas, Johnson, et al., 2019). Substantial differences were found in the total average cost between schools that were categorized as high fidelity versus low fidelity in the management subscale of the SET with a cost difference of US$27,660. Although not statistically significant, a trend can be seen whereby schools categorized as high fidelity on the ISSET Total Score as well as the subscale scores for Schoolwide, Targeted Interventions, and Foundations incurred a higher cost for PBIS.

Case Illustration of Friendship Middle School (FMS)

We also provide a case illustration of FMS (see Note 1; see Dopp et al., 2019). This particular illustrative case was selected because of the high level of implementation across the tiered framework, using quantitative school-based data. FMS was located in large suburban school district in a mid-Atlantic state. The school had approximately 820 students and 40 full-time teachers. The school scored a 98% on their SET and a 98% on their ISSET. These high overall scores indicated a high level of implementation, and as a result, it was selected to illustrate the costs associated with PBIS in this study. FMS received initial training in PBIS 7 years prior to this assessment and considered itself in the sustainability or maintenance phase of PBIS implementation. The school's PBIS team included 22 staff members, who met regularly to address schoolwide discipline and behavior support systems. All of the school's administrators ($n = 5$), 16 teachers, and one parent were on the team, which met monthly for approximately 40 min.

Within the PBIS framework, the school was also implementing several schoolwide and targeted interventions. Schoolwide, FMS was implementing Botvin's LifeSkills Training (Botvin et al., 2006; delivered by a school resource officer), Restorative Practice circles, and provided social-emotional learning lessons to all students. The student support team leader reported that five staff members received

training Botvin's LifeSkills Training that year which lasted for approximately 36 hr. All classroom teachers participated in a short (i.e., 30-min) restorative circles training. Finally, the school counseling team ($n = 3$) received approximately 6 hr of training to implement the social-emotional learning lessons during their guidance session. Targeted interventions for students who need additional support included Check-in/Check-out and mental health services for students provided by an off-site district-wide mental health provider. The SET leader reported that all classroom teachers participated in a 30-min training on Check-in/Check-out. No school staff were trained by the mental health services provider.

The PBIS team had a district-wide coach and an internal school-based assigned to FMS. The school also received coaching for its schoolwide and targeted interventions. Coaching for Botvin's LifeSkills Training, the social-emotional lessons, and mental health services were provided by persons external to the school (e.g., police department, professional counselor) for approximately 30 min each week. Coaching for restorative circles and Check-in/Check-out were provided by a member of the school's administrative team. The student support team leader reported a Check-in/Check-out coaching schedule which included 1 hr of weekly support while restorative circles coaching amounted to approximately 1 hr annually.

A substantial amount of time is spent coordinating and managing implementation of these schoolwide and targeted interventions. Monitoring activities included coordinating schedules, managing paperwork, and other tasks directly related to implementation. Implementation and management of the interventions greatly varied in the amount of time needed. For example, restorative circles required 30 min daily, whereas mental health services required 18 hr each week. The budget for PBIS activities comes from money from the school district and fundraisers. The school district provided US$1 per child in the school (US$820), and an additional US$1,000 was raised through donations and events like school dances and a "holiday flea market." As part of their ongoing monitoring of discipline data, FMS collects disciplinary data on a paper office referral form. This referral information is then entered into a *free* district-wide tracking system. The school collects 10 to 12 disciplinary referrals daily. The administrative team reviewed these data and shared it with both the SWPBIS team and a disproportionality team each month.

Discussion

Although research has documented a growing number of evidence-based approaches (Lloyd et al., 2019), many of these programs are costly for schools to implement. Having information on cost associated with school-based programming is informative for a range of decision-makers, including educators, district leaders, and policy-makers (Webb, 2018). Moreover, few researchers have efficient methods for tracking costs associated with program implementation. The current study sought to address some of these gaps by providing insight and guidance on one such mixed-methods approach for tracking costs associated with school-based programs through the collection of fidelity data. In conducting this work, we used a mixed-methods design that includes quantitative data collected in the fidelity assessment using the ingredients method (Levin et al., 2018) and a qualitative case illustration of the PBIS implementation (Dopp et al., 2019). Toward that end, we summarized data regarding implementation of schoolwide programming that were captured through the SET, and more targeted and advanced tier activities captured through the ISSET. This mixed-methods costing approach and the related case illustration provide a helpful framework and exemplar for considering the range of activities that schools might be engaged in when it comes to school-based prevention programming.

In reviewing the more substantive findings on the costs associated with PBIS through the full sample of schools, we find the largest estimate of cost at the school level to be US$53,216 or US$90 per student. Contrastingly, Borman and Hewes (2002) estimated the annual per student costs of several well-known interventions in education: Success for All (US$1,100), Tennessee STAR (US$2,000), Perry Preschool (US$12,362), and Abecedarian Project Preschool (US$14,531; see Note 2). Similarly, a recent study of social-emotional learning programs by Belfield and colleagues (2015) found that programs, like 4Rs (US$420), Second Step (US$390), and Responsive Classroom (US$900) were considerably more expensive than the PBIS framework, although they all did yield a favorable benefit to cost ratio. Together, these findings suggest that PBIS is a less expensive model than these other preventive interventions by orders of magnitude. While a full benefit cost analysis must also account for the benefits of PBIS, the cost side of the ledger suggests that it can have relatively small effects and still be considered cost-effective. For example, a recent report by Rumberger and Losen (2016) highlighted the significant costs associated with suspension and dropout for the nation; importantly, these two outcomes, along with a range of other student outcomes (e.g., academic performance, teachers' ratings of behavior problems, emotion regulation), have been linked with high-quality PBIS implementation (Bradshaw et al., 2010), suggesting a potential for significant cost savings associated with PBIS (see Swain-Bradway et al., 2017).

As expected, our findings did suggest that higher fidelity was associated with increased cost. In fact, it seems reasonable that a program or framework would "cost more" if a school implemented more of the intended activities and spent time actually implementing such efforts (e.g., attending team

meetings, providing training to school staff, preparing posters and materials), as compared with performing only a portion of the intended activities. Nevertheless, prior implementation research suggests that higher implementation fidelity would in fact translate into greater benefit in terms of outcomes (Dane & Schneider, 1998; Domitrovich et al., 2008).

In focusing more specifically on the case illustration, we see that many of the costs associated with PBIS implementation can actually be attributed to the training and implementation of other EBPs within the PBIS framework. As the school in the case illustration had been trained in PBIS over 7 years prior to the cost-tracking, training costs for this framework were less evident. This finding is consistent with Blonigen et al. (2008), who described more substantial costs associated with first-year PBIS training and implementation. In contrast, we saw that training for the schoolwide program, Botvin's LifeSkills, during studied school year accounted for a large amount of training costs. In addition, although PBIS team is fairly large, the amount time they met each month may reduce the coaching, PBIS activity, and management associated costs. In our illustration, the targeted mental health intervention included high management and implementation costs associated with weekly delivery of these services for even a small group of students.

Limitations and Future Directions

We selected PBIS for the focus of this article because it is currently implemented in more than 26,000 schools in the United States. Although research does suggest that the PBIS framework itself is an EBP (Bradshaw, Mitchell, & Leaf, 2010; Horner et al., 2009, 2010), some schools may opt to use non-EBPs within the PBIS structure. For example, a number of schools in this sample were using programs like D.A.R.E. or "home-grown" social skills lessons, rather than EBPs and curricula. As such, there may be some activities that essentially cost the same in terms of staff time to deliver, but yield more benefit in terms of outcomes, as compared with the limited benefits associated with non-EBPs. In addition, it is important to understand that our estimates of costs of these additional programs were based on what was reported by the school, and therefore might not reflect the resource allocation needed to obtain fidelity and maximize effects. For example, some of the estimates ranged considerably as a result of the information provided (e.g., training hours ranged from 103 to more than 4,000, office referrals ranged from 0 to 5,400). Also costs reflect direct costs and do not consider indirect costs induced through PBIS Tiers 2 and 3 supplemental support services; for additional information on similar service/program delivery models, refer to "service mediation interventions" (see Bowden et al., 2017).

In addition, we did not account for the cost of student time, as the activities implemented did not make the school day any longer for students. However, as the case illustration illuminated, many schoolwide interventions (i.e., Botvin's LifeSkills) or targeted/intensive interventions (i.e., Check In/Check Out or mental health counseling) may have taken students' out of the classroom. Thus, these interventions could represent an opportunity costs. Although our measure provided an estimate of student time (i.e., "On average, how much time does each student spend doing this program each school year?"), we were not able to determine whether this time displaced schoolwork. This represents a future area for research as it reflects that broader balance between supports for student behaviors and academic outcomes.

An added complexity with this and other systemic school-based models is that costs for implementing the PBIS framework occur at the school, district, and state or national levels (Lindstrom Johnson et al., in press). However, in this article, we focused largely on the school-level implementation, with acknowledgment of the process and recommendations for similarly tracking costs at the district and state levels. Nevertheless, the multiple levels of implementation support are important to consider in relation to the full range of implementation supports across levels. Future studies should account for the multiple levels of cost data, including the school, district, and state. Moreover, we did not account for the nesting of schools within districts, as there may be some efficiency if school districts scale the model across multiple schools simultaneously; for example, an analysis by Blonigen and colleagues (2008) suggested that there may be some efficiency at implementing PBIS across multiple schools as compared with a single school (see Blonigen et al., 2008). We would also encourage future research to attend to the phase of implementation and scale-up across multiple schools and districts, as the costs may be greater during initial adoption of the program, but level off after the school or district has reached a maintenance phase (Blonigen et al., 2008).

We also focused rather broadly on coaching supports; however, additional data on the specific types and amount of supports coaches are providing and to whom they are providing those supports may also reveal additional "hidden costs" (e.g., opportunity costs) for schools (Pas et al., 2020). Similarly, the PBIS teaming process may also mask specific aspects of implementation that have implications for cost. For example, a PBIS team meeting where a principal is always present may cost more than a meeting that does not have this level of administrative engagement and support; however, there may be additional benefits associated with that level of administrative support (where the costs are in fact greater) in contrast to schools where there is less administrative support and leadership. PBIS is intended to be a framework, rather than a discrete program (see Horner et al., 2010; Walker et al., 1996); as such, it may

be difficult to fully contain all elements of the model and put some parameters around what the model includes, and what is practice as usual. Similarly, the PBIS multitiered model includes the delivery of other EBPs, which complicates the application of traditional cost approaches (see Bowden et al., 2017).

Finally, with regard to methodology, we used a mixed-method approach (Hunter & Brewer, 2015) in which we drew upon data from several sources of data captured during the administration of the SET and ISSET. A strength of this article is that we leveraged qualitative methods to derive quantitative data from the fidelity assessment. We believe this study also illustrates the utility of embedding some mixed-methods data collection within a larger study to provide additional insight regarding various aspects of fidelity in conjunction with cost. Toward that end, we supplemented the fidelity data collection with a case illustration based on these data, thereby making this study mixed methods. Together, we believe this mixed-methods approach is informative with regard to PBIS cost estimation, and lends itself well to potential application to other school-based programs and frameworks commonly used in the special education and behavioral disorders fields. It is important to acknowledge, however, that mixed-methods approaches have been previously used in cost studies, largely in the field of medicine (e.g., Penkunas et al., 2020); however, there has been a greater emphasis on and expansion of the use of mixed-methods approaches in education as well (e.g., Pas et al., 2020). Toward that end, we hope that the current study serves to motivate and inform further use of mixed-methods approaches for documenting costs in educational studies.

Conclusions and Implications

We believe a unique feature of this study is the mixed-method approach, which enabled us to learn more about the costs associated with implementation, over and above what could have been learned through the use of a single method. This mixed-methods study also represents a potentially novel costing approach, in that we leveraged data from multiple sources in calculating costs. Quantitative data captured through both the SET and ISSET allowed for contextualization of the cost, which would not have been available in traditional cost interview. Moreover, the linkage of quantitative fidelity and cost data enabled us to jointly examine these two important aspects of program adoption. In contrast, programs are often assumed to have a static cost; however, our more nuanced consideration of what it might cost to implement a program with fidelity, as compared with poor fidelity, further illustrates how important it is to consider implementation fidelity in the context of evidence-based programming (Lloyd et al., 2019). Additional research should explore this hypothesis by integrating cost with relative evidence of effectiveness. A qualitative case illustration was leveraged to deepen readers' understanding of the application of this approach, and further exemplified the potential utility of a mixed-methods approach to cost analysis.

Taken together, the findings of this mixed-methods study provided insight on various activities and supports that PBIS schools are engaged in that translate into costs for schools. Although these are often challenging activities for school personnel to fully inventory, much less approximate, we believe mapping the ingredients approach onto fidelity data tracking may be helpful and efficient approach for tracking the costs of school-based programs and frameworks, like PBIS. Moreover, the substantive findings may also highlight the relatively low per-pupil costs of PBIS in comparison with other school-based programs (see Belfield et al., 2015). Additional work is needed to map out the ratio of these costs to student outcomes; however, data from prior randomized controlled trials of the universal SWPBIS framework, in relation to outcomes like school dropout, suggest a relatively high ratio of the magnitude of US$1 investment in SWPBIS being associated with a fiscal savings of US$104.90 (Swain-Bradway et al., 2017).

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Notes

1. Pseudonym was used to protect the school's identity.
2. These estimates have been updated to be put in 2015 dollars using the 2015 Consumer Price Index (CPI). The estimates in the original paper were given in 2000 dollars and were reported to be US$795, US$1445, US$8929, and US$10,496.

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