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Application of Economic Analysis to School-Wide Positive Behavior Support (SWPBS) Programs

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The authors discuss how to use economic techniques to evaluate educational programs and show how to apply basic cost analysis to implementation of school-wide positive behavior support (SWPBS). A description of cost analysis concepts used for economic program evaluation is provided, emphasizing the suitability of these concepts for evaluating educational programs. The authors also describe the specific data and measurement and analytic procedures that cost analysis evaluation requires. The concepts are then applied in a case study showing a cost analysis of SWPBS. Implications are provided for extending the cost analysis case study into evaluation of cost-effectiveness and/or cost–benefit economic analyses of program success.

Keywords: *cost analysis; opportunity costs; fixed and marginal costs; behavior intervention*

Starting in the 1930s, economists began to formalize a set of procedures for evaluating public programs based on a comparison of their costs and benefits (Drummond, O'Brien, Stoddart, & Torrance, 1997; Hummel-Rossi & Ashdown, 2002; Hy, 2000; White et al., 2004). These procedures, known as benefit–cost analysis or BCA, have since been applied to government programs ranging from road construction to environmental policies to the provision of low-income prenatal health care. The objective of BCA is to put government expenditures to the same test that economists believe people generally use in their private decision-making, that is, spending money only if the expected value of the benefits exceeds the expenditures or costs.

Education is a large component of public spending, and schools often need to choose from among a wide variety of possible programs to accomplish a variety of objectives. Thus, using benefit–cost analysis to evaluate school programs seems natural. Given the increasing constraints on fiscal resources in education, it is important to document the benefits of better educational programs in economic terms (Greenwald, Hedges, & Laine, 1996; Verstegen & King, 1998).

The costs of implementing educational programs are in principle easily defined and measured. Methods for estimating the benefits people get from goods and services that do not typically have market prices associated with them are now well established (Boardman, Greenberg, Vining, & Weimer, 1996; Harberger & Jenkins, 2002; Levin, 1983; White et al., 2004). Similarly, procedures for adjusting these costs and benefits for uncertainty and discounting them for timing have also become relatively standardized (Levin & McEwan, 2001).

Despite the compelling logic for the application of BCA, such methods have not yet been widely adopted by

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education administrators and researchers, in part due to the technical nature of the procedures used and in part because researchers in education have concentrated on developing programs and measuring their effectiveness with noneconomic measures such as student academic achievement and social behavior.

This situation is rapidly changing. Major federal funding agencies now require education researchers and program developers to demonstrate that their proposed reforms will be an efficient use of public funds relative to current or alternative programs. The federal Office of Management and Budget (2003) now requires a benefit–cost analysis for new federal regulations with estimated costs above $50 million, and a procedure for review of existing regulations is also being implemented. In short, economic analysis is appropriate for many education programs and increasingly expected by funding agencies. The scarcity of prior benefit–cost analyses of education programs, combined with the recent emphasis on funding educational reforms that yield the highest possible public return in valued outcomes, has created a need for research that demonstrates how methods of economic analysis can be applied to educational program evaluation.

In this article, we demonstrate how to use economic techniques to evaluate costs of educational programs, and we present a case study showing application of a cost analysis to one contemporary educational innovation, school-wide positive behavior support (SWPBS; Lewis & Sugai 1999; Sugai & Horner, 2006) for preventing and ameliorating student problem behaviors in schools. We describe a rationale for cost analysis and the specific data and measurement and analytic procedures involved. We then discuss how our cost analysis evaluation could be expanded from cost analysis to cost-effectiveness and benefit–cost analyses.

While our case study can provide a useful guide for educational cost analysis, we do not present a full benefit–cost analysis of SWPBS. Instead, we regard our case study as the necessary first step in this direction. A full economic evaluation would involve at least three types of analyses: cost analysis, cost-effectiveness analysis, and benefit–cost analysis. *Cost analysis* (such as the one we present here) involves evaluating the cost side of a program but does not include any attempt to attach values to benefits. *Cost-effectiveness analysis* requires comparison of the costs of several alternative programs, including the status quo, for achieving some given benefit, for example, a given reduction in amount of problem behavior. This requires both a cost analysis and analysis of program effects on outcome measures. Office discipline referrals (ODRs), widely used as a valid index of schools' behavioral health (Irvin, Tobin, Sprague, Sugai, & Vincent, 2004), might be one measure for assessing the cost effectiveness of SWPBS; results could be expressed in terms of decreased student and administrator time spent on behavioral incidents and increased student time spent academically engaged (Luiselli, Putnam, Handler, & Feinberg, 2005; Scott & Barret, 2004; Taylor-Greene et al., 1997). *Benefit–cost analysis* involves comparing the costs of a program to its benefits and thus requires not only measurements or estimates of the outcomes or benefits but their conversion into dollars. A benefit–cost analysis of SWPBS would likely require a measure of how improved social behavior translates into greater educational benefits and better long-term economic outcomes in the form of students' greater earning potential and lesser reliance on publicly funded social programs.

Because our focus here is primarily on demonstrating the process and value of cost analysis evaluation, we do not present cost-effectiveness or cost–benefit analyses in our case study. Rather, we return to consideration of these fuller economic analyses in the discussion as possible extensions of our cost analysis case study. A fourth possible economic analysis, *cost–utility analysis,* requires additional data on the stakeholder valuations of program effectiveness or "utility" for the resources expended and outcomes realized by the stakeholders in the program being evaluated. Cost–utility analysis yields a subjective program evaluation and is not considered further in this article because data regarding stakeholder valuations are not available for the SWPBS program.

School-Wide Positive Behavior Support

School-wide positive behavior support focuses on establishing the broad social, culture, and individual behavior supports needed to promote both academic success and prosocial behavior. SWPBS begins with school-wide emphasis on prevention of problem behavior and then adds more intensive individualized supports for those students who have developed and/or continue to display problem behavior, even with school-wide prevention efforts in place. The SWPBS approach is organized around five core imperatives (see www.pbis.org for more details):

1. Invest in preventing the development of problem behavior. Preventing problem behavior is more effective, cost-efficient, and productive than responding after problem behavior patterns have become ingrained. Investing in prevention requires development of a whole-school emphasis on

predictable, positive, consistent expectations. Students have a clear understanding of social expectations, and how those expectations are linked to educational outcomes.

2. Teach appropriate social behavior and skills. Because children come to school with widely differing understandings of what is socially acceptable, school personnel bear an increased obligation to define the core social expectations (e.g., be respectful, be responsible, be safe) that will lead to success. In addition, these expectations need to be taught overtly so students are able both to label the social expectations (e.g., be respectful) and define what that label means for real behavior in school settings (e.g., raise hand in classroom, share equipment on playground). When all students in the school are taught the same social expectations, a social culture is established where students have both personal knowledge about social behaviors expected in the school and the knowledge that everyone else in the school knows those same social expectations.
3. Acknowledge appropriate behavior. Students should receive regular recognition for appropriate behavior at rates that exceed corrections for rule violations and problem behaviors. Negative consequences alone will not change problem behavior. Instead of irregular punishment, or ignoring problem behavior, a continuum of consequences (e.g., correction, warning, and/or office discipline referral) for problem behavior should be maintained and used to prevent escalation and ensure that academic instruction is allowed to continue in class.
4. Gather and use data about student behavior to guide behavior support decisions. Data on the frequency of problem behaviors, where and what time of the day they are occurring, and who is engaging in these problem behaviors enable school personnel to develop the most effective, efficient, and relevant school-wide behavior support interventions.
5. Invest in systems that support effective practices. Tremendous effort has focused on the specific skills that allow teachers and administrators to be more effective. These skills are important, but they will not be effective or durable unless the skills are combined with the administrative systems needed to nurture and support implementation of effective practices. Systems variables include the teams, policies, funding, administrative support, and data structures within a school.

Implementation of these five core SWPBS features is combined with more intensive behavior support practices (e.g., wraparound, person-centered planning, functional behavioral assessment) to meet the needs of students with more extreme support needs. Our focus in this article is on the initial implementation of the SWPBS features. Costs associated with more intense, individualized supports will fit the same cost analysis model, but we have fewer examples of these costs and will address them in future manuscripts.

Implementation of SWPBS during the past 10 years has been initiated (and is occurring with varying levels of fidelity) in more than 4,700 schools across 30 states (Horner & Sugai, 2004; Sugai & Horner, 2006). The typical approach to implementation is for a state leadership team to (a) provide training for a set of local demonstration schools, (b) establish a cadre of local coaches who facilitate and sustain implementation, (c) invest in developing local trainers who assume ongoing training responsibilities once initial demonstrations are established, and (d) facilitate allocation of local evaluation resources that allow ongoing assessment and help guide ongoing improvement in implementation (Center for Positive Behavioral Interventions and Supports, 2004). Efforts to implement SWPBS focus on long-term, large-scale strategies for system change. Schools implementing SWPBS procedures with fidelity report reductions in office discipline referrals of 20% to 60%, improved student and staff morale, and initial indications that improving the social culture of the school is linked to improved academic gains (Bradshaw, 2006; Horner, Sugai, Todd, & Lewis-Palmer, 2005).

Research to date has focused on documenting that schools are capable of adopting the multiple elements of SWPBS and that adoption of these elements is associated with valued change in student outcomes. If SWPBS is to be implemented at a large scale, however, data are needed to support the financial feasibility of the approach. As with any major educational reform, answers to the questions "Can schools implement this approach?" and "Is implementation associated with valued student outcomes?" must be supplemented with an answer to "Can we afford to implement this approach?" In the remainder of this article, we focus on application of cost analysis to SWPBS. First we review standard cost analysis methods and their application to SWPBS, then we present our case study showing application of cost analysis to SWPBS, and finally we

discuss extension of cost analysis to fuller economic analysis, including cost-effectiveness analysis, benefit analysis, and benefit–cost analysis.

Review of Cost Analysis Method

Cost analysis involves evaluation of the costs of a program and does not include measuring or attempting to attach values to benefits (Levin, 1983). A cost analysis can be a useful input to decision-making when comparing alternative programs with similar benefits. If we are confident that a new program meets or surpasses an existing program in terms of benefits (based on prior research, evaluation, and/or program experience), and if the program also has lower costs, then implementing it will be an improvement. In this situation, accurate cost comparisons are sufficient for making the proper decision.

Data Requirements

The data needed for an accurate cost analysis are not trivial. Information is needed on personnel time, facility use, equipment and material needs, and client inputs (such as student, teacher, and administrative time), all of which are essential components in setting up and maintaining any program. Moreover, measuring the costs of personnel and client or student inputs requires information on the costs of time inputs. These costs may be direct (e.g., additional expenditures for wages and fringe benefits required to implement the program) or indirect (opportunity costs reflecting the use of existing resources in an SWPBS program rather than in an existing alternative program). Our case study provides an example of the various sources of SWPBS-related costs in an educational setting and demonstrates the importance of the some times subtle distinction between direct and opportunity costs.

Basic Cost Concepts

The economic definition of costs is significantly different in both concept and application from the more familiar accounting-based measures of cost (i.e., expenditures). The basic difference is the principle of *opportunity cost*. In economic terms, the cost of a good or service is what has to be given up to get it, that is, the alternative opportunity that is sacrificed. If nothing is given up, there is no economic cost (Fisher, Chestnut, & Violette, 1989; Harberger & Jenkins, 2002). Consider a room that is used for a SWPBS program training session. Accountants might measure the cost of building the room and amortize these across time and different uses. Economists just ask what would be given up by using the room for SWPBS training. If the room would otherwise sit unused, the economic cost of that resource is zero.

Teacher, Staff, and Administrator Inputs

Since the major input to SWPBS (and most other) educational programs is administrator, teacher, and staff time, it is important to understand how opportunity cost concepts should be applied here. Fortunately, in general we can make a strong argument that, for personnel, the wage is a good measure of opportunity costs (see Note 1). From a worker's point of view, the wage is the amount of money necessary to compensate for work effort and is set at a level such that those who are qualified will choose a particular job over other possible activities. In this sense, it is also a measure of the value of other opportunities given up when a job is selected or when extra hours are worked at a current job. From the employer's point of view, the wage represents the value placed on what the work effort yields. In this sense, in any shifting from one task to another, for example, status quo to SWPBS activities, the wage is an opportunity cost measure of the dollar value that is given up on the original work assignment.

On the basis of the economic opportunity cost interpretation of the wage, staff time should in general be valued at the amount of the wage. There are two scenarios in particular that may be of interest to schools implementing and maintaining SWPBS and most types of educational programs. The first is when the hours incurred by staff to implement and maintain the program are hours of time above and beyond the normal workweek. In this case, the school (or school district) must necessarily pay additional wages, and it is clear that these wages are the cost of the staff time (see Note 2).

It is more likely that SWPBS (or any other new program) will be implemented by staff members during regular working hours. In this case, the school district will not be paying any additional wages. However, the individual school does incur opportunity costs for staff time because, presumably, the time spent on performing other tasks connected with the education of students decreases. The value of this time to the employer is the wage. Thus, despite the fact that no additional wages are paid to implement the program, the staff time devoted to training and implementation should still be valued by the amount of staff wages paid for regular work hours. Similarly, if substitutes are hired to allow regular staff the time to participate in training, a cost analysis would record this cost in terms of the loss of regular staff time. The general rule for the application of the opportunity cost principle to labor

costs, therefore, is simple: Use the cost of wages and benefits. Exceptions to the rule are rare. Economic program evaluation therefore requires data on the amount of administrator, teacher, and other staff time needed to implement a program and the wages and benefits paid to administrators, teachers, substitute teachers, and other staff.

Facility Use Costs

The rationale for facility use costs follows the same general argument as previously, with one caveat. The main facility use related to SWPBS or other educational programs is an occasional meeting space for training. So long as this meeting space would be otherwise unused at the necessary time, there is no opportunity cost to using it beyond heat, air conditioning, and lights. On the other hand, some programs require dedicated space (e.g., space for one-to-one tutoring and/or behavioral intervention programming). The concept of opportunity cost again provides a simple guide: If this dedicated space has an alternative use that must be sacrificed, the dollar value of that sacrifice should be estimated. If new space will be required, construction or rental costs are an appropriate measure of opportunity cost.

The general rule for facility use costs is that they are zero unless new construction or rental of dedicated space is required. Economic cost analysis can safely ignore space requirements unless the program requires dedicated space that must be diverted from some other use, in which case rental costs are a useful approximation for costs. Data collection should note whether surplus space is used or space is used at a time that does not conflict with another use.

Equipment and Materials

These will typically be purchased inputs, and the appropriate measure of costs should be purchase price. Some equipment and materials, for example, computer programs used to enter behavioral data, might already be part of existing inventory, but their use might be reassigned to a new program replacing an existing program. In this case, the associated costs should be calculated as part of the new program's total costs, not as net costs (see distinction between total and net costs below).

Fixed Versus Marginal Costs

After opportunity costs, perhaps the most significant cost principle in economics is the distinction between fixed and marginal costs. Most programs involve some fixed costs that must be paid to implement the program but do not vary significantly with the size of the program. Costs that do vary with the size or the extent of implementation of the program are known as variable or marginal costs. For example, a program might require installing and maintaining a computer database that is capable of organizing and storing data on an essentially unlimited number of students; this cost is a fixed cost. Student data are entered for every student in each school implementing the program; the cost of data entry is a marginal (or variable) cost.

Programs that involve relatively high fixed and low marginal costs are said to exhibit "economies of scale." This means that while initial fixed costs may be high, the programs can be expanded at relatively low marginal cost.

The distinction between fixed and marginal costs is particularly important in cost analysis because it accounts for sensitivity of cost estimates to the scale of implementation. Implementing a program district wide may mean considerably lower per student costs than implementing it at only one school. Data collection should carefully distinguish between fixed and variable costs. This distinction is particularly important with pilot programs.

Present Versus Future Costs

In the discussion so far, we have ignored the timing of costs. However this simplification cannot always be justified. In principle, costs in the future should be given less weight than costs now. The simplest explanation for this is that there are always opportunities to invest money and earn interest. One way to pay a future cost is to put money away now, and when the bill comes due, pay it with the accumulated interest and the principal. The farther out in the future the cost is to be incurred, the larger the interest earnings will be, and therefore the less principal we will have to use. In this sense costs that are farther in the future impose less of a current burden. Obviously, higher interest rates will also reduce the current burden of future costs.

Cost analyses generally account for the timing of costs by discounting them all back to current values. These calculations can be complex, and for costs that come far in the future, the overall results of the analysis can be extremely sensitive to the choice of the interest rate used in the calculations. These complexities can be avoided for cost analyses of many educational programs by evaluating programs on a year-by-year basis instead of trying to predict costs over a longer time frame and then discounting these costs back to current values. This year-by-year analysis will be a reasonable approximation so long as there are not significant variations in costs from year to year.

However, if a program involves substantial startup costs in year one, followed by many years of lower costs, it would not be accurate (Clemen, 1996).

Data collected should distinguish between one-time and recurring costs and should include information on the timing as well as the amount of costs.

Total Versus Net Costs

In education, program design aims at development of new and better ways to accomplish existing objectives. In this sense, at least implicitly, new programs are being evaluated economically as substitutes for current programs. One implication for such economic evaluation is that we need to be careful to distinguish the total costs of a program from the net costs. While the total costs include all program-related expenses, the net costs include only those expenses above and beyond the operating costs of the status quo. The total–net distinction has important implications for economic interpretation. Many new programs are explicitly designed to tackle old problems in a more efficient, lower cost way. If effective, the net costs of such a program could easily be higher than the status quo, while the total costs are lower. In our cost analysis case study of SWPBS, we demonstrate this distinction regarding higher net costs and lower total costs.

Because in many cases, new programs are designed to replace old programs, economic analysis should carefully distinguish between the net and total costs. In the program design phase, evaluators should plan to collect data on which current programs are being used, and their costs, especially when the new program is intended to replace an existing program or programs.

Sensitivity Analysis

The results of any evaluation study are sensitive to the assumptions upon which it is based. Good practice involves identifying assumptions that are most likely to be imprecise and thus most likely to have potentially large effects on interpretations and related conclusions and then documenting how the conclusions vary with changes in the assumptions. For example, the largest component of most educational program costs will typically be staff time, which, as we noted above, should generally be valued at the wage. If we are not certain that a new program can be implemented without requiring overtime pay, then it would be appropriate to include a table showing estimated costs under both scenarios. When there is uncertainty about significant costs, information about the uncertainty should be collected so that analysis can report whether the results are robust for possible different costs.

Case Study

In this section, we apply the cost concepts just discussed to provide a comprehensive picture of the costs of implementing and maintaining an SWPBS program in an individual school and in a cluster of schools within a school district. The school district serving as our example has 27,000 students in a city of 140,000 people in the northwestern United States. We have verified the cost model developed in the case study with school districts in three additional states, and while the specific dollar costs vary, the overall model has proven functional. This is in large part because the types of activities carried out in an SWPBS program will not vary much across school districts, although the costs of these activities will vary depending on prices and wages prevailing in the school district's local area.

After detailing the various activities involved with the SWPBS program and their associated costs, we then outline how per-school costs in a district are affected by the number of schools within a school district that are implementing SWPBS.

SWPBS Program Components

Implementation and maintenance of an SWPBS program require four main types of activities, each with associated costs:

1. initial development of a leadership team for coordination and external relations;
2. initial training of the coaches and trainer;
3. initial training of the SWPBS team that will be the main leadership in the field, guiding implementation with the teaching staff and maintaining the program over time; and
4. activities to maintain the SWPBS program, including day-to-day implementation, ongoing training, data collection, and money for student incentives.

Within each of the four sets of SWPBS activities, two major types of costs are incurred: costs of physical materials used for training, promotion, etc., and costs associated with time spent by participants. While accounting for the costs of the first type is relatively straightforward, assessing the costs of people's time involves careful consideration and the application of some economic principles.

Valuing Staff Time

Two scenarios may be of interest to schools implementing and maintaining an SWPBS program. The first

scenario is when the hours incurred by staff to implement and maintain the program are hours of time above and beyond staff members' normal workweek. In this case, the school (or school district) must necessarily pay out additional wages, and it is clear that these wages are the cost of the staff time.

It is more likely that the SWPBS program will be implemented by staff members during regular working hours. In this case, the school district will not be paying any additional wages in its implementation and maintenance of the SWPBS program. However, this does not mean that the program does not incur costs for staff time. We assume that the time spent on SWPBS activities diverts the staff from performing other non-SWPBS tasks connected with education of students.

As we discussed in a previous section, the value of this time is the wage. Thus, despite the fact that no additional wages are paid to implement SWPBS, the staff time devoted to the program during regular working hours should be valued as opportunity costs in the amount of staff wages. The costs associated with training staff (and/or hiring substitutes) are calculated as an opportunity cost against the time typically associated with teachers' duties.

The difference in the two scenarios just described—implementing SWPBS with additional staff or staff time versus using regular staff hours—is not trivial. The latter scenario assumes that there must be some substitution of activities taking place when SWPBS is being implemented. If this is the case, it may be more relevant to examine the net costs of SWPBS, that is, the costs of the program minus the costs of the activities it is replacing. In a net cost calculation, equal amounts of labor cost cancel out, assuming the same wage for either activity. It is also possible that costs of materials for supporting the substitute programs would be equivalent as well and cancel out in a net cost calculation. For now, we will examine total costs of implementing and maintaining the SWPBS program before turning to net cost comparisons.

Total Cost of SWPBS Implementation

As noted in the previous section, there are four main components of the SWPBS program. The first three components include the initial training of the leadership team, the coaches and trainers, and the SWPBS team responsible for implementation at the school level. The final component is implementation at the school level. All four of these components primarily involve one-time fixed costs of implementation, though some involve ongoing training and maintenance activities that will lead to costs in subsequent years. Below we separately detail the costs of ongoing training and maintenance.

Table 1 provides a summary of the costs for each of these components. For each component, we specify whether the costs would be incurred at the level of the school district (or perhaps even the state) versus the level of the individual school. The first column of total costs provides numbers for implementation of the SWPBS program in just one school. The next two columns of total costs provide numbers for SWPBS implementation in a school district of 10 schools and a school district of 25 schools, respectively. For the initial discussion detailing costs we assume a one-school scenario, but in the final subsection, we discuss how the costs per school change as more schools within a district implement SWPBS.

Leadership Team

The leadership team is responsible for coordination of the entire organization of the SWPBS program (Center for Positive Behavioral Interventions and Supports, 2004). For our case study, this means coordination across a district of multiple schools, though these activities could occur at the state level across a number of school districts. The leadership team is also responsible for overseeing external evaluation of the program's effectiveness and promoting visibility of the program through newsletters, annual reports, and so forth. Our cost calculations assume a leadership team of 12 individuals, following recommendations that action groups remain small (e.g., between 7 and 15 individuals; Gilbert, 1978).

The first row in Table 1 (under Leadership Team) contains our estimates of the total costs of these activities. For purposes of our case study, we estimate that four annual 1-day meetings of the group of 12 will involve 48 staff days, with associated total labor costs of $300 per staff day, for a total of $14,400. Costs for renting a facility for the meetings will total $1,200, and transportation of the team to the location will cost $2,000. Coordination of the SWPBS program by the leadership team will involve an administrator at half time (i.e., 50% full-time equivalent), for which we project a cost of $54,000 in annual wages and benefits. The cost of an external evaluator to work with the leadership team to evaluate program implementation and effectiveness, both formatively and summatively, will be $10,000. Finally, visibility and marketing activities are estimated to cost $3,000. The total costs for this component are $84,600.

Coaches and Trainers

Implementation of the SWPBS program requires building an infrastructure of trained individuals who will serve as coaches and trainers for the SWPBS teams in

Table 1
Total Costs of PBS Implementation and Other First-Year Costs

Activity	Type	Items	Labor Costs	Nonlabor Costs	Total Costs (Labor + Nonlabor) 1 School	10 Schools	25 Schools
		Leadership Team					
Meetings	District	(a) 4 days for 12 staff @ $300 per staff day	$14,400	—	$14,400	$14,400	$14,400
		(b) Facility costs + transport	—	$3,200	$3,200	$3,200	$3,200
Coordination	District	(a) 0.50 FTE of administrator time	$54,000	—	$54,000	$54,000	$54,000
Evaluation	District	(a) Contract with external evaluator	—	$10,000	$10,000	$10,000	$10,000
Visibility/Marketing	District	(a) Newsletters, annual report, etc.	—	$3,000	$3,000	$3,000	$3,000
		Coaches/Trainers Team					
Recruitment/Orientation	District	(a) 1-day event for 15 staff @ $300 per staff day	$4,500	—	$4,500	$4,500	$4,500
		(b) Facility costs	—	$300	$300	$300	$300
Coach training	District	(a) 2.5 days for 10 staff @ $300 per staff day	$7,500	—	$7,500	$7,500	$7,500
		(b) Facility costs	—	$750	$750	$750	$750
Trainer training	District	(a) 2 days for 5 staff @ $300 per staff day	$3,000	—	$3,000	$3,000	$3,000
		(b) Facility costs	—	$600	$600	$600	$600
SWIS training	School	(a) 3 days for 1 staff @ $300 per staff day	$900	—	$900	$9,000	$22,500
		(b) Travel, lodging for staff	—	$500	$500	$5,000	$12,500
	District	(c) External trainer fees	—	$250	$250	$500	$1,250
		PBS Team Training					
Recruitment	District	(a) Conference and solicit sites		$3,500	$3,500	$3,500	$3,500
Team training	School	(a) 6 days for 5 staff @ $300 per staff day	$9,000		$9,000	$90,000	$225,000
	District	(b) Facility costs, materials	—	$3,000	$3,000	$3,000	$3,000
		(c) External trainer fees and travel	—	$9,600	$9,600	$9,600	$9,600
		School Implementation					
Faculty implementation	School	(a) PBS team staff time for biweekly planning	$5,000	—	$5,000	$50,000	$125,000
		(b) 2.5 days for 25 faculty @ $300 per staff day	$18,750	—	$18,750	$187,500	$468,750
SWIS	School	(a) Staff time for data entry for first year	$3,800	—	$3,800	$38,000	$95,000
Student incentives	School	(a) Monies for prizes and awards	—	$1,500	$1,500	$15,000	$37,500
Ongoing training	School	(a) 2 days of 25 faculty @ $300 per staff day	$15,000	—	$15,000	$150,000	$375,000
		Total costs:			$172,050	$662,350	$1,479,850
		Total costs per school:			$172,050	$66,235	$59,194

Note: PBS = positive behavior support; SWIS = School Wide Information System.

each school. Having a cadre of such individuals is essential for implementation and ongoing maintenance of the SWPBS program. An additional important feature is the implementation of a database to track problem behavior in the participating schools. For our case study, we presume this to be the School Wide Information System (SWIS), an online software system through which schools record and track disruptive behavior and resulting administrative outcomes, such as office discipline referrals, suspensions, and expulsions. The annual cost to license SWIS is $250 per school per year, with travel ($500), personnel costs ($900), and workshop ($250) costs for training a SWIS

facilitator to prepare, set up, and support personnel using SWIS in 5 to 10 schools.

The second set of numbers in Table 1 document projected costs associated with creating an infrastructure of trainers and coaches, as well as the costs of training SWIS facilitators. The investment in training district coaches, local trainers, and SWIS facilitators is part of the emphasis on the systems variables needed for sustained implementation. The assumption is that while initial implementation of SWPBS will be the highest cost, some level of ongoing training and support to schools will be required from the district due to natural staff and administration turnover. Recruitment and orientation of 15 individuals to serve as coaches or trainers is included in the SWPBS approach to facilitate high-quality implementation of the practices within schools and the development of local district capacity to continue training and dissemination of the practices beyond the initial development efforts. Costs for coaches and trainers include their labor time during the orientation event (estimated at $4,500) and facility costs ($300). From this set of individuals, 10 (1 for each school) will become coaches. These coaches require further training in the form of three half-day sessions and one full-day session, with associated labor ($7,500) and facility costs ($750). Five trainers likewise will require specialized training with a 2-day event that is projected to cost $3,000 in labor time and $600 in facility costs. Finally, training of one individual in the SWIS software in Eugene, Oregon, is projected to incur labor costs of $900, as well as conference fees, travel, lodging, and per-diem expenses adding up to $750. The total costs for this infrastructure component are $18,300.

School-Level PBS Team: Recruitment and Training

In-school team leaders are important for the ongoing success of the SWPBS program. Recruitment and training of these teams is done at the individual school level, with training led by experienced trainers. We assume that each school's PBS team comprises at least five individuals, so we project a total of at least 50 team members who must be trained across the 10 schools.

The third set of numbers in Table 1 documents the costs of recruiting and training the school-level SWPBS teams. Materials and staff time for recruitment, including a 1-day summer conference, are projected to cost $3,500. After recruitment, SWPBS team training consists of three 2-day training events. Total costs of the 5 team members' labor time over the 6 days at $300 per staff day is $9,000. Training material and facility costs are estimated at $3,000. Finally, the cost of the external trainer for these sessions, including travel and lodging, is $9,600. The total costs for this component are $25,100.

School-Level PBS: Implementation

The final step of SWPBS implementation includes the training of all faculty members at the participating schools and other SWPBS team implementation activities. For our example here, we assume that a school has 20 faculty members in addition to the SWPBS team, for a total of 25 faculty members.

The fourth and final set of numbers in Table 1 documents the costs of SWPBS implementation at the school level. Costs for biweekly meetings of the SWPBS team during the first year of implementation are projected at $5,000 for labor time. Implementation training of the faculty, including a 1-day planning event to kick off implementation and 1.5 days of further SWPBS implementation training, will cost an additional $18,750. The final few costs are related to ongoing training and maintenance in the first year of implementation. These include staff time to record discipline problems with SWIS, as well as the SWIS $250 annual fee ($3,800), money for student incentives encouraging appropriate behavior ($1,500), and projected ongoing training costs of $15,000 to cover the cost of training new personnel. In summary, the total costs for this school-level recruitment and training component are $44,050.

Total Costs per School

By adding up all the costs in Table 1, we calculate a total cost of initial implementation of the SWPBS program in one school as $172,050. This is clearly a substantial cost for any one school. However, many of these costs are fixed costs, in the sense that additional schools could be served without additional costs. For example, most of the costs of developing a leadership team and of developing coaches and trainers can be spread out over a school district comprising multiple schools. Thus, the costs of these activities will not change as the number of schools increases (at least, for a modest increase in the number of schools). Spreading these fixed costs across multiple schools reduces the costs per school substantially. This is a classic example of economies of scale—average costs decline as the number of participating schools increases.

The second column of total costs in Table 1 illustrates economies of scale for our particular case by outlining costs of SWPBS implementation for a school district comprising 10 schools. To estimate the costs of SWPBS implementation for 10 schools, we assume that district-level costs of implementation will not change, whereas school-level costs must be multiplied by 10. For example, this assumes that the number of staff involved in leadership, coach, and trainer training at the district level remains unchanged, as do associated facility and material costs.

On the other hand, training of the school-level SWPBS teams and faculty must be replicated across the 10 schools, thus incurring 10 times the single-school costs for these activities. Thus, in the column of total costs for 10 schools, the total cost rises to $662,350. Nevertheless, because the district level costs do not change and are being spread out over 10 schools rather than 1 school, the per school total costs drop substantially to $66,235.

A school district of 10 schools is still fairly small. In the final column of total costs in Table 1, we estimate total costs for a school district comprising 25 schools. For this increase in number of schools, it is no longer feasible to assume that many of the district costs would stay constant. For example, the number of coaches and trainers will likely have to increase, though probably not by as large a percentage as the increase in the number of schools. On the other hand, some district costs may not change at all. For example, the costs to put together an annual report or facility costs are unlikely to change much, and we assume no change for the sake of simplicity in our example.

With these appropriate adjustments in mind, we estimate that the total cost of SWPBS implementation for a school district of 25 schools will be $1,479,850. This is a per school cost of $59,194. This per school total is slightly lower than the per school average with ten schools of $66,235, suggesting that school districts can continue to realize economies of scale by spreading out SWPBS implementation across more schools. However, the drop in per school costs from 10 to 25 schools is much less than in from 1 school to 10 schools. This means that SWPBS implementation for 10 schools is already reasonably effective in lowering per-school costs.

Net Cost Calculations

To this point, our cost calculations have assumed that SWPBS is being added to a school district's existing programs. Thus, the labor time requirement is assumed to be fulfilled by asking existing staff to work additional hours or by hiring additional staff. In reality, most schools are likely to substitute existing staff time (at least to some extent) from other activities to implement SWPBS and maintain it over time. This means that labor time will be saved from other activities and its use is not an additional cost to the school or district. In other words, diverting labor time from one activity to another with no increase in total staff hours worked results in a net labor cost of zero. A similar argument can be made for materials and facilities used. If identical materials and facilities used for the SWPBS program would have been used to promote and maintain other activities, then these incur zero net costs as well. Thus, if substitution is complete from other activities to the SWPBS program (with no additional staff time or materials used) then net costs of the SWPBS program are zero. A major theme in SWPBS implementation is this reallocation of existing resources rather than the addition of new resources. We recognize, however, that (a) this reallocation will require termination of some existing activities and that loss of these activities may incur an opportunity cost and (b) many existing efforts might be reduced but not completely eliminated, generating some savings but possibly not zero effects.

Zero net costs due to complete substitution may be realistic once the SWPBS program is past the first year and into its maintenance phase. However, implementation of the SWPBS program (or any new program) requires initial set-up costs that an ongoing program would not be incurring. Most of these are concerned with training costs.

In Table 2, we detail the net costs that we estimate would be incurred during the implementation phase of the first year. Certainly, training of a leadership team would incur costs additional to any existing program.

We have assumed that there would be a net increase of 2 days of training with SWPBS implementation. We have also assumed that the administrator simply substitutes his or her time spent with other programs to coordinate the SWPBS program. This means zero additional net costs for the administrator's time. Likewise, marketing and visibility efforts switch between programs for net costs of zero. For the next two sets of costs (coach and trainer training and SWPBS team training), we have assumed that most are new costs that current programs are not incurring. The final set of costs involves some SWPBS implementation with faculty but are mainly costs associated with activities that would involve maintenance and ongoing training done by local coaches and district trainers.

In the final analysis, the net costs of SWPBS implementation are much smaller than the total costs described above. The per-school costs for 1-, 10- and 25-school districts are $65,500, $20,705, and $17,732, respectively. If we assume that maintenance and ongoing training costs for SWPBS are no different from the activities or programs for which it is a substitute, then these represent the entire net costs for SWPBS in all years of the program. In a sense, schools only have to incur these one-time transition costs to switch to the SWPBS program. Table 3 summarizes the differences between total costs and net costs.

Discussion

Our demonstration of how to measure and evaluate SWPBS implementation costs accurately should prove

Table 2
Net Costs of PBS Implementation and Other First-Year Costs

Activity	Type	Items	Labor Costs	Nonlabor Costs	Total Net Costs (Labor + Nonlabor) 1 School	10 Schools	25 Schools
		Leadership Team					
Meetings	District	(a) 2 days for 12 staff @ $300 per staff day	$7,200	—	$7,200	$7,200	$7,200
		(b) Facility costs + transport	—	$1,600	$1,600	$1,600	$1,600
Coordination	District	(a) 0.50 FTE of administrator time	$0	—	$0	$0	$0
Evaluation	District	(a) Contract with external evaluator	—	$10,000	$10,000	$10,000	$10,000
Visibility/Marketing	District	(a) Newsletters, annual report, etc.	—	$0	$0	$0	$0
		Coaches/Trainers Team					
Recruitment/Orientation	District	(a) 1-day event for 15 staff @ $300 per staff day	$4,500	—	$4,500	$4,500	$4,500
		(b) Facility costs	—	$300	$300	$300	$300
Coach training	District	(a) 2.5 days for 10 staff @ $300 per staff day	$7,500	—	$7,500	$7,500	$7,500
		(b) Facility costs	—	$750	$750	$750	$750
Trainer training	District	(a) 2 days for 5 staff @ $300 per staff day	$3,000	—	$3,000	$3,000	$3,000
		(b) Facility costs	—	$600	$600	$600	$600
SWIS training	School	(a) 3 days for 1 staff @ $300 per staff day	$900	—	$900	$9,000	$22,500
		(b) Travel, lodging for staff	—	$500	$500	$5,000	$12,500
	District	(c) External trainer fees	—	$250	$250	$500	$1,250
		PBS Team Training					
Recruitment	District	(a) Conference and solicit sites	—	$3,500	$3,500	$3,500	$3,500
Team training	School	(a) 2 days for 5 staff @ $300 per staff day	$3,000	—	$3,000	$30,000	$75,000
	District	(b) Facility costs, materials	—	$1,000	$1,000	$1,000	$1,000
		(c) External trainer fees and travel	—	$9,600	$9,600	$9,600	$9,600
		School Implementation					
Faculty implementation	School	(a) PBS team staff time for biweekly planning	$0	—	$0	$0	$0
		(b) 1 day for 25 faculty @ $300 per staff day	$7,500	—	$7,500	$75,000	$187,500
SWIS	School	(a) Staff time for data entry for first year	$3,800	—	$3,800	$38,000	$95,000
Student incentives	School	(a) Monies for prizes and awards	—	$0	$0	$0	$0
Ongoing training	School	(a) 2 days of 25 faculty @ $300 per staff day	$0	—	$0	$0	$0
		Total net costs:			$65,500	$207,050	$443,300
		Total net costs per school:			$65,500	$20,705	$17,732

Note: PBS = positive behavior support; SWIS = School Wide Information System.

especially useful to educators in schools that have SWPBS or other programs in place for dealing with student problem behavior. Documenting that a new program such as SWPBS has cost savings over the status quo could mean that a change from the status quo to SWPBS will be a net benefit (assuming they both accomplish the same goals or that SWPBS does better than the status quo). From a broader program evaluation point of view, our cost analysis case study should be a useful template for evaluation of costs for many educational programs because the

Table 3
Differences Between Total and Net Costs

Activity	Type	Items	Total Costs	Net Costs	Cost Differences		
					1 School	10 Schools	25 Schools
		Leadership Team					
Meetings	District	(a) Staff meeting time	$14,400	$7,200	$7,200	$7,200	$7,200
		(b) Facility costs + transport	$3,200	$1,600	$1,600	$1,600	$1,600
Coordination	District	(a) FTE of administrator time	$54,000	$0	$54,000	$54,000	$54,000
Evaluation	District	(a) Contract with external evaluator	$10,000	$10,000	$0	$0	$0
Visibility/Marketing	District	(a) Newsletters, annual report, etc.	$3,000	$0	$3,000	$3,000	$3,000
		Coaches/Trainers Team					
Recruitment/Orientation	District	(a) 1-day event for 15 staff @ $300 per staff day	$4,500	$4,500	$0	$0	$0
		(b) Facility costs	$300	$300	$0	$0	$0
Coach training	District	(a) 2.5 days for 10 staff @ $300 per staff day	$7,500	$7,500	$0	$0	$0
		(b) Facility costs	$750	$750	$0	$0	$0
Trainer training	District	(a) 2 days for 5 staff @ $300 per staff day	$3000	$3000	$0	$0	$0
		(b) Facility costs	$600	$600	$0	$0	$0
SWIS training	School	(a) 3 days for 1 staff @ $300 per staff day	$900	$900	$0	$0	$0
		(b) Travel, lodging for staff	$500	$500	$0	$0	$0
	District	(c) External trainer fees	$250	$250	$0	$0	$0
		PBS Team Training					
Recruitment	District	(a) Conference and solicit sites	$3,500	$3,500	$0	$0	$0
Team training	School	(a) staff training time	$9,000	$3,000	$6,000	$60,000	$150,000
	District	(b) Facility costs, materials	$3,000	$1,000	$2,000	$2,000	$2,000
		(c) External trainer fees and travel	$9,600	$9,600	$0	$0	$0
		School Implementation					
Faculty implementation	School	(a) PBS team staff time for biweekly planning	$5,000	$0	$5,000	$50,000	$125,000
		(b) Time for 25 faculty @ $300 per staff day	$18,750	$7,500	$11,250	$112,500	$281,250
SWIS	School	(a) Staff time for data entry for first year	$3,800	$3,800	$0	$0	$0
Student incentives	School	(a) Monies for prizes and awards	$1,500	$0	$1,500	$15,000	$37,500
Ongoing training	School	(a) 2 days of 25 faculty @ $300 per staff day	$15,000	$0	$15,000	$150,000	$375,000
		Total savings:			$106,550	$455,300	$1,036,550
		Total savings per school:			$106,550	$45,530	$41,462

Note: PBS = positive behavior support; SWIS = School Wide Information System.

SWPBS program is, like many other educational programs, operationally defined in terms of both implementation processes and desired outcomes.

Three particular elements of our SWPBS cost analysis are common to evaluation of many educational programs. First, many of the costs are denominated in nonmonetary units. For example, we have measures of the time educators spend in SWPBS training and implementation, and these time measures need to be converted into dollars. Second, as with many programs, the costs of implementing SWPBS are spread out over multiple administrative units. For example, school districts are typically responsible for some staff training costs, while individual schools often bear implementation costs. In this article, we have shown how to account for costs for the school, district, and state stakeholders within a cost analysis evaluation. A third

aspect of our case study that is common to evaluation of other educational programs is that it demonstrates economic program evaluation in a situation where alternative programs with similar goals are competing for the same (often scarce) resources. For example, the alternative use of teacher time that is devoted to training in an SWPBS program would likely be training for some alternative program or activity. This is true for most new educational programs—the alternative use of staff time is a different program or activity, not the absence of any program.

Economic program evaluation involves selection of one or more possible methodologies to evaluate a specific educational program: cost analysis, cost-effectiveness analysis, and benefit–cost analysis (White et al., 2004). As we described briefly earlier in this article, these different methods of economic evaluation have different purposes, have different data requirements, and require progressively more stringent assumptions and more complex technical methods. We believe, however, that it is often possible to make economically sound decisions on the basis of a cost analysis alone.

Some policy and program decisions require economic valuations of program effects and/or benefits in relation to program costs. When a given outcome is desired or has been predetermined to be optimal, cost-effectiveness analysis is useful. For example, suppose that a 25% reduction in problem behavior in schools has been established as a benchmark. The economic evaluation question then becomes, "Which of two or more different programs will achieve this result at least cost?" The cost-effectiveness analysis required to address this question will involve cost data for each program under consideration, along with data on problem behavior reduction outcomes for the alternative programs. These cost and outcome measures will then be analyzed for each alternative program to determine which program achieves the benchmark outcome at the least cost. Using our SWPBS program and a hypothetical alternative program as an example, the logic of cost-effectiveness analysis is as follows. Direct and indirect program costs are incurred by implementing either an SWPBS or another program to achieve the objective of reducing the number of office discipline referrals (ODRs) in a school building. In addition to cost data for both programs, cost-effectiveness analysis requires data on changes in the number of ODRs associated with each program to permit a calculation of the total cost per unit of reduced ODRs.

Benefit–cost analysis (BCA) involves comparing the costs of a program to its economic benefits, requiring not only measurements of costs and outcomes or benefits of a program but also a method for converting those benefits into dollars. Typically, a BCA is done for one program at a time, with the comparison program being the status quo. This approach is appropriate when a new program creates substantial new benefits as well as costs. The policy question is whether these new benefits are worth the new costs. As we noted just above, cost-effectiveness analysis in our example requires cost data and data on changes in the number of ODRs that, in turn, permits a calculation of the total cost per unit of reduced ODRs. A benefit–cost analysis of an SWPBS program extends the cost-effectiveness analysis by assigning a monetary value to each ODR, which permits an evaluation of whether the benefits of reducing ODRs exceed the cost of doing so.

The additional data and analytical requirements for the benefit side of a BCA can be large (Levin & McEwan, 2001; Scriven, 1974). The assumptions required for attaching dollar values to benefits are often especially difficult for policymakers and citizens to accept (e.g., valuing the dollar benefit of reduced problem behavior, drug use, or juvenile delinquency). The required economic analysis procedures and results can be complex and often seem arcane to noneconomists. Given these difficulties, there generally is a preference for avoiding BCA, especially if the policy question can be reframed as one that can be addressed by a straightforward cost analysis or a cost-effectiveness analysis of two or more programs. Cost, cost-effectiveness, and/or benefit–cost calculations made in comparison to a pre-existing baseline program permit an assessment of the relative economic value of a SWPBS program in comparison to competing uses of resources.

When a full BCA is planned, information on the timing of benefits will need to be collected. The further in the future that a given benefit comes, the less it is worth to us today. Just as we described earlier for cost data in cost analyses, benefit–cost analyses generally account for the timing of benefits by discounting them back to current values. Since discounting applies to benefits as well as to costs, a benefit–cost analysis that compares current costs to future benefits requires discounting of the future value of benefits so as to make them economically comparable to the current costs. These calculations can be complex, and for benefits that come far in the future, the overall results of the analysis can be extremely sensitive to the assumptions used in the calculations (Steiger & Fouladi, 1992). As we described for cost analysis, these complexities can be avoided by evaluating programs on a year-by-year basis. Many benefits of SWPBS programs are, however, longer term, for example, suspension and expulsion rates, overall school safety, student academic achievement, and so forth, and some degree of complexity is unavoidable in calculating their value.

Applying benefit estimation to educational programs requires several considerations. First, measures of changes in outcomes are needed. The most reliable method to

obtain these is with a control–treatment procedure. An alternative is to collect data on outcomes before and after implementation of a new program. Second, economic measures of the benefits of these outcome improvements are needed. We believe that educational program design should incorporate measures of outcomes that are likely to be associated with significant economic benefits. Examples of such benefits include lower discipline problems, higher standardized test scores, and increased graduation rates. Just as for costs, when there is uncertainty about significant benefits, information about the uncertainty should be collected so that analysis can report whether the results are robust for reasonable different benefits.

Notes

1. For simplification of terminology in this discussion, we use the term *wage* to represent not only hourly wages or salary but also nonwage compensation, such as health and retirement benefits.

2. If labor rules require additional compensation, say, time-and-a-half, for these overtime hours, then these higher wages are the measure of the true opportunity costs. So long as benefits do not increase with overtime, however, these should not be counted.

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