

The Impact of Positive Behavior Intervention Support (PBIS) on School Climate and Academic Performance: A Critical Literature Review of Evaluation Methods for PBIS Success

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Abstract: Positive Behavior Intervention Support (PBIS) programmes are a tiered framework that provides a continuum of support to meet the behavioral and academic needs of students.

Studies indicate that PBIS effectively promotes positive student outcomes and improves school climate. However, almost all empirical studies on the effect of PBIS do not use the adequate statistical methods that can give a robust estimate of the effect of PBIS. We conducted a literature review to summarize the current literature. In this paper, we present evaluation methods that can be used in future research initiatives in this field of study.

Keyword: Difference-in-Difference, School climate, School performance, , PBIS, Support and positive behavior.

Introduction

The management of student behavior is a concern of several educational systems around the world. The problem behavior can affect school learning as well as teachers, students, and instructional time. Many programs and approaches are available to improve student behavior in schools, including the Positive Behavioral Interventions and Supports (PBIS) teaching approach.

The history of the PBIS approach begins in the late 1980s, when American society experienced a sharp increase in violence and crime. This phenomenon has spread in schools and has therefore affected the behavior and performance of students. In response to this problem, researchers at the University of Oregon¹ are starting a series of studies and experiments to find solutions to improve the school climate. This research indicated that more attention should be directed to prevention, research-based practices, data-based decision-making, and explicit teaching of social skills.

The 1990s saw the emergence of PBIS-type interventions and in 1997 the US government decided to grant a grant to found a national center for positive behavior support. In the same year, the PBIS center was authorized to provide technical assistance to schools for the improvement of the school climate and support for students with behavioral problems. Today, 17 years after its inception, the National PBIS Technical Assistance Center has helped implement the program in more than 18,000 schools in the United States. Since the early 2000s, it has also been implemented in Canada and has begun to spread all over the world in recent years. Such programs have been implemented in Japan, Turkey, Finland, the Netherlands, Norway, Hungary, Portugal and Australia. PBIS can be defined as a systematic approach that aims to implement a continuum of instructional interventions to improve student academic achievement and social behavior (Sugai et al, 2000). Positive behavior support is an approach that begins with a school-wide prevention effort and then adds intensive individualized support for students with the most extreme needs. PBIS has four basic strategies:

- Focus on preventing the development and onset of problem behaviors, which is more effective, cost effective and productive than responding after problem behaviors have become deeply ingrained.
- Teach appropriate behavior and social skills. Because children come to school from different backgrounds, schools should define basic social expectations (eg, be respectful, be responsible, be safe), and openly teach the behaviors and skills associated with those expectations. . When all students in the school are taught the same social skills, a social culture is established where students not only have personal knowledge of social expectations, but they know that everyone in the school experiences those same social expectations. .

¹ Biglan, 1995; Colvin, Kame'enui, & Sugai, 1993; Horner, Sugai, & Anderson, 2010; Lewis & Sugai, 1999; Mayer, 1995; Sugai & Horner 2002

- Recognition of Appropriate Behavior: Students should receive regular recognition for appropriate behavior at rates that exceed blame rates for rule violations and problematic behaviors. Negative consequences alone will not change problem behaviors. Rather than ignoring behavioral issues, a continuum of consequences (e.g. correction, warning, referral disciplinary desk) for behavioral issues should be maintained and used to prevent escalation and enable recovery. instruction to be continued in class.
- Collect and use student behavior data to guide behavior support decisions. Data on this problem behaviors are observed how often, where and at what time of day they occur, and who is engaging in these problem behaviors, will allow schools to develop a more effective, efficient behavior support plan relevant throughout the school.

Over the past ten years, we have witnessed the emergence of several empirical studies that address the question of the PBIS effect and its magnitude. These studies have shown that PBIS has a positive effect on students' social skills and academic performance. Nevertheless, if we consider PBIS as a practice based on empirical evidence, few studies have examined this impact in a rigorous way. The purpose of this document is, therefore, to provide a new methodology for evaluating the impact of the PBIS program. A method that can be useful for specialists in the field of education.

Our work is organized in two parts. In the first part, we will expose the literature review of the studies which are interested in the study of the impact of the PBIS, and in the second part, we will be interested in the explanation of two methods of evaluation which will make it possible to better measure the effect.

1. The PBIS: a literature review

Recent research indicates that positive whole-school behavior is associated with a decrease in exclusionary, reactive, and punitive practices (Horner, Sugai, Todd, & Lewis-Palmer, 2005; Luiselli, Putnam, & Sunderland, 2002), increased student satisfaction (Todd, Lewis-Palmer, Horner, Sugai, Eber, & Phillips, 2002), and improved perceptions of school safety (Schneider, Walker, & Sprague, 2000). Our objective through this literature review is to examine, first, the relationship between the support of positive behavior and the social skills of students. And secondly, to look for the relationship that exists between the support of positive behavior and the improvement of school performance.

1.1. Positive behavior intervention support and student social skills

The vast majority of empirical studies show that PBIS has a positive effect on student behavior. Over 90%² of schools that have implemented PBIS have reduced behavior problems. We will try, in the rest of this text, to present in detail the studies that have examined the relationship between PBIS and behavior. Bradshaw, Mitchell and Leaf (2010), uses a sample of 12,344 primary school students in 37 elementary schools. Data was collected over the four school years (2002-2007) on 12,334 children who were in kindergarten, first and second grade when the study began. The evaluation of the effectiveness of the program was made using a checklist completed for each child by his primary teacher. This list included questions relating to each child's receipt of disciplinary dismissal and expulsion from school during that school year using a yes/no dichotomous. Teachers completed a survey for each child in the class 5 times over the four years (one baseline and one each spring of the four years). The authors used hierarchical linear modeling (HLM). Study results indicate significant effects of PBIS on children's behavioral problems, concentration problems, social-emotional functioning, and pro-social behavior. Children in PBIS schools were also 33% less likely to receive a disciplinary dismissal than those in comparison schools. The effects tend to be stronger in children who were first exposed to PBIS in kindergarten.

Muscott, Mann and LeBrun (2008) present the results of a PBIS education program in New Hampshire schools in 2002. The results indicate that the majority of schools were able to implement positive school behavior interventions with fidelity over 2 years.

The PBIS measures have resulted in a reduction in disciplinary dismissals and expulsions from class. These reductions made it possible, according to the study, to recover 864 teaching days. The implementation of the PBIS was also associated with academic gains in mathematics for the vast majority of schools that implemented it with fidelity.

Simonsen et al (2011) describe the development of a positive behavior support program and present the results of a hierarchical linear modeling that shows the effects of implementing a PBIS, with and without fidelity, on the behavior of children. students and academic results for a sample of 428 Illinois schools. The effectiveness of the program was evaluated by the results obtained by the students in a regional math exam (academic achievement) and by the number of suspensions and referrals to the disciplinary office (social

² Andrea M. Cohn(2001), National Association of School Psychologists

behavior). The results indicate that most schools that implemented a PBIS, with fidelity, maintained or improved student achievement, and implementation fidelity was associated with good behavior outcomes and improved academic achievement in math.

Sørli and Ogden (2007) test the effect of the intervention program "Positive Behaviour, Interactions and the Learning Environment in School" (PALS). PALS is a Norwegian version adapted from the Positive Behavior Model of Academic Support (PBIS), widely developed in the United States and Canada. The effectiveness of the program was evaluated with an experimental design (a test group and a control group) in four primary schools. Two years after implementation, an equal number of comparison schools were included in the study.

The variable used to test the impact is the set of responses from teachers and students. They were asked to assess the current situation and then reassess it a second time after two years.

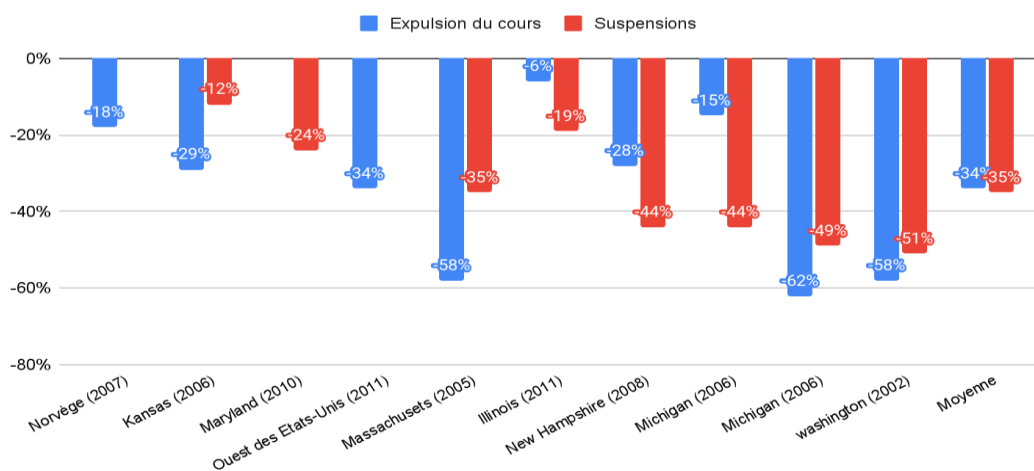
The results of the study show an overall reduction in behavior problems in the eight participating schools. The reduction was significantly greater in the intervention schools than in the comparison schools. But the positive behavioral changes observed in the intervention schools were more evident at the school level than at the classroom level.

Students' social skills increased significantly in all schools during the two-year project period, according to teachers and students. Immediate reductions in behavior problems observed by teachers ranged from moderate to large, while results based on student ratings of social competence and classroom climate were less encouraging. Lassen et al (2006) tracked the results of a PBIS program obtained in urban middle schools in the state of Kansas over a three-year period.

The authors will examine the relationship between student behavior problems and academic achievement, and then investigate the relationship between the PBS intervention and improvement in academic achievement over the three years following the intervention. Data to assess student behavior are: disciplinary dismissals and suspensions, and to assess program effectiveness, student scores on standardized math and reading tests. It should also be noted that the authors have emphasized the importance of treatment fidelity

Results show that a PBIS intervention led to significant reductions in disciplinary dismissals and suspensions and increases in math and normalized reading achievement. Furthermore, regression analysis suggests a significant relationship between student behavior problems and academic performance. So this PBIS intervention was associated with an improvement in the academic level and social behavior of the students. Empirical studies have allowed us to know the nature and magnitude of the effect of a PBIS program. We have grouped together in Figure 1, the different results of studies that find the existence of a reduction in behavioral problems.

Figure 1: Réduction des problèmes comportementale après l'implémentation du PBIS



Source: A partir des études : Nelson et al(2002), Sorlie et Ogden(2007), Lassen et al (2006), Bradshaw et al(2010), Caldarella et al (2011), Luiselli et al(2005), Simonsen et al(2011), Muscott et al (2008), Ervin et al(2006)

PBIS has reduced behavior problems, on average, by 35% since the first year of its implementation. The small effect of PBIS in some studies is due to its implementation in schools where there are not many behavioral problems to begin with.

Using PBIS as a strategy to maintain appropriate social behavior will, in turn, make schools safer. Safer schools are more effective learning environments. Based on this observation, we sought to see whether empirical studies show that there is an effect of PBIS on school performance.

1.2. Positive behavior intervention support and academic performance

The fact that a student behaves badly will also affect his academic performance. Many studies have shown that there is a correlation between student behavior and academic success. These empirical studies agree that higher rates of referrals to the disciplinary office are associated with problematic behavioral climates in schools (Irwin, Tobin, Sprague, Sugai, & Vincent, 2004).

This relationship between academic performance and behavior problems has also been studied at the secondary school level (Fleming, Harachi, Cortes, Abbott & Catalano, 2004; Morrison, Anthony, Storino, & Dillon, 2001; Roeser, Eccles & Sameroff, 2000; Tobin & Sugai, 1999). Tobin and Sugai (1999) found that academic failure in secondary school was correlated with three or more expulsions from the course in ninth grade. They also found correlations between student average and specific types of bad behavior (fighting, harassment, threats of violence, nonviolent misbehavior) for boys in sixth grade. Morrison, Anthony, Storino, and Dillon (2001) reviewed the records of students who were referred to a school expulsion program. Students who did not have previous disciplinary referrals had higher grade point averages than students who had disciplinary referrals.

LaFrance (2009) demonstrated that students with severe disabilities experienced significant academic difficulties compared to their typical peers. In most subjects, these deficits have remained stable over time. However, in the case of mathematics, the deficits grow over time.

A number of initial studies have shown that positive behavior support (PBIS) reduces behavior problems, increases time spent on school instruction, and is associated with better academic achievement. These studies are encouraging, but remain descriptive in nature and lack the experimental control necessary to confirm a relationship between PBIS and improved academic performance.

Luiselli, Putnam, and Sunderland (2002) find that after implementing PBIS in a middle school, detentions for disruptive antisocial behavior decreased over a four-year period. Student attendance has also increased over the four years. A draw experiment was conducted each term for each student who met or exceeded a specific academic and behavioral grade point average. The percentage of students who were eligible after this experiment increased from 40% of the study population to 55% over the course of four years.

Gage et al. (2013) examine the effect of a PBIS intervention on school achievement in the state of Connecticut. With a sample of 150 schools that implemented the PBIS between 2007 and 2011.

They use as an indicator of academic achievement, an assessment in reading, mathematics and written expression using tests conducted throughout the State of Connecticut, such as the Connecticut Mastery Test (CMT) for grades 3-8, and the Connecticut Academy Achievement Test (CAPT) for 10th grade.

The authors present a review of the literature of all American studies that seek the link between a PBIS intervention and academic success. Then, they carry out a longitudinal analysis at the level of the schools of application and the schools of control. Finally, the Propensity Score method was carried out to identify the differential effects.

The results of the state-level longitudinal study confirm that there are no differences in grade level between the SWPBIS fidelity and non-fidelity demonstration schools and the control schools. The results of this study suggest that PBIS alone does not affect academic performance at the school level.

LaFrance (2009) presents quantitative research to examine the level of implementation of a PBIS program. The sample for the research question includes 134 elementary schools and 59 high schools that actively used the PBIS during the 2007-2008 school year in the state of Florida.

The Quality Benchmark (BoQ)³ was used to measure the fidelity of program implementation. Academic achievement was measured using reading and math test scores from the Florida Comprehensive Achievement Test (FCAT). Data on student behavior was collected from information on the number of times the student had a disciplinary dismissal and the total number of days of expulsion.

The results of the study show that at the elementary level, no statistically significant difference in reading was noted between those who did not apply the PBIS, and those who implemented the PBIS, even with high fidelity. On the other hand, a significant difference is found between the PBIS and the non-PBIS in the mathematical tests, but no difference was noted between those with low or high fidelity.

In addition, LaFrance (2009) finds significant and positive results between the PBIS intervention and the social behavior of students. Benner et al. (2012) examine the effectiveness of a PBIS intervention on behavioral

³ Quality Benchmark is an instrument to measure the fidelity of universal implementation of a PBIS program in schools. This tool was developed by Kincaid, Childs, and George (2005) at the University of South Florida.

disorders and academic achievement. The study was conducted in elementary schools in the Pacific Northwest in the United States. An experimental method, with 44 treatment students and 26 control students, was used.

The level of students' academic skills is measured by the Woodcock-Johnson III tests (Woodcock, McGrew and Mather, 2001). This standardized test was applied to all students in March 2008 (baseline) and May 2009 (post-test). The WJ-III test is composed of subtests of: Letter-Word Identification, Spelling, and Numeracy. The results of the study show that there is no statistically significant effect between the test group and the control group. In addition, students who did not take a PBIS program performed better than those who took a PBIS.

But, although students who received a PBIS did not show improvements in their academic performance compared to the control group, they did, however, show improvement in their social behavior compared to the control group. Lane, Wehby, Robertson, and Rogers (2007) test the effects of a PBIS program conducted at the secondary school level on students' academic achievement. This study is conducted in central Tennessee, in two high schools with a sample of 178 students out of a population of 1172 students.

To measure the performance of the students after the implementation of this program, the authors used the general average obtained by each student and measured the effect of the intervention after one year of implementation of the PBIS. The results show that there is no statistically significant link between the implementation of the PBIS and the academic achievement between the groups during the year of the implementation.

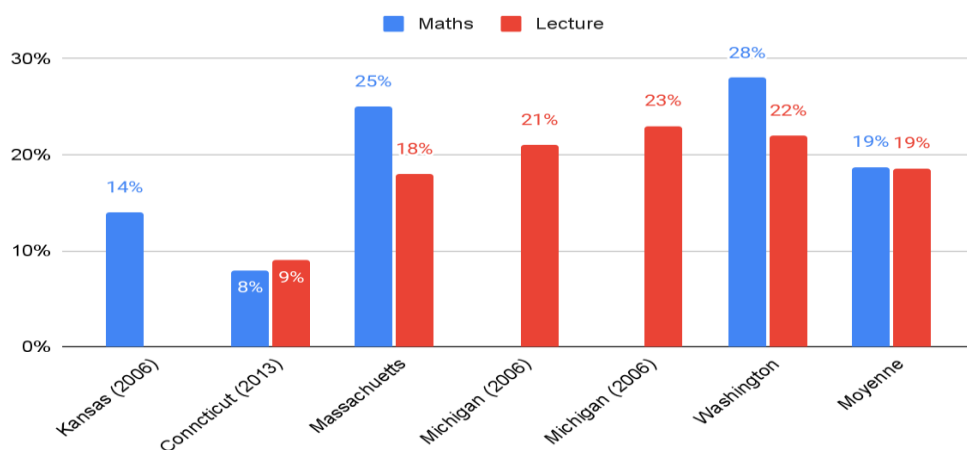
Luiselli et al. (2005) are interested in the effect of a PBIS intervention on the academic results of pupils in a primary school in an urban environment. The school is located in Massachusetts, the mid-eastern region of the United States with a sample of 550 students. The variable used to measure the academic performance of students is a standardized test called Metropolitan Achievement Test-Seventh Edition (MAT-7). The subjects considered in this test are mathematics and reading.

The analysis of the results is done in three stages, with a duration of one year for each analysis, one before the intervention, the second during the intervention and the last one year after the intervention. The evolution of the level of the students is measured by a percentage of the average obtained in the MAT-7 test. The results obtained show that the PBIS has a positive effect on the level of students, with an average increase of 18% in reading and 25% for mathematics.

The study by Caldarella et al. (2011) examines the effects of PBIS on the climate and academic achievement of college students. The data used is made up of over 300 teacher responses and 10,000 student responses at two schools in the western United States. One school implemented a PBIS intervention over a four-year period, while the other served as a control. The variable used to measure students' academic success is the general average. This study used an analysis of variance to examine differences between the four years of the intervention.

The results of this study show the absence of a statistically significant difference between the tested school and the control school. Although, the authors suggest a positive and statistically significant link between implementing PBIS and improving school climate, and reducing student misbehavior.

Figure 2: Improved school performance after PBIS implementation



PBIS improves academic performance, on average, by 19% since the first year of its implementation. This effect is very great knowing that 2/3 of the student's academic results depend on the external effects of the school.

Empirical studies that find no impact of PBIS can be explained either by the poor implementation of the program and the lack of motivation of the academic body, or by the poor choice of measurement variables and measurement method.

The following text highlights two more robust evaluation methods that can be used to measure the success of PBIS programs.

2. Assessment methods: an adaptation of the PBIS program

A program may appear potentially promising before it is implemented. The obvious need for impact evaluation is to help decision-makers determine whether such a program will generate the desired effects at the lowest cost, and to fill gaps in understanding of what works and what does not. .

Identifying the precise effects of an educational program is a complex task. To isolate the external effects that also impact our variable of interest, we need to adopt methods that take this problem into account. In the following text, two impact evaluation methods that can be used to study the effect of PBIS will be presented.

2.1. Regression discontinuity method

The regression discontinuity method is a quasi-experimental (pre-test-post-test) approach that can be used to estimate the impact of a program in situations in which applicants are selected for treatment according to a threshold appointed. The idea is that the population to be evaluated must have the same characteristics.

Individuals above and below the threshold are assumed to be similar in observed characteristics. Having a sample close to the eligibility threshold will allow us to ensure the comparability of our population. For example, if we apply the PBIS approach to schools where there are a lot of behavioral problems with schools where there are almost no behavioral problems, our results will be biased. We will not be able to determine the true effect of the program. So the solution is to remove the extreme points to be able to compare what is comparable. Schools that score between 10 and 90 on a scale of 100 receive PBIS training.

This method will certainly eliminate schools from implementing the program, but it will help us to have a clearer idea of the PBIS effect. You can use this approach in a pilot study, for example, and then learn lessons to apply to other schools.

2.2. Difference-in-difference method

As its name suggests, the difference-in-differences method compares the differences in outcomes over time between a population participating in a program (the treatment group) and one not participating (the comparison group). If we take a school construction program as an example, which cannot be randomly assigned or allocated on the basis of a continuous index with an eligibility threshold, makes it impossible for us to use a regression discontinuity model. As one of the objectives of this program is to improve the academic results of the pupils, the success rate can constitute one of the result indicators of this program. Mere observation of the change in the success rate in school, before and after the implementation of the program is not enough to measure its causal effect. Indeed, many other factors that vary over time can influence the success rate. Similarly, comparing regions that received the program to those that did not would be problematic since there may be unobserved reasons why some regions benefited from the program and others did not (i.e. problem of selection bias). The solution will therefore be to see the two differences, in time and between regions and this is exactly what the difference-in-difference method does.

In summary, program impact is calculated as the difference between two differences. The difference-in-difference method can be presented as follows:

Given a two-period framework where $t = 0$ before the program and $t = 1$ after the program is implemented.

$$DD = (Y_1^T - Y_0^T) - (Y_1^C - Y_0^C) \quad (1)$$

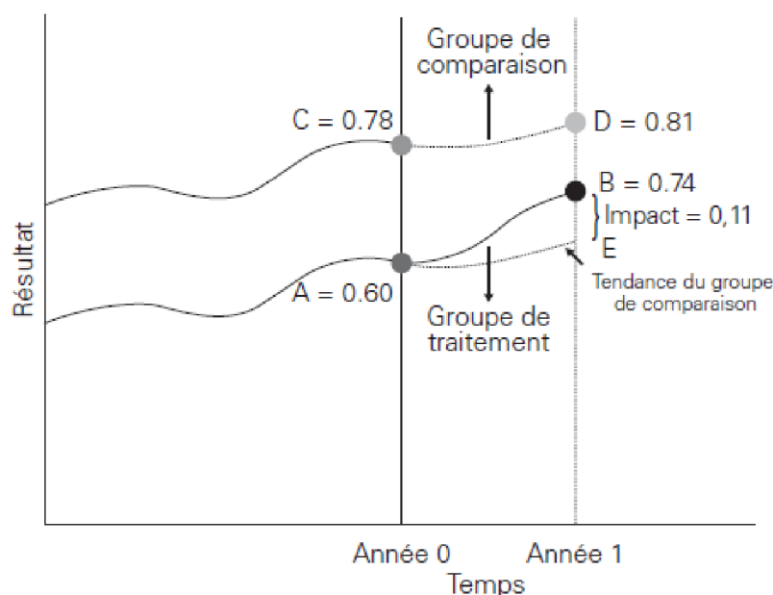
Where,

Y_t^T et Y_t^C be the respective results for a beneficiary of the program and the untreated units in time t .

The double-difference (DD) estimator controls for unobserved heterogeneity (unobserved difference in mean hypothetical outcomes between treated and untreated units) that can lead to selection bias. For example, one may want to account for factors not observed by the researcher, such as differences in innate ability or personality across subjects treated and controls or the effects of non-random program implementation at the policy level. DD assumes this unobserved, time-invariant heterogeneity, so the bias is canceled out by

differentiation. In other words, the outcome changes for non-participants reveal the hypothetical outcome changes as shown in equation (1) and Figure 3 above.

Figure 3: The double-difference method



Source: Gertler et al. (2011)

We can summarize the approach of the method of the double difference with the following formula:

1. We first calculate the difference in result (Y) between the situation before and after for the treatment group ($B - A$).
2. Next, we calculate the difference in result (Y) between the situation before and after for the comparison group ($D - C$).
3. At the end, we calculate the difference between the difference in results for the treatment group ($B - A$) and the difference for the comparison group ($D - C$), i.e. $DD = (B - A) - (D - C)$.

The choice of these two methods was motivated by the fact that they can be easily used by non-specialists. Through these methods, the pedagogical managers, within the school, can themselves evaluate and measure the impact of the program. In addition, the difference-in-difference method that we have presented does not require a lot of data to be possible. With data from a single school, the effect of the PBIS program can be measured. The observation made after the literature review of almost all empirical studies on the effect of PBIS, is that education specialists do not use a statistical method that can give an exact estimate of the effect of PBIS. The magnitude of the PBIS effect may therefore be underestimated.

Conclusion

Positive behavior support is a proven program, according to the existing literature. It allows the improvement of the school climate and academic performance, although additional research on the impact of this educational program on success and the school climate is necessary. There are a number of research questions that arise from the review of this literature. First, most studies make pre-post comparisons or are descriptive in nature. On the other hand, we should rather go towards studies that employ a more rigorous experimental control. Positive behavior support appears to potentially be an intervention that has a great impact on school climate and achievement, but much research needs to be done to establish confirmatory evidence.

Secondly, for the measurement variables, we must go more towards the use of standardized tests, because they provide more reliable information on the improvement of school performance than regional or national tests. Finally, we suggest the use of the difference-in-difference method because it requires less observation than the regression discontinuity method: more observations means more data collection, which can be very expensive in terms of cost.

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