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Author(s):	**Lindsey Turner**
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Scaling up Schoolwide Positive Behavioral Interventions and Supports (SWPBIS) Framework in Rural Settings Through the Idaho Rural Implementation Model

Award #2017-CK-BX-0021

Project Director/Principal Investigator:

Lindsey Turner

Director, Center for School & Community Partnerships

Boise State University

1910 University Drive

Boise, ID 83725-1742

lindseyturner1@boisestate.edu

Recipient Organization:

Boise State University

1910 University Drive

Boise, ID 83725

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Summary of the Project

This project's primary focus was exploring scalable strategies for improving the fidelity of implementation of a universal behavioral prevention program in rural schools. A type 3 hybrid implementation effectiveness trial was designed to test a comprehensive bundle of implementation supports called Rural School Support Strategies (RS3; modified from the project title described as the Idaho Rural Implementation Model [I-RIM]). To rigorously test the added benefit of the implementation supports, a randomized trial was conducted to assess the implementation outcomes that occurred at schools that received RS3 supports, as compared to outcomes for schools that only received training. This multi-year parallel-arm study used a cluster randomized design with 40 rural public K-12 schools in Idaho, which were randomized to one of two conditions: 1) a standard series of trainings about PBIS (basic condition), or 2) an enhanced condition that includes the standard training series plus RS3. The primary outcome of the trial was the fidelity of implementation of Schoolwide Positive Behavioral Interventions and Supports (SWPBIS, hereafter referred to as PBIS) in rural schools. In addition, the research explored the feasibility, acceptability, and appropriateness of RS3. Additional outcomes included staff-level perceptions of school climate. The trial was planned to occur over two school years, but due to the COVID-19 pandemic the intervention and data collection was extended for a third year.

Major Goals and Objectives

The major goal of the project was to assess implementation strategies to scale universal behavioral interventions in rural schools. Objectives were:

1. Train control and intervention school teams yearly in the tiers of the PBIS framework.

2. Provide continuing implementation support to intervention schools in the form of technical assistance, a virtual learning collaborative, additional trainings, and online resources.
3. Used mixed methods to assess the feasibility, acceptability, and appropriateness of the implementation support strategies.
4. Use quantitative methods to examine the impact of PBIS implementation fidelity on student and staff outcomes.

Research Questions

This project explored the following four research questions:

1. Does standard training plus RS3 (additional supports) improve PBIS implementation fidelity relative to a training-only control condition?
2. Are there mediators of the effectiveness of RS3 on implementation fidelity, such as changes in school-level PBIS team functioning, organizational readiness, and psychological safety among school staff?
3. Do student outcomes (office discipline referrals, academic achievement and perceived climate) differ for students attending schools randomized to RS3 as compared to students at schools in the control condition?
    a. Do improvements in student outcomes occur through mediation by schoolwide fidelity of implementation of PBIS?
4. What is the perceived feasibility, acceptability, appropriateness of RS3 among school stakeholders, and what are the costs associated with RS3?

Research Design, Methods, Analytical and Data Analysis Techniques

Research Design

This multi-year parallel-arm study used a cluster randomized design with 40 rural public K-12 schools in Idaho, which were randomized to one of two conditions: 1) a standard series of trainings about PBIS (basic condition), or 2) an enhanced condition that includes the standard training series plus the supports of RS3. The yearly trainings provided to all schools are described below.

Teaming (all schools). Each school was guided in developing a PBIS implementation team of 5 to 8 people, including the school principal. One person was designated as the team coach—a person with primary responsibility for guiding the PBIS implementation team's work.

Yearly PBIS trainings (all schools). Trainings on PBIS content were provided to all schools in the summers of 2019, 2020, and 2021. All members of the school's PBIS team were invited to the training, and attendance rates were high (above 95% of invited people were present on each day of training). Content was aligned with PBIS tiers, with Year 1 covering Tier 1 PBIS (universal prevention), Year 2 covering Tier 2 (targeted interventions) plus a refresher on Tier 1, and Year 3 covering Tier 3 (intensive interventions) with a Tier 1 refresher and integration of practices across all tiers. Training was conducted in-person in 2019. Due to social distancing restrictions because of the Covid-19 pandemic, the PBIS trainings were conducted virtually in 2020 and 2021. In 2019, travel expenses were paid, and participants received a stipend for attending. In 2020 and 2021, the training sessions were conducted via synchronous teleconferencing and team members who attended were provided a stipend for their time, but no travel expenses. Each year, the PBIS trainings lasted 3-4 days. Each summer, the trainings

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occurred over seven weeks (during June and July), with schools grouped by treatment condition and geographic region in Idaho. For consistency, the same school groupings of schools who attended training during the same week in 2019 were also maintained in 2020 and 2021, to allow schools to build regional support networks. Activities during the trainings included presentations, full-group problem solving, and time for teams to collaborate and build their action plan.

Enhanced Supports for All Schools: Rural School Support Strategies (RS3)

The additional supports provided only to RS3 schools are described below.

Technical Assistance (RS3 schools). Proactive in-person and remote technical assistance (TA) was delivered on a monthly basis to RS3 schools by two implementation support practitioners (ISPs; Albers et al., 2020; Metz et al., 2021). The ISPs were K-12 educators with strong content expertise and credibility, having previously worked in rural Idaho schools leading PBIS implementation. During the first three months of the trial, ISPs travelled to the RS3 schools for in-person TA visits. In the winter of 2019, visits transitioned to a virtual format (Zoom) due to the hazards of travelling to remote and mountainous regions in winter. The trial design planned a mix of TA provided primarily through a virtual modality with occasional onsite TA visits; however, the COVID-19 pandemic forced all TA to be delivered virtually after the first three months. In the third year of the trial, supplemental virtual TA was provided by a third ISP with expertise in advanced tiers of PBIS (targeted and intensive interventions for selected students).

TA was tailored to each school's needs, including guidance on data-based decision-making, problem-solving, following their action plan, and engaging in audit and feedback. Typically, each school's assigned ISP would attend the team's monthly meeting (in-person at

first, then virtually), and coaches could email or call their ISP. Although ISPs proactively contacted PBIS coaches at the RS3 schools every month, each school varied in the amount of TA used. TA tracking logs were used to record process data regarding the dosage and type of TA provided, with details including the mode of contact (email, phone, teleconference) as well as duration of the contact, and the topics addressed.

Virtual Learning Collaborative (RS3 schools). The ISPs hosted monthly meetings of a virtual learning collaborative (VLC; Zubkoff et al., 2019) for RS3 coaches. Each hour-long session began with a presentation on a specific topic (e.g., coaching strategies, PBIS refreshers, wellness). In the second half hour, coaches were given time to share experiences, solve problems, and ask the ISPs questions. Attendance averaged 12 coaches per meeting.

Additional Year 1 Trainings (RS3 schools). The coach and administrator at RS3 schools received three additional in-person trainings in the first year. The first focused on planning for implementation. The second two focused on coaching school teams through PBIS implementation. Each training lasted one full day. Attendance was high, with all 20 schools sending both the administrator (principal or assistant principal) and the PBIS coach to Boise to attend the in-person meetings. Travel reimbursement was provided, with a stipend for the time commitment. The content for the first in-person session focused on leadership skills, including the evidence for PBIS and establishing the motivation for implementation, strategies for building the buy-in of staff to implement PBIS, and assessing needs and beginning the action planning phase. This meeting also included time for networking among schools, and building relationships with the project's implementation support providers. The second and third training both focused specifically on coaching skills, with didactic content about the Cognitive

Coaching approach, and time for the PBIS coaches and administrators to practice coaching and communication skills, with feedback and guidance provided by the research team.

Online Resources (RS3 schools). RS3 schools had access to a password-protected web portal with curated resources (e.g., videos, forms). Log-in data showed that utilization was very low, mainly occurring after the ISPs had referred coaches to resources during TA meetings.

Methods

Setting and Participating Schools. The project was conducted in Idaho, a predominantly rural state. The National Center for Education Statistics (NCES) urban-centric locale codes were used to assess eligibility for this project: schools in rural areas (NCES codes 41, 42, and 43) were eligible, as were schools in townships (NCES codes 31, 32, and 33). There were 156 potential Idaho public K-12 schools from which to recruit. Because of the focus on school-level implementation fidelity, schools were not required to serve specific grade levels (i.e., elementary or high school only). This decision was also made due to the varying composition of rural communities, where some schools serve grade ranges that are less common in urban or suburban settings but tend to be prevalent in rural areas (e.g., K-12, K-8, 7–12, etc.).

Recruitment and Randomization

Recruitment. Demographic characteristics of all rural, public K-12 schools in Idaho were obtained from the Common Core of Data (National Center for Education Statistics, 2022). In Fall of 2018 all public schools serving any grade level from Kindergarten to Grade 12 were invited to apply for the trial if they were located in a rural area or township, had at least 100 students, and no prior PBIS training. Informational packets and an invitation video were distributed by mail and email to principals of eligible schools. In order to reach the planned enrollment of 40

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schools, repeated follow-ups and outreach were made by project staff in fall 2018. This resulted in 40 schools being recruited for the trial by the October 2018 target date for enrollment; in addition, three elementary schools from the same district applied after the deadline and were held on a waitlist. Generally, the schools that enrolled were small, with just under 350 students and 19 teachers, on average. Most were rural remote (42.5%; more than 25 miles from a metropolitan area) or rural distant (40%; 5 to 25 miles from a metropolitan area). Most were K-5 or K-8 schools (57.5%), with 20% middle schools, 10% high schools, and 12.5% serving all grades K-12. Consistent with the racial demographics of rural Idaho, the enrolled schools served predominantly White student populations (range=33.1-97.4%; M=77% SD=16%), with substantial Hispanic (M=19% SD=16%) representation, and other races reported at ≤2% on average.

Randomization. After the recruitment of schools, randomization occurred in October 2018 and was overseen by an independent doctoral-level educational statistician who was not on the study team. First, demographic data were confirmed for each of the 40 schools that applied to participate, using the NCES Common Core of Data (National Center for Education Statistics, 2018) to characterize school size (number of students), and poverty (% of students eligible for free/reduced-priced meals), and school level/grades served. Schools were blocked into pairs based on these demographics. Blocking also accounted for district membership, to avoid potential cross-contamination within district; therefore, districts with multiple schools participating were blocked before randomizing, matching on number of interested schools and randomly allocating one district (and schools therein) to the intervention condition and the other to control. Once blocks were established, a coin was flipped to assign one school in each

block to intervention, and the other to control. In addition to oversight by the independent statistician, the coin flipping procedure was observed by two independent researchers to verify the procedure and confirm the accurate recording of group assignment. One district with three schools was assigned to the intervention condition, but before schools were notified of assignment, the superintendent decided to withdraw from the project. This district group was replaced by the waitlisted district group of three schools. This randomization procedure yielded two groups of schools with baseline demographic characteristics presented in Table 3. Chi-square and t-tests were conducted to test whether the two groups differed on baseline demographics; there were no significant differences between intervention and control schools, suggesting similarity at baseline.

Measures

School Context

Demographic characteristics such as school size, funding, student composition, staffing, and fiscal characteristics were obtained from NCES.

Fidelity Data

The Tiered Fidelity Inventory (TFI). The TFI (Algozinne et al., 2021; McIntosh et al., 2017) is completed by school-level teams and takes approximately 45–60 min to complete through an online data capture system. The measure yields a percentage (range 0%–100%) with: a) an overall score across all three tiers; (b) a score for each tier; and (c) subscale scores for each tier that focus on key domains of teams, implementation, and evaluation. Scores above 70% represent adequate fidelity (see ***Appendix A*** for items and coding). The TFI was collected each summer (2019, 2020, 2021, 2022).

Observational Data

School Physical Environment. Aspects of the school physical environment can impact student perceptions of safety, thus the School Assessment for Environmental Typology (Bradshaw et al., 2015) was collected at baseline to characterize aspects of the built environment at each school. Trained observers masked to school condition conducted the observation at each school in spring 2019 (see ***Appendix B*** for items and coding).

Survey Data

Perceived School Climate. Surveys were used to assess perceptions of three sets of key stakeholders at baseline in March 2019, using the validated Maryland Safe and Supportive Schools (MDS3) suite of questionnaires (Barrett et al., 2008) for: 1) school staff; 2) students; and 3) parents/caregivers (see ***Appendix C*** for additional details). Surveys were programmed in Qualtrics by the research team, with a unique set of electronic links for each school. Staff surveys were distributed to staff email addresses with a customized link for each staff member, based on staff email directories that were confirmed by school administrators. These data were collected confidentially to allow linkage across multiple waves of staff survey data. The student and parent/caregiver surveys were gathered anonymously using an online survey link. The survey module for students was administered by teachers during classes, either in the computer lab or using tablets in the classroom. The survey module for parents was distributed with assistance from school administrators who emailed it to parent lists; the parent surveys were available in English and Spanish versions.

Informed consent/assent was obtained prior to each survey administration. The student and parent surveys took approximately 15 minutes to complete, and staff surveys contained

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additional items and took approximately 25 minutes to complete. The staff surveys were slightly longer because, in addition to assessing perceived school climate, the surveys also included additional scales to measure constructs such as burnout, psychological safety, and attitudes toward evidence-based interventions (see ***Appendix D*** for additional details).

Student and parent surveys were collected only at baseline in 2019. Staff surveys were collected at baseline in 2019, and then to mitigate the loss of student data due to the pandemic, collection of staff surveys was expanded, occurring additionally in spring 2020, 2021, and 2022.

Process Data

School PBIS team activities. School PBIS coaches completed the Team Implementation Checklist (Sugai et al., 2012) in December 2019 and December 2021, to assess implementation process. The checklist assesses PBIS team activities such as whether the team meets regularly, uses discipline data for planning, and monitors progress toward the action plan. Prior work demonstrates high internal consistency ($\alpha = 0.93$) (Barrett et al., 2008). ***Appendix E*** provides more details about this measure.

School PBIS team functioning and readiness. School PBIS team members were asked to complete surveys in spring 2019, 2020, and 2022 (see ***Appendix F*** for details). Items from the PROSPER (PROmoting School-community-university Partnerships to Enhance Resilience) project surveys were used to assess functioning of the PBIS team, specific to team goals, culture, and leadership (Perkins et al., 2011). Additionally, the Organizational Readiness to Implement Change scale (Shea et al., 2014) assessed change commitment and efficacy by school implementation teams.

Acceptability, appropriateness, and feasibility of RS3. These elements were explored through interviews with key stakeholders at participating schools, namely, the school PBIS coach, and the principal.

Student Outcomes

Student disciplinary incidents. All schools used SWIS (Educational Community Supports, 2017), the data monitoring tool for office disciplinary referrals for PBIS; data are tracked at an individual student level. We anticipated examining changes in office referrals; however, the school closures in Spring 2020 due to the COVID-19 pandemic made these data unavailable. Impacts on this outcome measure are acknowledged in the Changes in Approach section below. Even after schools resumed in-person or hybrid operations in fall 2020, due to social distancing (i.e., fewer students in classrooms) and virtual modes of instruction, these data were no longer valid for assessing changes as a result of the intervention.

Student academic outcomes. In Idaho, student achievement is measured with the Idaho Standards Achievement Test (Idaho Standard Assessment Test, 2021) in grades 3–8 and grade 10, in English language arts and in mathematics. Due to the COVID-19 pandemic, no testing occurred in spring 2020, and thus these outcomes were not analyzed in the trial.

Analytical and Data Analysis Techniques

This report presents the primary analyses that were planned for the project and are described in the study protocol paper (Turner et al., 2022).

Research Question 1

Research Question 1 examined whether standard training plus RS3 (additional supports) improved PBIS implementation fidelity relative to a training-only control condition. This was

examined using t-tests to assess whether fidelity on the Tiered Fidelity Inventory differed significantly, unadjusted and by condition. Additional analyses used descriptive statistics, linear regression, and logistic regressions to explore year-to-year changes in fidelity in relation to exposure to varying dosage and duration of support. First fidelity was considered as a continuous outcome of TFI percentage, then as a binary variable indicating whether each school reached the threshold of 70%, which is considered by the PBIS developers to demonstrate sufficient fidelity to improve student outcomes.

We found that basic implementation supports—establishing an implementation team and hosting an intensive, team-based training—helped rural schools build a strong foundation for implementing PBIS. However, additional supports significantly accelerated implementation fidelity. With the addition of the RS3 supports, 80% of schools reached 70% fidelity on Tier 1 of the TFI after the first year of implementation, versus 55% of the basic support schools. This was demonstrated by a marginally significant RS3 condition effect in the linear regressions for TFI and implementation subscale in the first year (see Figure 1 below). Regression analyses showed a marginally-significant effect (b = 8.48, SE = 4.61, p = .07) of the intervention condition on TFI, indicating that its inclusion in the intervention schools related to an increase of 8.5 percent in TFI score at the end of the first year of implementation. Total dosage (number of supports received) increased the odds of schools reaching 70% on the TFI implementation subscale in 2020. The COVID-19 pandemic affected schools during the second year of the trial (2020-2021). This was reflected in declining TFI scores for many schools during that time. By the end of the 2021-2022 school year, during which all schools returned to in-person operations, 90% of RS3 schools had reached the 70% fidelity threshold, while only 65% of basic support schools had

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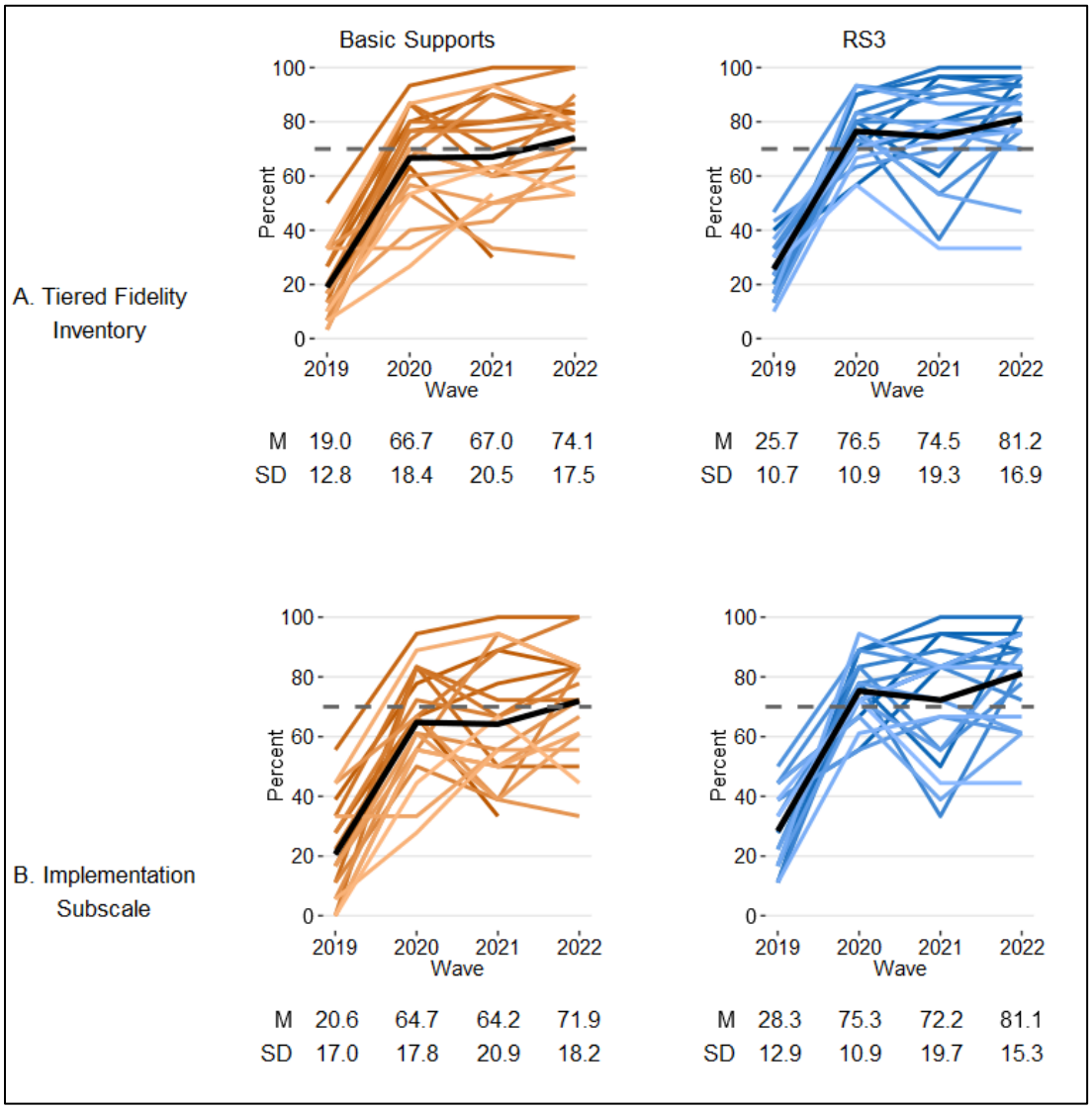
reached that level. The only significant effect observed in the final year of the trial related to VLC sessions, showing the value of the virtual community for supporting schools in later stages of implementation. Impacts on fidelity were significant, even though supports were provided virtually in the first year (and all were virtual thereafter), demonstrating the value of an online modality for providing support to schools beyond the initial implementation phase.

Figure 1: ***Fidelity Outcomes: Percentage of Total Points, by Scale and Condition***



Notes. Lines portray individual schools. Black lines show scale mean value within condition. Dashed grey line indicates 70% threshold.

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Research Question 2

Research Question 2 examined whether there are mediators of the effectiveness of RS3 on implementation fidelity, such as changes in school-level PBIS team functioning, organizational readiness, and psychological safety among school staff (see coding of constructs in ***Appendix F***). This was explored in several steps. First, analyses identified the direct effect of the intervention condition on intervention fidelity at the school level in 2020. An unadjusted path model identified a significant effect of intervention condition on TFI Tier 1 percentages in 2020 (b = 9.83, p = .01, 95% CI [0.68,18.99], β = 0.63), indicating that intervention schools had an increase of 9.8 percent in TFI score at Time 2. Including a baseline control for TFI, the intervention effect was slightly reduced (b = 8.58, p = .085, 95% CI [-1.19,18.36], β = 0.55). A final model, including baseline controls and covariates for school level and fringe rural locale, maintained a similar effect size (b = 8.40, p = .056, 95% CI [-0.22,17.01], β = 0.54).

Next, staff-level mediators were tested in separate multilevel mediation models. This approach, referred to as a 2-1-2 mediation model (Preacher, 2011; Preacher et al., 2010), is a structural equation model approach that separates within-level variance from between-level variance of the level-1 mediator to provide estimates of the between-level relationships among all three constructs (organizational readiness, team functioning, and fidelity). Modeling of organizational readiness and change commitment included a baseline control for each to the within-level component of the path models, allowing for a more robust assessment of the intervention's effect on each mediator. The conceptual approach is shown below in Figure 2.

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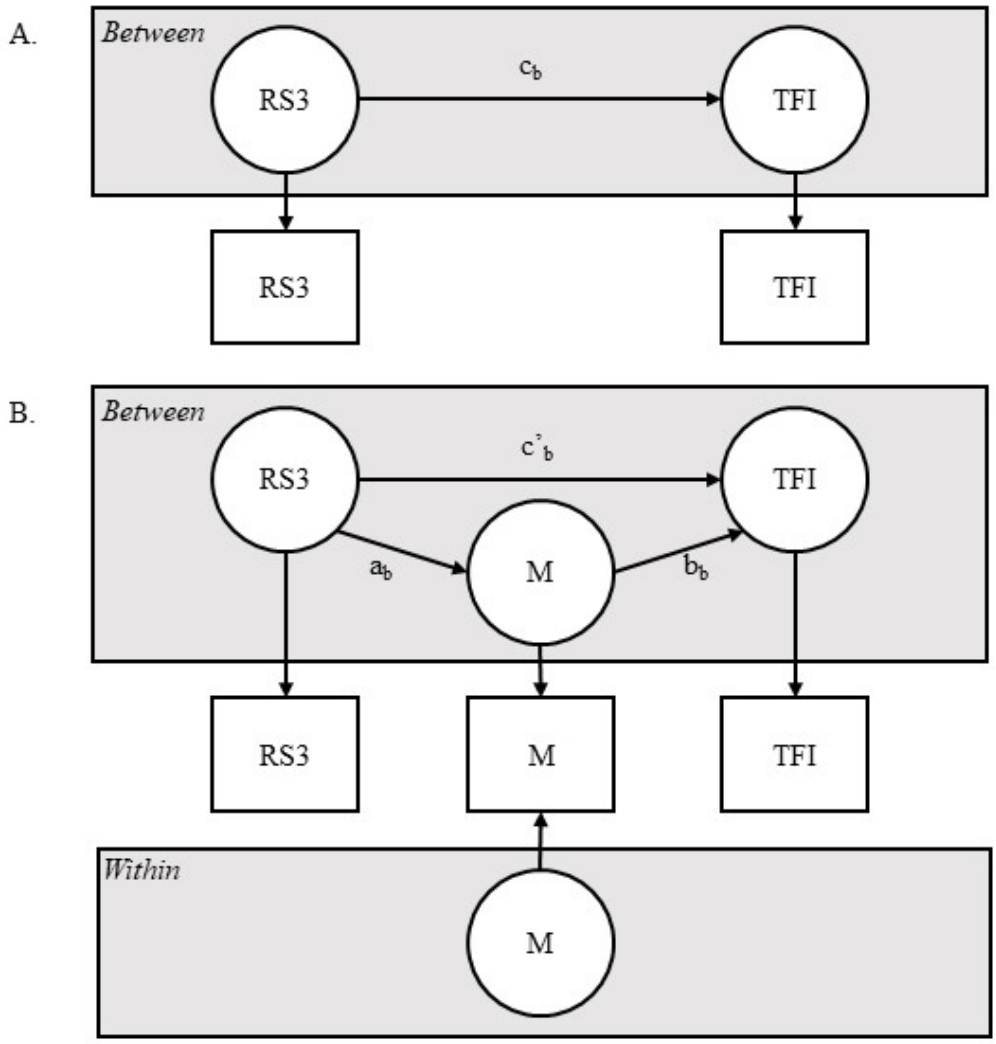
Figure 2: ***Conceptual Approach to Multilevel Mediation Analyses***



Notes: RS3: Rural School Support Strategies; TFI: Tiered Fidelity Inventory; M: Mediator.

Model results are presented below in Table 1. Both models had significant *a* paths, indicating that after adjusting for baseline and the respondent's role at the school, the intervention had a positive effect on respondents' perceptions of both organizational readiness and change commitment. The models also had significant *b* paths, indicating significant positive

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associations between each mediator and fidelity, as well as non-significant *c'* paths, suggesting full mediation of the intervention's effects on implementation fidelity. However, the indirect paths for change commitment (*b* = 5.87, *SE* = 3.52, *p* = .095, β = .19), and for organizational readiness were nonsignificant (*b* = 7.09, *SE* = 4.53, *p* = .118, β = .23). Although the approach cannot be used to infer significance, Monte Carlo estimates of these indirect effects produced more robust confidence intervals, with estimates of 5.90 (95% CI [0.24,13.69]) and 7.08 (95% CI [0.82,16.04]), respectively. Both models had non-significant chi-square values, acceptable within-level SRMR values, and acceptable (change commitment) or marginal (organizational readiness) between-level SRMR values.

Table 1. Multilevel Mediation Model Results with Mediator Baseline Controls

	Organizational Readiness			Change Commitment		
Path	*b*	*SE*	β	*b*	*SE*	β
Between-level						
M on Intervention (a)	0.44*	0.18	0.41	0.39*	0.19	0.34
TFI on M (b)	16.15**	5.60	0.56	15.16**	4.86	0.56
TFI on Intervention (c')	1.86	5.19	0.06	2.43	4.53	0.08
Indirect (a*b)	7.09	4.53	0.23	5.87†	3.52	0.19
M on Fringe	0.55**	0.20	1.02	0.47*	0.22	0.84
M on Level	0.25	0.18	0.46	0.17	0.19	0.29
TFI on Baseline	0.04	0.18	0.03	0.13	0.18	0.10
TFI on Fringe	-9.00	5.81	-0.58	-8.05	5.46	-0.52
TFI on Level	8.73†	4.93	0.57	9.90*	4.48	0.64
M Intercept	1.75**	0.56	3.27	1.57***	0.34	2.79
TFI Intercept	30.75*	13.34	2.00	33.68**	9.82	2.19
Residual variances						
TFI	129.74***	36.04	0.55	120.30**	35.20	0.51
M	0.18**	0.07	0.63	0.24**	0.08	0.76
Within-level						
M on Baseline	0.38**	0.14	0.35	0.37***	0.08	0.45
M on Role	0.24*	0.12	0.34	0.18	0.12	0.26
Residual variances						
M	0.45***	0.09	0.86	0.40***	0.06	0.79
X^2(*df*)	7.693(5)			8.305(5)		
SRMR within	0.053			0.069		
SRMR between	0.102			0.076		

***p<.001 **p<.01 *p<.05 †p<.10; *b* = unstandardized coefficient, β = standardized coefficient.

Notes: M: Mediator; TFI: TFI Score in 2020; SRMR: Standardized Root Mean Squared Residual.

Of the five post-test-only mediators (see Table 2), significant intervention effects were observed in the *a* paths for team culture, team goal-setting, and team productivity. Team productivity significantly mediated the relationship between the intervention and the Tier 1 TFI score, with both significant *a* and *b* paths, a significant indirect (*a***b*) path (*b* = 6.30, *SE* = 2.63, *p* = .017, β=.21), and a non-significant *c*' path, with Monte Carlo estimates of indirect effects of

6.34 (95% CI [0.83,13.86]). Team culture and goal-setting both had significant *a* and *b* paths and a non-significant *c'* path, as well as non-significant indirect paths. Monte Carlo estimates of these indirect effects were more robust, with estimates of 5.38 (95% CI [0.29,12.53]) and 11.20 (95% CI [1.23,24.97], respectively. Team efficacy had non-significant *a* and *c'* paths, as well as a non-significant indirect effect, and team tension had only non-significant paths, suggesting that neither team efficacy nor team tension mediated the relationship between intervention condition and TFI. Model fit was like that of the prior models, with non-significant chi-square tests, acceptable within-level SRMR, and acceptable or marginal between-level SRMR. Summary results are shown below in Table 2.

Table 2. Multilevel Mediation Model Results

	Team Culture			Team Efficacy			Team Goal Setting		
Path	*b*	*SE*	β	*b*	*SE*	β	*b*	*SE*	β
Between-level									
M on Intervention (a)	0.40*	0.19	0.36	0.21	0.18	0.21	0.55**	0.20	0.49
TFI on M (b)	13.47**	4.14	0.49	14.63***	3.74	0.47	20.29*	7.83	0.73
TFI on Intervention (c')	3.29	4.15	0.11	5.50	4.16	0.18	-2.17	6.56	-0.07
Indirect (a*b)	5.38†	3.11	0.18	3.08	2.78	0.10	11.10†	6.66	0.36
M on Fringe	0.38	0.24	0.68	0.42†	0.23	0.84	0.32	0.26	0.57
M on Level	0.24	0.19	0.43	0.24	0.17	0.47	0.33	0.21	0.60
TFI on Baseline	0.08	0.17	0.06	0.09	0.18	0.07	0.04	0.17	0.03
TFI on Fringe	-5.64	5.05	-0.37	-6.70	5.22	-0.44	-6.62	5.90	-0.43
TFI on Level	9.36*	4.34	0.61	9.10*	4.43	0.59	6.00	4.99	0.39
M Intercept	3.25***	0.18	5.82	3.37***	0.15	6.78	3.17***	0.23	5.71
TFI Intercept	14.57	14.94	0.95	8.84	12.62	0.58	-5.31	25.53	-0.34
Residual variances									
TFI	133.27***	32.33	0.56	133.93**	39.14	0.57	97.93**	36.11	0.41
M	0.24**	0.08	0.76	.20**	0.07	0.80	0.19**	0.07	0.62
Within-level									
M on Role	0.13	0.15	0.20	0.10	0.13	0.17	0.22†	0.13	0.25
Residual variances									
M	0.43***	0.07	0.99	0.39***	0.06	1.00	0.74***	0.13	0.99
X^2(*df*)	3.88(4)			3.70(4)			4.19(4)		
SRMR within	0.002			0.001			0.004		
SRMR between	0.086			0.079			0.102		

***p<.001 **p<.01 *p<.05 †p<.10; *b* = unstandardized coefficient, β = standardized coefficient. Abbreviations: M, Mediator; TFI, TFI Total Percentage at 2020; SRMR, Standardized Root Mean Squared Residual.

Table 2 (continued)

	Team Productivity			Team Tension		
Path	*b*	*SE*	β	*b*	*SE*	β
Between-level						
M on Intervention (a)	0.52*	0.22	0.40	0.14	0.30	0.10
TFI on M (b)	12.24**	3.66	0.51	5.69†	3.45	0.25
TFI on Intervention (c')	2.12	4.37	0.07	7.78†	4.34	0.25
Indirect (a*b)	6.30*	2.63	0.21	0.80	1.82	0.03
M on Fringe	0.39	0.34	0.61	0.69**	0.22	1.01
M on Level	0.05	0.22	0.07	0.09	0.30	0.13
TFI on Baseline	0.11	0.17	0.09	0.09	0.18	0.07
TFI on Fringe	-5.55	5.25	-0.36	-4.51	5.66	-0.29
TFI on Level	11.92**	4.23	0.78	12.06**	4.43	0.78
M Intercept	3.40***	0.19	5.29	3.58***	0.30	5.25
TFI Intercept	16.27	13.95	1.06	37.80**	13.01	2.46
Residual variances						
TFI	127.64**	0.12	0.54	163.60***	38.59	0.69
M	0.32**	0.12	0.79	0.39	0.28	0.84
Within-level						
M on Role	0.24	0.15	0.31	-0.01	0.27	-0.01
Residual variances						
M	0.59***	0.10	0.98	1.66***	0.30	1.00
X^2(*df*)	3.56(4)			4.39(4)		
SRMR within	0.000			0.004		
SRMR between	0.079			0.086		

***p<.001 **p<.01 *p<.05 †p<.10. Abbreviations: M, Mediator; TFI, TFI Total Percentage at 2020; SRMR, Standardized Root Mean Squared Residual.

In summary, we found significant mediation effects of the RS3 supports on implementation fidelity through improved team productivity, as well as marginal effects through improved organizational change commitment, team culture, and team goal-setting.

Research Question 3

As noted above, student data were unavailable after baseline, and thus we were not able to assess Research Question 3, which pertained to the impact of the intervention on student outcomes.

Research Question 4

Qualitative data was used to explore Research Question 4, which assessed the perceived feasibility, acceptability, appropriateness of RS3 among school stakeholders. All data collected from interviews with various stakeholders was first transcribed verbatim using Otter software (Otter.AI, Mountain View, CA, USA). Then, transcripts were imported into Dedoose qualitative coding software (Sociocultural Research Consultants, LLC Manhattan Beach, CA, USA). Qualitative coding was conducted using directed content analysis (Hsieh & Shannon, 2005) with two independent coders.

We found that in-person and virtual trainings with ample collaboration time for teams, and ongoing implementation support provided in-person or virtually by an experienced Implementation Support Practitioner (ISP), were highly acceptable and appropriate strategies for supporting PBIS implementation in rural schools. The monthly virtual learning sessions and web portal with resources, were still acceptable, but not as highly rated. The virtual learning sessions were appreciated for the collaboration with other schools in the intervention. The web portal was rated least acceptable, with not many school staff engaging with it outside of using links to specific resources that were sent by the ISPs.

With regard to the modality of support delivery, school staff preferred in-person trainings and meetings with ISPs, when possible. However, the strategic use of virtual trainings and meetings was appropriate and increased the feasibility of attendance to the trainings, as well as the feasibility of TA delivery. The use of in-person support at the onset of implementation was viewed across the board as essential to accelerate relationship-building and increase rapport between the ISP and the school PBIS team (as well as other staff at the

schools). Providing virtual TA later was more acceptable to both parties (the ISPs and the school teams) because of the established familiarity with one another, as well as the ISPs having a better understanding of the school setting. Importantly, providing virtual assistance increased the feasibility of providing high-quality support to all schools in remote settings on a monthly basis, while not compromising too much on acceptability and appropriateness. Extensive details about the qualitative results are reported in a published manuscript (Calvert et al., 2023).

Additional Exploratory Analyses

Although not included as a specific research question in the original project design, the staff surveys were collected annually and were leveraged to address additional research topics relevant to the project. These are briefly described here, and full results are available in

Expected Applicability of the Research

We expect that the results from this study will be applicable to rural schools not only in the state of Idaho, but also rural schools across the United States. Furthermore, because the design of the trial was to test an approach for scaling up evidence-based interventions, with PBIS as the intervention, it is also quite likely that the implementation support strategy that we tested can be used with other school-based universal prevention interventions.

Participants and Other Collaborating Organizations

There were no collaborating organizations other than Boise State and the public K-12 schools engaged in the work. Three schools were involved during the piloting phase of the project, to finalize the RS3 implementation support strategies, and 40 schools were involved in the randomized trial.

Changes in Original Approach

One notable modification and one notable impact occurred as a result of the COVID-19 pandemic. First, the training elements of the study–for both arms of the trial—were delivered as virtual trainings rather than in-person trainings from Summer 2020 onward. As a result, the summer 2020 and 2021 institutes occurred virtually, with school teams meeting in the same regional groupings as they had done during the Tier 1 institute (summer 2019). The notable impact to this study involved missing data due to statewide cancellation of academic achievement testing in May 2020, the lack of validity of student behavior data, and schools' requests that due to other burdens on students and families that we not collect the student and parent climate surveys in spring 2020 or spring 2021. Due to the missed year of student standardized testing in 2020 as well as disrupted collection of disciplinary data at schools that were using virtual learning, we were unable to investigate Research Question 3, pertaining to student outcomes. These changes are described in the published protocol paper (Turner et al., 2022), which uses the CONSERVE (CONSORT and SPIRIT Extension for RCTs Revised in Extenuating Circumstances) guidelines (Orkin et al., 2021) to document the impacts to the original trial design.

Activities/Accomplishments

We successfully concluded the project, providing four years of training and additional supports to rural schools implementing PBIS. This was an unanticipated result of the of no-cost extension we received due to COVID-19. At the last data collection point at the end of the research trial in 2022, most of the schools enrolled were still implementing PBIS with fidelity, even despite the challenges of the pandemic shutdown. After the intervention portion of the grant period ended, the research team continued to disseminate findings through conference presentations (16 total) and manuscripts (4 published).

Results and Findings

As noted above, primary analyses showed a significant effect of the implementation supports on the fidelity of schoolwide (Tier 1) implementation fidelity, early in the trial. Our results also confirm that external supports can improve organizational readiness and change commitment, and that these are associated with improved Tier 1 implementation fidelity. This is a particularly important finding given that PBIS developers generally suggest that a high level (> 80%) of staff commitment is required to garner positive student behavioral changes at the school level, yet few strategies for obtaining this buy-in have previously been developed. Trainings and assistance that improve school-wide capacities, particularly during the adoption phase of evidence-based programming, may be one such strategy. Organizational readiness is critical to the successful adoption and sustainment of evidence-based programming.

These results have meaningful implications for scale-up of schoolwide (i.e., universal)

prevention initiatives. Although many initiatives are designed to be self-sustaining within schools following limited initial trainings, school teams can benefit from additional trainings and ongoing assistance from experts. Importantly, the RS3 approach that we tested was feasible and acceptable to schools, and had relatively minimal personnel and time requirements, as well as very little travel burden. This suggests that investment in external supports provided by a small number of content experts—particularly those that focus on improving school team functioning and building school-wide capacity—can lead to positive gains for districts and states, and can be delivered efficiently through virtual modalities.

Limitations

The primary limitations to this study's results stem from pandemic-related impacts. Notably, we were not able to reliably or validly assess student-level outcomes such as academic, behavioral, or safety/climate outcomes. These data were either not collected, not available, or not reliable. Consequently, the analyses focused on other aims, specifically the focus on drivers of implementation, and mediators of the implementation process, such as team functioning. We also gathered detailed process evaluation data to assess the acceptability and feasibility of virtual supports for PBIS implementation in rural settings.

Artifacts

List of Products

Peer-Reviewed Published Papers

Calvert, H. G., McQuilkin, M., Havlicak, A., Lewis, T., & Turner, L. (2023). Acceptability, appropriateness, and feasibility of Rural School Support Strategies for behavioral interventions: A mixed methods evaluation over two years of a hybrid type 3 implementation-effectiveness trial. *Implementation Science Communications*, *4*(1), 92. https://doi.org/10.1186/s43058-023-00478-4

Fleming, C. M., Calvert, H. G., & Turner, L. (n.d.). Psychological safety among K-12 educators: Patterns over time, and associations with staff well-being and organizational context. *Psychology in the Schools*, *n/a*(n/a). https://doi.org/10.1002/pits.23165

Fleming, C. M., Calvert, H. G., & Turner, L. (2023). Burnout among school staff: A longitudinal analysis of leadership, connectedness, and psychological safety. *School Mental Health*, *15*(3), 900–912. https://doi.org/10.1007/s12310-023-09594-x

Turner, L., Calvert, H. G., Fleming, C. M., Lewis, T., Siebert, C., Anderson, N., Castleton, T., Havlicak, A., & McQuilkin, M. (2022). Study protocol for a cluster-randomized trial of a bundle of implementation support strategies to improve the fidelity of implementation of schoolwide Positive Behavioral Interventions and Supports in rural schools. *Contemporary Clinical Trials Communications*, *28*, 1–13. https://doi.org/10.1016/j.conctc.2022.100949

Papers Currently in Peer Review

Calvert, H. G., Fleming, C. M., McQuilkin-Lowe, M., Lewis, T., Siebert, C., Havlicak, A., Anderson, N., Castleton, T., & Turner, L. Training and technical assistance increase the fidelity of implementation of a universal prevention initiative in rural schools: Results from a three-year cluster-randomized trial. *Prevention Science.*

Fleming, C. M., Calvert, H. G., & Turner, L. Training and technical assistance increase the fidelity of implementation of a universal prevention initiative in rural schools: Results from a three-year cluster-randomized trial. *Prevention Science.*

Conference Presentations

Calvert H.G., Fleming C., Lewis T, McQuilkin M., Anderson N., Castleton T., Havlicak A., Turner L. *Intervening to improve the fidelity of implementation of universal prevention initiatives in rural schools: Results from a three-year trial.* Society of Behavioral Medicine's 45th Annual Meeting & Scientific Sessions. Philadelphia, PA: March 13-16 2024.

Turner L., Fleming C., Calvert H.G., Lewis T, Siebert C., McQuilkin M., Anderson N., Castleton T., Havlicak A. *Training and technical assistance increase implementation fidelity of Positive Behavioral Interventions and Supports in rural schools: Results from a three-year trial*. Society for Prevention Research Annual Meeting. Washington, DC: May 30-June 2 2023.

Turner, L. *Improving the implementation of universal prevention initiatives in rural K-12 schools through external supports: Testing mediation impacts on school team functioning, organizational readiness, and change commitment.* 15th Annual Conference on the Science of Dissemination and Implementation in Health. Washington, DC: December 2022

Turner, L., Fleming C, Calvert HG, Lewis T, Siebert C, McQuilkin M, Anderson N, Siebert C., Castleton T., Havlicak A. *Intervening to improve the implementation of universal prevention practices in K-12 schools: Impacts on schoolwide PBIS implementation fidelity and staff knowledge & beliefs*. Society for Prevention Research Annual Meeting. Seattle, WA: 2022.

Turner, L. *Studying implementation of Positive Behavioral Interventions and Supports in rural schools…during challenging times*. National Institute of Justice, School Safety Conference. Virtual: 2021.

Anderson N, Calvert HG, Lewis T, Turner L. *Coaching and remote technical assistance help rural Idaho schools implement PBIS.* The 18th International Conference on Positive Behavior Support. Virtual: March 2021.

Calvert HG, McQuilkin M, Anderson N, Castleton T, Lewis T, Havlicak A, Siebert C, Turner L. *Acceptability of implementation strategies in a hybrid type 3 randomized trial of universal prevention programs in rural K-12 schools*. 13th Annual Conference on the Science of Dissemination and Implementation in Health. Virtual: December 2020.

Turner L, Calvert HG, Bubak-Azevedo K, Siebert C. *Resources and school culture are associated with readiness for implementation of universal prevention programs in rural schools.* 12th Annual Conference on the Science of Dissemination and Implementation. Arlington, VA: December 2019.

Conference Posters

Castleton T, Anderson N, Calvert HG, Fleming C, Turner L. *Physical and social environments in rural schools: Associations between physical appearance and climate perceptions*. Society for Prevention Research Annual Meeting. Washington, DC: May 30-June 2 2023.

Lewis T, Calvert H.G., Anderson N., Castleton T., Havlicak A Turner L. *The Coaches' Self-Assessment Inventory (CSI): Preliminary testing of a new monitoring tool for PBIS implementation in schools.* Society for Prevention Research Annual Meeting. Seattle, WA: 2022.

Fleming C., Turner, L., Calvert H.G, Lewis T, Siebert C. *Leadership as a determinant of perceived psychological safety among staff in K-12 education settings: Key ingredients for the implementation of innovations*. Society for Prevention Research Annual Meeting. Seattle, WA: 2022.

Turner L., Fleming C., Calvert H.G., Lewis T., McQuilkin M., Anderson N., Siebert C., Castleton T., Havlicak A. *Improving implementation of universal prevention initiatives in K-12 schools through external supports: Impacts on school team functioning, readiness, and change commitment*. Society for Prevention Research Annual Meeting. Seattle, WA: 2022.

Turner L, Calvert HG, Bubak-Azevedo K, Siebert C, Havlicak A. *Educator perceptions of psychological safety, leadership, school climate, and implementation of behavior management practices: exploring associations in K-12 school settings*. American Public Health Association Annual Meeting. Virtual: October 2020.

Castleton, T., Anderson, N., Havlicak, A., Calvert, HG, Turner, L. *Understanding the unique safety-related needs and challenges of rural schools*. PBIS Leadership Forum. Chicago, IL: 2019.

Anderson, N., Castleton, T., Havlicak, A., Calvert, HG, Turner, L. *RK-12 Rural schools research project: Studying SWPBIS implementation in rural settings*. PBIS Leadership Forum. Chicago, IL: 2019.

Calvert, HG, Castleton, T., Anderson, N., Havlicak, A., Turner, L. *The Idaho Rural Implementation Model: An approach to scaling SWPBIS in remote locations*. PBIS Leadership Forum. Chicago, IL: 2019.

Datasets Generated

A school-level dataset was compiled, including school demographic characteristics, intervention condition, and dosage of each mode of implementation support for each semester (Fall, Spring, Summer) of the study period. The school dataset also includes annual TFI scores for 2019 to 2022.

The staff dataset includes survey responses collected from school staff during each of the 4 waves of the study period, as well as a unique identification number to link respondents across waves. The staff dataset includes constructed scales that were used in reports, publications, and other dissemination products.

A dataset was generated to include survey responses from the PBIS implementation team members in 2019 and 2020. This dataset includes survey responses, tracking information, and scales used in publications and presentations.

Student and parent datasets were generated using survey data collected from each during the baseline wave of the study. Each dataset contains anonymous survey responses, as well as scales generated across survey items.

Three separate qualitative datasets were generated from the interviews with school PBIS coaches and administrators at the end of years 1, 2, and 3 of implementation. One additional qualitative dataset was generated from the group interview with the three implementation support practitioners that provided TA to the schools throughout the project.

Dissemination Activities

Dissemination activities for this project primarily included conference presentations, reports, and manuscripts published in peer-reviewed journals, all listed above.

Results of Evaluability Assessments

No evaluability assessments were collected in this project.

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