



Preventing School Failure: Alternative Education for Children and Youth

ISSN: 1045-988X (Print) 1940-4387 (Online) Journal homepage: <http://www.tandfonline.com/loi/vpsf20>

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To cite this article: Allison F. Gilmour, Joseph H. Wehby & Terrell M. McGuire (2017) A preliminary investigation of using school-based coaches to support intervention fidelity of a classwide behavior management program, *Preventing School Failure: Alternative Education for Children and Youth*, 61:2, 126-135, DOI: [10.1080/1045988X.2016.1214907](https://doi.org/10.1080/1045988X.2016.1214907)

To link to this article: <https://doi.org/10.1080/1045988X.2016.1214907>



Published online: 11 Aug 2016.



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A preliminary investigation of using school-based coaches to support intervention fidelity of a classwide behavior management program

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ABSTRACT

Many schools are beginning to implement universal behavior management interventions as part of multitiered systems of support. Past research suggests that teachers need support to implement new practices with fidelity. Coaching is one method for supporting implementation, but little is understood about how coaching takes place when relying on school staff to act as coaches. The goal of this study was to examine the extent to which school-based coaches delivered coaching and to compare the intervention fidelity of teachers randomly assigned to school-based or university-based coaches. The authors worked with school-based staff to develop a nonintensive coaching procedure and schedule. School-based coaches found it challenging to find time to deliver coaching with one school-based coach completing zero coaching sessions. Teachers assigned to the university-based coach maintained intervention fidelity, adherence, and quality over time compared to teachers assigned to the school-based coaches. The results suggest that, under some conditions, school-based coaches may not be able to provide the intensity of support needed for teachers to maintain high levels of fidelity.

KEYWORDS

Classroom management; intervention fidelity; teacher coaching

Schools are increasingly adopting multitiered systems of support (MTSS) to improve student academic and behavioral outcomes. Response to Intervention (RTI) and Schoolwide Positive Behavioral Interventions and Supports (SWPBIS), both MTSS, include levels of more intensive support for students who fail to respond to embedded universal interventions. For MTSS to succeed in improving student academic and behavioral outcomes, schools must implement generally effective universal programs with fidelity (Fixsen, Blase, Metz, & Van Dyke, 2013; Technical Assistance Center on PBIS, 2010). Research supports the capability of school staff to implement schoolwide programs with fidelity (Bradshaw, Reinke, Brown, Bevans, & Leaf, 2008; Fairbanks, Sugai, Gardino, & Lathrop, 2007) but few studies have concentrated on the implementation of universal programs within individual classrooms (Pas, Waasdorp, & Bradshaw, 2015) or how to support teachers with implementation.

The degree and quality of intervention fidelity generally depends on the school and classroom context, individual implementers, and program components (Han & Weiss, 2005). Even when teachers begin intervention implementation with high levels of fidelity, fidelity tends to decrease over time (Han & Weiss, 2005), which could have a detrimental effect on intervention outcomes. One method for improving or maintaining intervention fidelity may be providing coaching to teachers. The purpose of this study was to provide preliminary information about the capability of school staff to provide coaching to support intervention fidelity of a classroom behavior management program and to compare the intervention fidelity of

teachers assigned to school-based coaches to teachers assigned to university-based coaches.

Intervention fidelity and outcomes

Effectively scaling up evidence-based practices (EBPs) relies on the ability of school personnel to implement the practices with enough fidelity to impact student outcomes. Fixsen et al. (2013) argued that improved student outcomes are dependent on the interaction between intervention fidelity and EBPs; without intervention fidelity EBPs will not be effective. Additional studies support the importance of intervention fidelity for intervention effects. In a meta-analysis of school-based behavior interventions, Wilson and Lipsey (2007) found that the average effect size of programs for students with behavior needs in separate educational settings without implementation problems was 0.42 standard deviations higher than the average effect size of studies with implementation problems after controlling for a number of other study level characteristics. Additionally, a one-unit increase in the implementation quality of pullout behavior support interventions was associated with a 0.17 standard deviation increase in program effectiveness. However, the authors did not identify a statistically significant relation between implementation quality and program outcomes for universal behavior interventions despite identifying a positive relation in an earlier meta-analysis (Wilson, Lipsey, & Derzon, 2003).

Implementation has been an important component of evaluations of SWPBIS but most studies have focused on

the ability of schools to reach acceptable levels of fidelity (Bradshaw et al., 2008). A smaller number of studies have examined how implementation was related to student outcomes. Flannery, Fenning, Kato, and McIntosh (2014) investigated the implementation fidelity of Tier 1 of SWPBIS in high school settings. They found that schools with higher levels of implementation of SWPBIS had larger reductions in student problem behavior. These findings corroborate data reported by Kovalski, Gickling, Morrow, and Swank (1999), who found no effects on student outcomes in schools with low implementation of an MTSS while student behavior problems decreased in schools with high implementation.

Other studies have examined the relation between fidelity and intervention outcomes at the classroom level. Using a quasi-experimental design, Burke, Oats, Ringle, Fichtner, and DelGaudio (2011) evaluated the relation between intervention fidelity of a classroom management program and student academic and behavior outcomes in 56 elementary school classrooms. There were overall positive treatment effects, but students in classrooms with high-fidelity had better behavioral outcomes than students in low-fidelity classrooms.

Coaching and intervention fidelity

Coaching, or ongoing, nonevaluative, targeted feedback following observation (Stormont, Reinke, Newcomer, Marchese, & Lewis, 2014), may help to support teacher intervention fidelity of EBPs. Research studies often include coaching to improve teacher fidelity (Han & Weiss, 2005), but few studies have examined coaching as an independent variable (Kretlow & Bartholomew, 2010; Stormont et al., 2014). Studies have primarily evaluated the use of coaching in early childhood programs, for example, Conroy, Sutherland, Vo, Carr, and Ogston (2014), Domitrovich, Gest, Jones, Gill, and DeRousie (2010), Fox, Hemmeter, Snyder, Binder, and Clarke (2011), and Sutherland et al. (2015). Fox et al. (2011) identified a relation between a professional development package that included coaching with performance feedback and three teachers' implementation of practices included in a tiered system for promoting social-emotional development in young children. Two of the teachers maintained high levels of implementation after coaching ended, suggesting that coaching can help teachers implement new practices and may promote sustained implementation over time.

Similar coaching approaches are promising for teachers of older students. Reinke, Stormont, Herman, and Newcomer (2014) investigated the use of coaching to support teacher implementation of a universal classroom management program. Following in-service training, 56 teachers received coaching from a program staff member that involved observations, goal setting, and performance feedback. The findings supported the efficacy of coaching to improve and maintain teacher intervention fidelity.

Similar studies have demonstrated that coaching with performance feedback has maintained or prevented the decrease of intervention fidelity over time (DiGennaro, Martens, & McIntyre, 2005; Kretlow, Wood, & Cooke, 2011). In a review of 29 peer-reviewed studies of school-based social-behavior

interventions that included teacher coaching, Stormont et al. (2014) identified that 86% of studies reported coaching increased intervention fidelity. Though coaching holds promise for improving intervention fidelity, most research studies that include coaching provide limited information about the actual coaching procedures and who acts as the coach (Kretlow & Bartholomew, 2010; Stormont et al., 2014).

School-based coaching

Most studies of the relation between coaching and the intervention fidelity have relied on research staff to act as coaches (Stormont et al., 2014), but for coaching to be efficient and sustained at scale, coaching should be provided by school staff (Stormont et al., 2014). Although some programs stress the importance of on-staff coaches with flexible schedules to assist schools with implementation (e.g., SWPBIS), little systematic research provides information about coaching by school staff under typical school conditions.

A recent experimental study has directly compared school staff and research staff as coaches to support intervention adoption and fidelity (McMaster, Han, Cooling-Chaffin, & Fuchs, 2013). Following intervention training, McMaster et al. (2013) randomly assigned 16 teachers to receive implementation support for a kindergarten reading intervention from experienced teachers or university staff. They identified an effect size of 0.41 for teacher intervention fidelity favoring teachers assigned to the university staff, but this finding was not statistically significant. Teachers assigned to school-based coaches received fewer observations with feedback than teachers assigned to the university-based coaches due to challenges with finding time to leave their classrooms and observe teachers in other classrooms and sometimes other schools. The study suggests that school-based coaches may find it challenging to provide the level of support delivered by research staff, but that less support may not be related to drastically reduced intervention fidelity.

Purpose and research questions

The purpose of this study was to provide more information about school-based coaching and intervention fidelity by assigning teachers to receive support from school-based or university-based coaches. This exploratory study provides preliminary experimental information about challenges to using school-based staff to support teacher intervention fidelity. We investigated two research questions: (1) To what extent did school-based coaches provide coaching to teachers? and (2) Did teachers assigned to school-based coaches maintain the same levels of intervention fidelity (adherence and quality) over time compared to teachers assigned to university-based coaches?

Based on the results from McMaster et al. (2013), we hypothesized that school-based coaches would deliver coaching to teachers but at a lower dosage than the university-based coach. We expected teachers assigned to school-based coaches to have lower intervention fidelity than teachers assigned to university-based coaches if teachers assigned to school-based coaches received a lower dosage of coaching.

Methods

Coaching context

The goal of our study was to learn more about the use of school-based coaches and to compare teacher intervention fidelity between teachers assigned to school-based or university-based coaches. Teachers were trained to use the Class-Wide Function-related Intervention Teams (CW-FIT), a group contingency program. We did not evaluate the effectiveness of CW-FIT in supporting student behavior. CW-FIT is supported by experimental research and evaluated in two IES Goal 3 grants (Caldarella, Williams, Hansen, & Wills, 2015; Kamps et al., 2011; Kamps et al., 2015; Wills et al., 2010). There are three main components to CW-FIT: (a) students are taught behavior expectations; (b) students earn points in teams for exhibiting these behaviors; and (c) all teams of students that reach a point goal access a reward. The specific program components measured for fidelity are outlined in Table 1.

Setting

The principals of two schools who participated in a randomized control trial of CW-FIT during the 2012–2013 school year requested that university staff provide in-service training to all of their teachers at the beginning of the following school year. The teachers and instructional support personnel, who acted as school-based coaches, worked in two elementary schools located in a large, urban school district in the southeastern United States. School 1 served students from pre-kindergarten through fourth grade; 92% of students were identified as Black; and nearly all students were eligible for free or reduced-price lunch (FRL). School 2 served students from pre-kindergarten through fourth grade; the majority of students were White (65%); and 25% of students identified as Black. Nearly 40% of students qualified for FRL. Class sizes ranged from 15–20 students in both schools. A few teachers at each school had implemented CW-FIT in a previous study; these teachers were not included in this study. Both schools had trained teachers in a schoolwide acknowledgment system as part of SWPBIS.

Participants

Teachers

A total of 70 teachers attended the initial CW-FIT training. Of these teachers, 25 responded to our follow-up contact and

Table 2. Teacher demographic information.

Variable	Group					<i>t</i> (<i>DF</i>)	χ^2	
	School-based		University-based					
	<i>M</i>	<i>N</i>	<i>M</i>	(<i>SD</i>)	<i>N</i>			
Age	40.61	(14.83)	5	35.78	(12.52)	7	.61(10)	
Years teaching	6.17	(5.42)	6	8.81	(9.22)	8	−.62 (12)	
Years at current school	1.91	(1.62)	6	4.96	(3.72)	8	−1.87(12)	
Gender								
Male			1			0		1.44
Female			5			8		
Education								
Bachelor's			1			3		.73
Master's			5			5		
Ethnicity								
White			2			6		
Black			4			0		7.88*
Hispanic			0			3		

Note. Two teachers, one from each coaching condition, did not report age.

*Indicates that the difference between groups was statistically significant.

received coaching and assistance during kick-off and 17 provided consent to participate in this current study. Two teachers left the study prior to randomization—the first citing a dislike of observers and the second was excluded due to maternity leave. One teacher withdrew from the study after randomization citing a dislike of being observed. This left a total of 14 teachers in the final sample: eight teachers at School 1 and six teachers at School 2. Teacher demographic information is provided in Table 2.

Coaches

Each school had an on-site instructional support staff member who independently approached the research team and volunteered to assist with the project. Both staff members described their roles as supporting teachers with instruction delivery and acted as the school-based coaches in this study. The coach at School 1 was in her first year as an instructional specialist at the school after five years of teaching kindergarten at School 1. She had a total of 13 years of teaching experience. She had implemented CW-FIT in her classroom during the previous school year as part of a larger study. The coach at School 2 was in her second year as the literacy support staff at the school. She had previously worked as a reading specialist or literacy specialist within the district for 10 years.

The lead author of this study acted as the CW-FIT coach for teachers assigned to the university-based coaching condition. She was a doctoral student in special education with certification to teach students with disabilities in K–12 settings. The university-based coach had three years of classroom teaching experience and one year of experience in assisting teachers with implementation of CW-FIT.

Research design and randomization

We randomized teachers within schools to two conditions: (a) school-based coaching or (b) university-based coaching. Randomization resulted in five teachers assigned to the university-based coaching condition and three teachers assigned to the school-based coaching condition at School 1. At School 2, three teachers were assigned to the university-based coaching condition and three teachers were assigned to the school-based coaching condition.

Table 1. Procedures for the teacher-implemented intervention (CW-FIT).

CW-FIT procedures
1. Skills are prominently displayed on posters.
1. Precorrects on skills at beginning of session.
2. Corrections are instructive and refer to skills.
3. Team point chart displayed.
4. Daily point goal posted.
5. Timer used and set at appropriate intervals.
6. Points awarded to teams for use of skills.
7. Points tallied for teams.
8. Winners immediately rewarded or winner's reward announced if delayed.
9. Frequent praise (points) given.
10. Behavior-specific praise given.
11. Praise (points) to reprimand ratio is approximately 4:1.

Measures

We collected data on two outcomes: implementation fidelity of coaching and teacher intervention fidelity. Implementation fidelity of coaching addressed RQ1. Intervention fidelity was a teacher level measure addressing RQ2. We collected survey information from teachers about their satisfaction with the intervention, training, and coaching support.

Implementation fidelity

The coaches were instructed to complete three forms at each teacher observation: (a) the intervention fidelity adherence and quality measure (discussed in more detail below), (b) the teacher coaching feedback form, and (c) a coaching implementation fidelity checklist. We used the intervention fidelity adherence and quality measure and the coaching implementation fidelity checklist to assess the dosage of coaching (RQ1). The coaching implementation fidelity checklist had six feedback procedures where the coach circled “Yes” or “No.” These procedures included: completed the teacher coaching feedback form, calculated the fidelity score, recorded the number of praise statements, provided one praise statement, provided one area for improvement, and gave the teacher the feedback form. The coaching fidelity was self-reported but we intended to collect inter-observer agreement (IOA) for 30% of coaching sessions. Unfortunately, the school-based coaches did not follow the coaching schedule (see “Results” section), and we were unable to collect IOA on the school-based coaching fidelity. We collected IOA on the coaching fidelity measure for the university-based coach. Agreement estimates for the university-based coach coaching implementation fidelity were 100% across 30% of sessions. In addition to these forms, we spoke individually with coaches to obtain more qualitative information about their experiences with providing school-based coaching.

Intervention fidelity

We measured two components of CW-FIT intervention fidelity; adherence and quality (O’Donnell, 2008). Both measures of intervention fidelity were collected biweekly (every other week) for teachers in both conditions. We collected follow-up data on intervention fidelity one month after the last scheduled data collection observation.

We measured teacher adherence using a rating form after observing each teacher during 20 min of CW-FIT. The form (Table 1) included a list of 13 procedures making up CW-FIT; the observer recorded “yes” (Y) if the step was implemented, “no” (N) if the step was not implemented, and N/A for steps that observers did not have the opportunity to record during the 20-min observation. We calculated the proportion of steps observed by dividing the number of steps observed by the total number of steps possible and multiplying this number by 100. The adherence portion of this measure had high internal consistency with a Kuder-Richardson 20 of .98 and point-biserial correlations ranging from .78–.98.

The second component of intervention fidelity was quality. For each procedure marked observed on adherence, the research assistant (RA) also provided a quality score of 1 to 3.

For procedures not observed but not marked N/A (when the “no” was circled by the observer), the RA gave a quality score of 0. We calculated the average overall quality by summing the quality scores and dividing by the total number of procedures marked observed or not observed. The denominator excluded any steps marked N/A. The Cronbach’s alpha for this polytomously scored measure was .89. We calculated IOA for adherence using exact agreement and for quality with agreement within one point on the scale. Across 30% of observations, average IOA adherence was 98.17% (76.92%–100%) and average IOA for quality was 97.78% (83.33%–100%).

Teacher satisfaction

Our final measure addressed teacher satisfaction with both CW-FIT and the coaching procedures. The surveys included 10–11 items, depending on teacher coaching condition, with a Likert response ranging from 1 (*Not True*) to 4 (*Very True*). Four items related to the usefulness of CW-FIT and CW-FIT training; two to three items addressed coaching (type and frequency); and the remaining questions pertained to new skills learning, likelihood of using CW-FIT in the future, and student response to CW-FIT. The survey included four constructed response items asking teachers the following: what helped them to learn CW-FIT; why they chose to use CW-FIT; what could be more helpful to teachers; and a general question about classroom management. The items were worded to match the teacher’s assigned coaching condition. All teachers filled out the survey before the follow-up data-collection session.

Data collection

Four graduate level RAs collected data. The RAs had experience completing direct observation measures in previous studies of CW-FIT. Each RA completed training on the measures using videos and in-person observations. All RAs reached a criterion of 90% agreement with an expert coder. The RAs observed each teacher and completed the coaching implementation fidelity and intervention fidelity outcome measures over six sessions with a seventh observation for follow-up data. The first session, session 0, was immediately after kickoff and each teacher was required to reach a score of at least 80% adherence before the intervention began. Sessions 1–5 were intervention sessions. We scheduled data collection for every other week during the same class period each week. If a teacher was absent or preferred that we did not observe that day, we returned later in the week at the same observation time. We augmented these quantitative data with qualitative information to help us better understand our findings for RQ1. We planned to interview each school-based coach after the intervention ended using a semistructured interview protocol with questions about the feasibility of the coaching procedures.

Study procedures

All participating teachers received training from university staff on CW-FIT prior to random assignment. Training consisted of (a) the in-service presentation and (b) kickoff support. The training procedures were consistent with the training suggested

by the program developers (Wills et al., 2010). The coaching intervention began after training.

In-service training

We delivered a 2-hr training at each school during in-service days prior to school beginning for students. The presentation began by sharing data on the effectiveness of CW-FIT. Next, we presented the main components of CW-FIT. The teachers watched short videos of each component. After allowing time for additional questions to be addressed, we explained that teachers who chose to implement CW-FIT would receive kickoff support and collected contact information from teachers who requested support.

Kickoff support

We contacted each interested teacher by e-mail to meet and schedule kickoff support. During kickoff, the RA introduced CW-FIT to the class, taught the required skills, modeled implementation, and provided coaching and feedback to the teacher. Each teacher received three days of kickoff support, with each session lasting 45 min–1 hr. After kickoff, we allowed the teacher three school days to independently practice CW-FIT. Within five school days of ending kickoff, an RA observed the teacher to ensure the teacher met the checkout criterion of completing 80% of the CW-FIT steps. If the teacher did not meet the criterion, the RA provided targeted feedback and observed the teacher the following day. Only two teachers needed additional feedback to reach the criterion. We required teachers to reach 80% fidelity to account for difference in implementation over time that could be due to starting levels of implementation.

Coach training

Each school-based coach attended the schoolwide CW-FIT training and received additional training during an individual meeting with the research team. This additional training was conducted by the third author, a project coordinator who had extensive experience with CW-FIT and the coaching procedures. Components of the individual training included (a) an explanation of the research project and research questions, (b) directions for completing the CW-FIT intervention fidelity form, (c) directions for completing the coaching implementation fidelity form, and (d) a suggested calendar of teacher observation schedules. We provided each coach with the operational definitions for the intervention fidelity form and provided the opportunity for coaches to ask the research team any additional questions. The university-based coach completed the same training.

Intervention

Because the extant literature on coaching provided little information about the coaching frequency necessary for maintaining teacher intervention fidelity and suggested that school-based coaches may only observe teachers infrequently (McMaster et al., 2013), we consulted with the school-based coaches to

create an observation schedule that was manageable for school staff. Both coaches wanted observations to be short and infrequent with an easy-to-implement feedback procedure. Previous studies suggested that providing teachers with brief feedback on the steps of the intervention completed could support intervention fidelity (Reinke, Lewis-Palmer, & Martin, 2007; Reinke et al., 2014). We simplified the intervention fidelity sheet to create a form that could be given to teachers at the end of each observation. The form included all steps of the intervention and the coach circled which steps were implemented and which steps were not implemented. At the bottom of the form the coaches wrote the percentage of steps completed and wrote a short note including one specific praise statement, one area for improvement, and a general statement thanking the teacher. The coaches were available to discuss the form, but planned to leave the form on each teacher's desk so as not to disrupt instruction.

We worked with the coaches to create a schedule of observations every other week for 20 min. Based on previous research (McMaster et al., 2013) we anticipated that school-based coaches would deviate from the suggested coaching schedule but we encouraged coaches to try to conduct at least five observations with performance feedback. The coaching intervention was implemented for 12 weeks.

After teachers reached the CW-FIT training criterion of 80% adherence, we informed each teacher of their coaching condition and explained that they would be observed and receive feedback biweekly from their assigned coach. Teachers were informed of their condition in order to confirm scheduled observations. Additionally, teachers knew the school-based coach at their school. We instructed the school-based coaches and the university-based coach to follow a prescribed coaching procedure. First, the coach sent an e-mail to the teacher to schedule or remind the teacher of the observation. Second, the coach observed the teacher for 20 min at the scheduled time. After observing for 20 min the coach completed the coaching implementation fidelity form, the intervention fidelity adherence and quality measure (described in the "Measures" section), and the teacher coaching feedback form. The coach gave the teacher coaching feedback form to the teacher. RAs collected the intervention fidelity checklist and coaching implementation fidelity form from the school-based coach each month.

Data analysis

We evaluated the extent to which school-based coaches provided coaching to teachers by counting the number of coaching fidelity forms completed by each school-based coach. We also communicated with each school-based coach throughout the intervention about the number of coaching sessions completed. We analyzed our qualitative data by composing thematic summaries of the interviews and evaluating these summaries for information about the feasibility of coaching. One coach (as described in the results) provided us with written qualitative information instead of interview data. We evaluated the written information in lieu of an interview thematic summary.

We used a linear growth model to evaluate the relation between coaching condition and both aspects of intervention

fidelity (RQ2). Before fitting the final model we examined scatter plots and kernel density plots to ensure that the model fit the data and that a linear model was the correct functional form. This visual inspection also allowed us to identify any outliers that could possibly influence the data. Linear growth models (LGMs) allowed us to evaluate the relation between condition and outcomes over time, modeling each time point separately but also providing an estimate of the effect overall (Singer & Willett, 2003). LGMs are a type of multilevel model with time nested within individuals. We ran our models with a random intercept and slope for time.

Results

Randomization

Shown in Table 2, we used *t* tests and chi-squared test of differences to compare the teachers assigned to each group. We found a statistically significant difference between groups on teacher ethnicity but no other differences. We controlled for ethnicity in all analyses to ensure comparability across groups; ethnicity was not statistically significant in any of the models.

School-based coaching delivery

We evaluated RQ1 with quantitative and qualitative data. Both school-based coaches volunteered to coach teachers before the school year began. Each coach expressed that a biweekly coaching schedule was feasible and fit into their job requirement of observing teachers and giving feedback. The coach at School 1 did not provide any coaching. In the first week of school she decided she did not have enough time to provide coaching. She shared:

I've been trying to schedule initial visits with the teachers I am supposed to be working with and it honestly has been a struggle. My schedule is so busy and changes on an hourly basis so I am really having a hard time finding time to get this done. Once I get something on my schedule 8 times out of 10 it ends up changing because I get pulled to go somewhere else. . . . I just don't want the teachers to get frustrated when I can't come as scheduled and I want them to be able to get the coaching they need on a consistent basis. I apologize. . . . I was actually excited about being able to do this. I'm just stretched too thin right now.

The coach at School 2 was also confident in her ability to adhere to the coaching schedule. The coach at School 2 only completed four teacher observations with feedback; the original

schedule included 15 observations. This coach reported she was unable to complete this number of observations for three reasons. First, the coach experienced constant changes in her schedule due to principal, student, and teacher needs. Second, teachers were frequently unavailable for observation due to absences and schedule changes. Third, the school-based coach decided that one of the teachers did not need to use CW-FIT and she discontinued coaching with this teacher. We had planned for an RA to accompany the school-based coach on 30% of coaching visits to complete IOA on the coaching procedures. However, the unpredictability of when she completed coaching sessions did not allow for this coordination. RAs collected teacher fidelity at separate visits from the coaching observations.

Intervention fidelity

To answer RQ2 we measured two aspects of intervention fidelity: adherence and quality. We compared teachers assigned to the school-based coach to the teachers assigned to the university-based coach. Only a linear slope was needed in the model and the variance components were near zero in all models. We identified one potential outlier. This teacher decided not to use CW-FIT and subsequently left teaching. We could not assess the impact of coaching on intervention fidelity when the teacher did not actually use the intervention. Excluding the outlier also resulted in a significant improvement to model fit, $\chi^2(38.29, 3)$, $p < .01$ for adherence; $\chi^2(15.55, 3)$, $p < .01$ for quality. We interpreted and reported the results excluding the outlier. The pseudo- R^2 for adherence was .33 at level 1 and .59 at level 2 and the pseudo- R^2 for quality was .28 at level 1 and .57 at level 2, suggesting that the models explained a moderate portion of variability in the data (Willett & Singer, 2003).

The first graph in Figure 1 shows the results from the two conditions for adherence, controlling for teacher ethnicity. The results of the linear growth model for adherence are in Table 3. Teachers in both groups began the study with equivalent levels of adherence by design ($p = .97$). Time was associated with an average decrease in adherence of 7.39 percentage points ($p < .01$), controlling for coaching condition assignment and ethnicity. However, teachers assigned to the university-based coaches, on average, completed 7.68 percentage points more steps of the intervention over each time point ($p < .01$) than teachers assigned to school-based coaches. Receiving coaching from the university-based coach, on average, completely

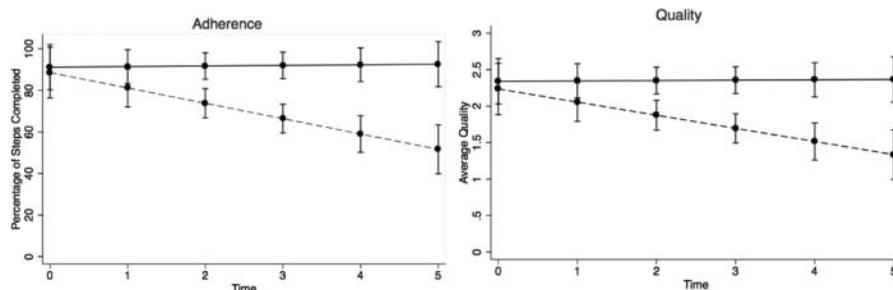


Figure 1. Graphs of the change in average intervention fidelity, adherence, and quality over time for both schools combined. Results shown by the solid line are for teachers assigned to the university-based coach. Results shown by the dashed line are for teachers assigned to the school-based coach. The vertical bars represent a 95% confidence interval.

Table 3. Effect of coaching on the adherence component of intervention fidelity.

Variable	Analysis for RQ2			School 1			School 2		
	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>
Intercept	87.81	6.45	<.01	92.75	6.75	<.01	78.33	12.90	<.01
Coach × Time	7.68	2.73	<.01	8.27	2.70	<.01	7.17	5.75	.21
Time	-7.39	2.03	<.01	-8.33	2.14	<.01	-6.00	3.79	.11
Coach	2.58	8.33	.76	-0.91	8.20	.91	11.39	18.39	.54
Ethnicity	0.97	2.19	.66	0.34	1.92	.86	12.78	13.03	.33

eliminated the decrease in fidelity over time. At time five, teachers assigned to school-based coaches had an average fidelity score of 58.51% ($SD = 23.55$) and teachers assigned to the university-based coach had an average fidelity score of 92.53% ($SD = 5.12$). The Hedges's g effect size at time five was 2.09, favoring the group assigned to the university-based coach.

We also measured quality as a second component of intervention fidelity. The second graph in Figure 1 illustrates the average change in quality over time for teachers in each condition, controlling for ethnicity. Coefficients are provided in Table 4. Both groups began the study with the same levels of quality ($p = .66$). On average, a one-unit change in time was associated with a -0.18 unit change in quality ($p < .01$), after controlling for coaching assignment and teacher ethnicity. On average, teachers assigned to the university-based coach did not experience a decrease in quality over time ($p = .02$). The Hedges's g effect size at time five was 1.60, favoring the group assigned to the university-based coach. The average quality for teachers assigned to school-based coaches was 1.46 ($SD = 0.67$) and the average quality for teachers assigned to the university-based coach was 2.34 ($SD = 0.41$) at time five.

Exploratory analysis by school

Teachers at School 1 who were assigned to the school-based coach did not receive any coaching but teachers at School 2 who were assigned to the school-based coach received 0–2 sessions of coaching. Here we presented some exploratory analyses by school. These results are exploratory and provided some more descriptive information. We interpreted these results with caution due to smaller sample sizes.

The results for School 1 are presented in column two of Table 3 and Table 4. All teachers began the intervention with an average adherence score of 92.75%. Adherence decreased significantly over time with an average decrement of 8.33 percentage points at each time point ($p < .01$), but this decrease was almost entirely protected against by coaching from the

university-based coach. School 1 had similar results for quality. These results are illustrated in Figure 1.

Intervention fidelity over time was more variable at School 2, but these results may be due to the small sample. Only two teachers were in the university-based coaching condition and three teachers were in the school-based coaching condition. The results for School 2 are presented in column three in Table 3 and Table 4 and Figure 1. After controlling for all other variables, time was associated with a six percentage point decrease in fidelity but this relation was not statistically significant ($p = .11$). Teachers assigned to the university-based coach did not have this decrement over time, but the difference between groups is not statistically significant ($p = .21$). Quality follows a similar trend. The 95% confidence intervals illustrated in Figure 2 show that teachers in both conditions at School 2 had more variability in fidelity. Despite no statistically significant differences, the size of the coefficients are similar across analyses; teachers assigned to university-based coaches did not, on average, experience the same decrease in intervention fidelity over time compared to teachers assigned to school-based coaches.

Follow-up and social validity

We measured adherence and quality six to eight weeks after the coaching intervention ended. For teachers assigned to a school-based coach, average adherence, unadjusted for ethnicity or starting adherence, increased from 58.51% at time five to 70.60% at follow-up. Average quality, unadjusted, increased from 1.46 to 1.68. For teachers assigned to the university-based coach, adherence decreased from 92.54% at time five to 67.59% at follow-up. Average quality decreased from 2.34 to 2.11. There were no statistically significant differences on any of the outcome measures by group at the follow-up data collection.

Thirteen out of the 14 participating teachers completed an anonymous survey that asked teachers for their opinions about CW-FIT, coaching, and, more generally, behavior management. All teachers agreed that CW-FIT was easy to use and improved student behavior; teachers assigned to the university-based coach averaged 3.82 in agreement (ranging from 1 for *Not True* to 4 for *Very True*), and teachers assigned to the school-based coach averaged 3.29 in agreement. When asked what was most helpful in learning how to implement the CW-FIT program, six teachers reported that the modeling during kickoff was most helpful.

Discussion

In this study we examined the extent to which school-based coaches provided implementation support to teachers. We compared the intervention fidelity of teachers assigned to school-based coaches to the intervention fidelity of teachers assigned to a university-based coach. The two school-based coaches in our study were unable to maintain a frequent schedule of coaching. Overall, the biweekly schedule of school-based coaching did not appear to be feasible at either school despite each school having a dedicated instructional coach who reported that her job was to observe teachers and provide feedback. This preliminary research suggests that some schools

Table 4. Effect of coaching on the quality component of intervention fidelity.

Variable	Analysis for RQ2			School 1			School 2		
	β	<i>SE</i>	<i>p</i>	β	<i>SE</i>	<i>p</i>	β	<i>SE</i>	<i>p</i>
Intercept	2.21	0.19	<.01	2.17	0.21	<.01	2.11	0.35	<.01
Coach x Time	0.19	0.08	.02	0.16	0.08	.06	0.26	0.16	.09
Time	-0.18	0.06	<.01	-0.19	0.07	<.01	-0.16	0.10	.11
Coach	0.11	0.24	.66	0.15	0.25	.55	0.11	0.50	.82
Ethnicity	0.04	0.06	.57	0.06	0.06	.33	0.33	0.35	.36

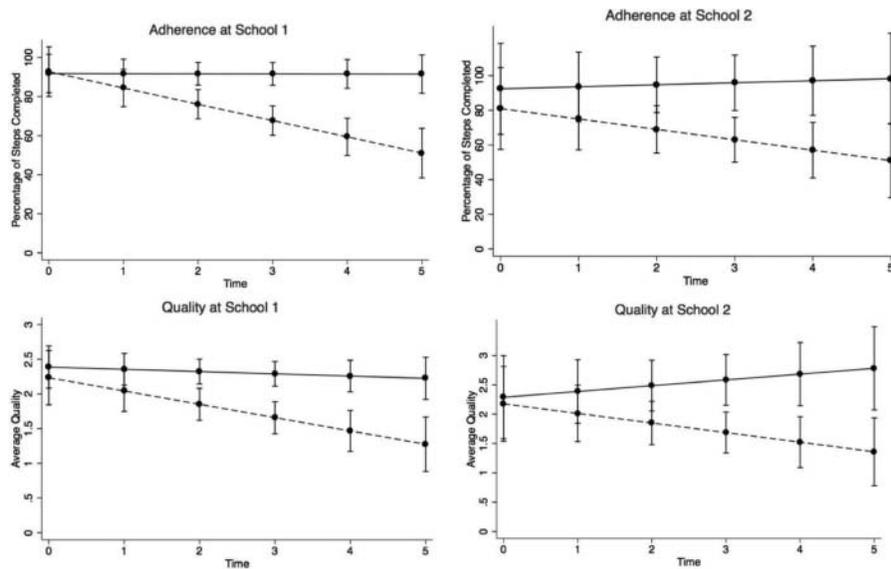


Figure 2. Graphs of the change in average intervention fidelity, adherence, and quality, over time by school. At School 1, the teachers assigned to the school-based coach did not receive any coaching. At School 2, the school-based coach completed four coaching sessions (two teachers each received two coaching sessions). Results shown by the solid line are for teachers assigned to the university-based coach. Results shown by the dashed line are for teachers assigned to the school-based coach. The vertical bars represent a 95% confidence interval.

may not have the capacity to provide teachers with the supports suggested by program developers to implement even basic universal classroom management interventions.

Our primary outcome of interest was intervention fidelity, both adherence and quality. We found that teachers assigned to the university-based coaching condition maintained higher levels of adherence and quality than teachers assigned to the school-based coaching condition. Even after disaggregating results by school, the teachers assigned to the school-based coach who conducted two coaching sessions for two teachers and none for the third based on professional judgment, these teachers experienced an average decrease in adherence of six percentage points at each time while teachers assigned to the university-based coach actually increase their adherence over time. The small amount of coaching provided by the school-based coach at School 2 was not enough to eliminate the decrease in teacher intervention fidelity over time.

These findings align with those of previous studies that found coaching can minimize the usual decrease in intervention fidelity over time (Reinke et al., 2014). In these studies, coaching was frequent—weekly or even daily. Our schedule of coaching was less intensive than the schedules commonly used in research studies (Stormont et al., 2014) but still provided enough feedback to teachers to maintain fidelity over three months. Past studies of CW-FIT involved more frequent coaching, and teachers had an average fidelity score of 88% with a range from 64%–100% (Kamps et al., 2011). Our results suggested that, although some amount of coaching is necessary to prevent a decrease in intervention fidelity, a lighter schedule of biweekly 20-min observations with written feedback might be sufficient to maintain fidelity.

In contrast to our results during the intervention period, teachers in both groups had, on average, equivalent levels of intervention fidelity at follow-up, after not receiving any support for six to eight weeks. The e-mail contact from research staff to schedule the follow-up data collection point could have

prompted the teachers to implement the intervention during the follow-up observation. This could suggest that future studies should examine low resource prompts such as e-mail check-ins to help teachers maintain intervention fidelity over time.

Limitations

Results should be interpreted with four main limitations in mind. First, we cannot directly compare the impact of school-based versus university-based coaching because the school-based coaches did not adhere to the coaching schedule. This study simply provides some preliminary information about the realities of relying on school-based coaches to support teacher intervention fidelity when using a new practice. A second limitation of this study is the small sample size that limits the generalizability of our findings. The roles of school-based coaches, and the barriers they faced, may not be similar in other schools or other districts. Third, the finding that a small amount of coaching is sufficient to maintain implementation fidelity may not extend to more complex interventions, other contexts, and teachers less friendly toward using a new intervention. Fourth, the school-based coach at School 2 conducted four school-based coaching sessions and we did not conduct IOA on these sessions. It is possible that the coaching protocol was not implemented with fidelity and the decrease in intervention fidelity over time was due to poorly implemented coaching procedures instead of the low dosage of coaching sessions.

Recommendations

For schools to independently implement new interventions without researcher involvement, more information is needed about coaching and intervention fidelity. The study results provide four main recommendations for future research on coaching. First, researchers investigating coaching and intervention fidelity should define all aspects of the coaching condition and

attempt to prescribe coaching schedules that could be feasible for implementation outside of the research context. Current research too often fails to define the details of coaching support provided to teachers and relies on a schedule of coaching that may be unrealistic for schools to implement. Teachers may need different amounts and types of coaching support depending on their individual characteristics, the context, and the intervention. Future research should explore how coaching can be adapted based on different variables related to fidelity.

Second, more research is needed on who should act as coaches to support teachers. School instructional coaches seem an obvious choice, but the competing demands of their jobs may prevent instructional coaches from finding the time to provide coaching on new interventions.

Third, the duration and intensity of initial training may be related to the amount of coaching needed by teachers to implement new interventions. It is possible that the three days of intensive training and coaching at the beginning of implementation resulted in overall moderate levels of fidelity regardless of coaching. Future research should address how aspects of the training, such as intensity and duration, are related to the coaching supports needed by teachers.

Fourth, researchers should continue investigating the efficacy of coaching interventions that may require fewer school resources, such as distance coaching (Rathel, Drasgow, Brown, & Marshall, 2014). Our follow-up data suggested that teachers might be able to maintain intervention fidelity of CW-FIT without extensive support. Although the teachers assigned to school-based coaches showed a decrease in intervention fidelity over time, teachers in both groups had, on average, equivalent levels of intervention fidelity at follow-up, after not receiving any support for six to eight weeks. The e-mail contact from research staff to schedule the follow-up data collection point could have prompted the teachers to implement CW-FIT during the follow-up observation.

Practical implications

This study also provides information for practice. The coaches we worked with in this study reported that they were used as tutors and substitute teachers instead of directly working with teachers to help improve teacher skills in classroom management or instruction. This suggests that school-based coaches may have ill-defined roles within schools. Schools need to outline how coaches should use their time and express to teachers how coaches can support their instruction.

When schools choose to adopt a new intervention, school leaders must consider the resources on hand to support teachers with implementation. In this study, school-based staff found it nearly impossible to allocate time to providing teachers with very low levels of support, despite their assurances that this schedule was reasonable. However, teachers still implemented some components of the intervention without support. This could be due to initial teacher buy-in with the intervention and the match between the intervention and teacher needs. School leaders should carefully consider their school context, teacher characteristics, and characteristics of the intervention before investing in whole-school adoption of a new intervention.

Acknowledgments

We would like to acknowledge LeAnne Johnson and Blair P. Lloyd for their helpful comments in preparing this article.

Funding

This research was supported by the Institute of Education Sciences, Department of Education (R324A120344). The first author was supported by a grant from the Office of Special Education Programs (H325D120091).

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