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Effectiveness evaluation of the Positive Family Support intervention: A three-tiered public health delivery model for middle schools☆

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ABSTRACT

This article presents the results of an evaluation of Positive Family Support, an ecological family intervention and treatment approach to parent supports and family management training developed from a history of basic and translational research. This effectiveness trial, with 41 public middle schools randomly assigned to intervention or control, examined student-, teacher-, and parent-reported outcomes, as well as math and reading scores and school attendance. Multilevel analyses suggested that for students at risk for behavior problems, immediate-intervention schools outperformed control schools on parent-reported negative school contacts for students at risk for behavior problems. Implementation, however, was hampered by several challenges, including school funding cuts, lack of staff time to provide parenting supports, and staff turnover. Given that preventive interventions are generally cost effective, it is critical that researchers continue their efforts to refine these interventions and find ways to support schools' implementation of evidence-based programs that can reduce problem behavior. This article is part of a special issue "Parental Engagement in School-Based Interventions".

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1. Introduction

Student problem behavior at school is one of the most stressful challenges facing teachers and school staff (Sugai & Horner, 2002; Walker, Colvin, & Ramsey, 1995) and one of the most costly problems facing communities and society (Miller, 2004). Youths who engage in problem behavior at school often have a variety of related concerns, including low achievement, low school attendance, depression, and substance use (Boles, Biglan, & Smolkowski, 2006; Kellam, 1990; Patterson, Reid, & Dishion, 1992). The transition to high school is a risky period for youths and is characterized by increased antisocial behavior, including substance use and violence, especially for youths with deviant peer relations (Dishion, Capaldi, Spracklen, & Li, 1995; McIntosh, Flannery,

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Sugai, Braun, & Cochrane, 2008). By ninth grade, having had just one suspension doubles the chance that a student will drop out of public school (Balfanz, Byrnes, & Fox, 2013), suggesting the need for services that address problem behavior as early as middle school. Many of the behavioral problems that define the risk trajectory for serious delinquency and early-onset substance use are most apparent and predictable from prior behavior in the school setting and from disorganized family management practices (Dishion & Patterson, 1993; Schaeffer, Petras, Ialongo, Poduska, & Kellam, 2003). Thus, early adolescence represents a window of opportunity to intervene with students who are currently displaying behavior problems and are prone to escalating these behaviors in adolescence.

1.1. Family management interventions

Research supports the value of parental involvement and monitoring as predictors of academic achievement (Spera, 2005) and the need for interventions that target parenting practices for high-risk students (e.g., Stormshak, Connell, & Dishion, 2009). Family management skills have an influence on the developmental pattern underlying adolescent problem behaviors (Fosco, Dishion, & Stormshak, 2012; Patterson & Dishion, 1988; Peterson, Hawkins, Abbott, & Catalano, 1994). Supportive family relationships reduce the risk of substance use and later problem behavior (Connell, Dishion, Yasui, & Kavanagh, 2007; Padilla-Walker, Nelson, Madsen, & Barry, 2008; Stormshak, Fosco, & Dishion, 2010; Szapocznik et al., 1991). Some reviews of effective interventions to reduce youth problem behavior have revealed that family-centered treatment models have the largest effects over time (e.g., Sanders, 2012; Weisz & Kazdin, 2010; but cf. McCart, Priester, Davies, & Azen, 2006).

Despite the evidence of benefits, a very small percentage of parents participate in parenting or family interventions to address behavior problems (Prinz & Sanders, 2007; Zubrick et al., 1995). Although relatively brief parent interventions in public schools may motivate positive change in parenting and reduce problem behavior (Dishion & Kavanagh, 2003; Forgatch, Bullock, & DeGarmo, 2003; Kazdin, 2002), few public middle schools integrate empirically supported mental health and parent interventions into their behavior management armamentarium (Atkins, Hoagwood, Kutash, & Seidman, 2010). Failure to adopt these practices may have been a product of multiple barriers. The costs and logistics of implementation, time needed to train school administrators or specialists to execute the intervention, inability to secure the requisite professionals for training, inability to reach parents and provide services to families, and competing priorities limit the ability of schools to implement interventions that involve families (Forman, Olin, Hoagwood, Crowe, & Saka, 2009). As such, most interventions that target parenting practices are unrealistic for schools (Christenson, 2003). Hence, cost-effective and efficient strategies for engaging parents within school systems that offer a clearly defined set of evidence-based behavior management and academic support strategies are warranted.

1.2. Positive Family Support within tiered behavioral supports in schools

Multitiered frameworks such as positive behavioral interventions and supports (PBIS; e.g., Anderson & Kincaid, 2005; Horner, Sugai, Todd, & Lewis-Palmer, 2005) that embed services within a model of universal, selected, and indicated interventions delivered in the school (Horner, Sugai, & Anderson, 2010) provide this context for integrating family-centered interventions. PBIS focuses on positive, nonaversive, and systems-change approaches, which have been shown to reduce problem behaviors within school settings (e.g., Bradshaw, Mitchell, & Leaf, 2010; Horner et al., 2009; Lane, Wehby, Robertson, & Rogers, 2007; Lassen, Steele, & Sailor, 2006; Smolkowski, Strycker, & Ward, 2016; Waasdorp, Bradshaw, & Leaf, 2012; Ward & Gersten, 2013). Many schools implement PBIS practices schoolwide, in the classroom, and when working with individual students. Common schoolwide PBIS implementations embrace a set of core principles: (a) all stakeholders share the operational set of values, beliefs, vision, mission, and purpose that shapes the climate and culture of the school and classrooms; (b) a small set of positively worded behavioral expectations can be clearly defined and actively taught; (c) appropriate behaviors are reinforced; (d) problem behaviors are viewed as an opportunity to teach, with corrections applied calmly and consistently; (e) decisions about students and systems are driven by data about office referrals and other aspects of school functioning; and (f) administrators are an active component in the process. Horner et al. (2010) discuss schoolwide PBIS as an educational practice and the evidence base for primary (schoolwide) interventions, as well as secondary and tertiary interventions. Schools that implement PBIS may involve individual parents or adopt specific home–school collaboration practices to support their students (Horner et al., 2010), such as sending home a daily behavior report card (Chafouleas, Riley-Tillman, & Sassu, 2006) or Check-In/Check-Out point cards for parents to review (Turtura, Anderson, & Boyd, 2014). Few schools integrate parent management training or other parenting supports into their portfolio of strategies, but features of the tiered behavior support systems may serve as ideal points of entry for more intensive parenting and family management services.

The Positive Family Support (PFS) model is a school-based approach to providing a range of family management interventions for middle school youths and their caregivers. To improve the efficiency and uptake of evidence-based family supports, such as the Family Check-Up (FCU; Dishion & Stormshak, 2007), the intervention model was redesigned to fit within the PBIS system by using principles of *systemic concatenation* (Dishion, 2011). Systemic concatenation entails adopting the core intervention principles (see concept of *kernels*; Embry & Biglan, 2008) found to be effective in evidence-based programs into a delivery system that improves the workflow and ecology of the school environment. In systemic concatenation with the FCU model, the scope and sequence of family supports align neatly within the context of the PBIS system. Consonant with the precursor Adolescent Transitions Program (ATP; Dishion & Andrews, 1995), a key feature of PFS is that it is a multilevel intervention model, assessment driven, and tailored to the needs of youths and families (Dishion & Kavanagh, 2000). Fig. 1 provides an overview of the PFS model and its integration within the PBIS system. Universal interventions built on the PBIS structures emphasize parents' awareness of school

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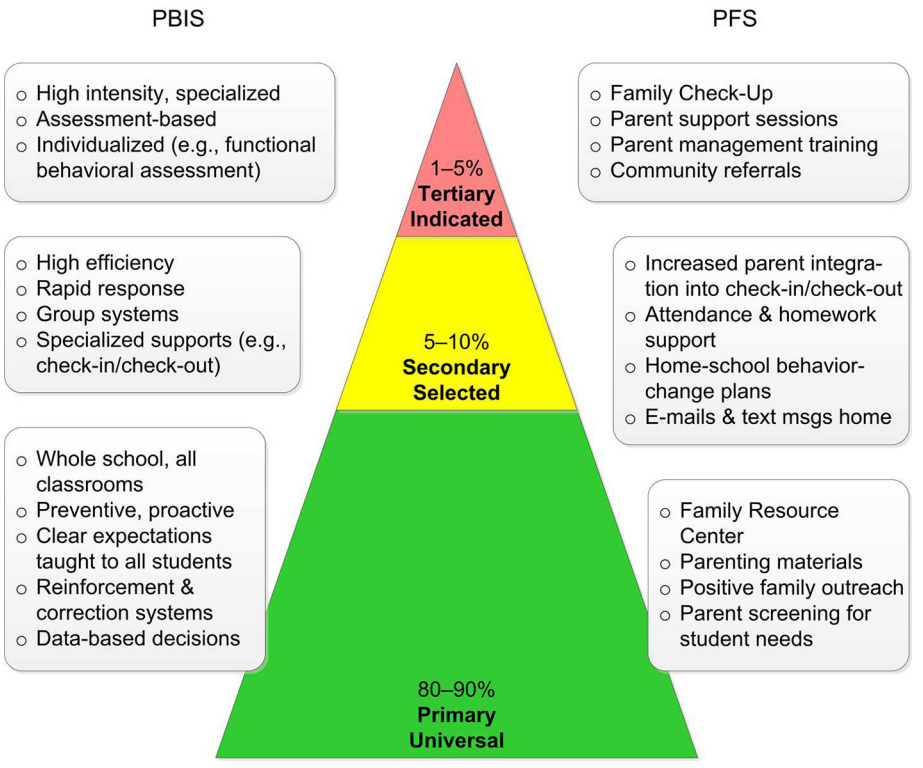

Fig. 1. An overview of how the Positive Family Support (PFS) model integrates within positive behavior interventions and supports (PBIS). Universal interventions built on the PBIS structures emphasize parents' awareness of school expectations, promote student engagement through the family resource center, and recommend brief workshops to teachers about increasing parent engagement and teacher–parent communication. The secondary or selected level provides more intensive supports, such as a protocol for engaging parents in the Check-In/Check-Out intervention and supports to improve attendance and homework completion. The tertiary or indicated level of supports includes the Family Check-Up, which comprises a family assessment, feedback, and menu of parenting support services, as well as parenting support sessions, parent management training, and community referrals.

expectations, promote student engagement, and recommend brief workshops to teachers about increasing parent engagement and teacher–parent communication. The selected level provides more intensive supports, such as a protocol for engaging parents in the Check-In/Check-Out intervention and supports to improve attendance and homework completion. The indicated level of supports includes the FCU, which consists of a family assessment, feedback, and menu of relevant and available parenting support services as well as parenting support sessions, parent management training, and community referrals.

This strategy allows PFS implementers to take advantage of systems typical of PBIS, such as behavior support that is among the top school improvement goals, behavior support teams that use data for decision making, and administration support for preventive interventions. Adaptations to PFS, however, were needed to facilitate the school-based delivery of the FCU. The standard FCU model included videotaping family interactions, for example, which was removed from the protocol, and parent and teacher assessment ratings used to provide feedback to parents were shortened. This streamlining was intended to facilitate the completion of an FCU with parents in one or two sessions when delivered by school staff, in contrast to the minimum 3 h of contact the FCU required in efficacy studies (see Dishion & Stormshak, 2007). Parent management training was also shortened to include four modules particularly relevant to school staff, based on focus groups with school staff members: (a) positive behavior support in the home to increase academic engagement, (b) limit setting, (c) monitoring one's adolescent, and (d) relationship building by negotiating solutions to conflict between parents and adolescents. PFS also included content directly related to school success, such as parenting strategies to increase homework completion and attendance support.

1.3. Positive Family Support conceptual model

PFS content was based on a number of evidence-based parent management and training models, including the Parent Management Training Model (PMTO; Forgatch, Patterson, & DeGarmo, 2005), ATP, and the Everyday Parenting Curriculum (Dishion, Stormshak, & Kavanagh, 2011). The conceptual framework for the PFS model is presented in Fig. 2. As can be seen, the PFS approach is hypothesized to improve family management and academic support strategies in the home (e.g., reduced family conflict, improved student monitoring, increased parental involvement with school and their child, decreased negative school contact, increased positive school contact). Several studies support the impact of PFS practices on family management and academic support strategies (e.g., Fosco, Van Ryzin, Connell, & Stormshak, 2016; Irvine, Biglan, Smolkowski, Metzler, & Ary, 1999).

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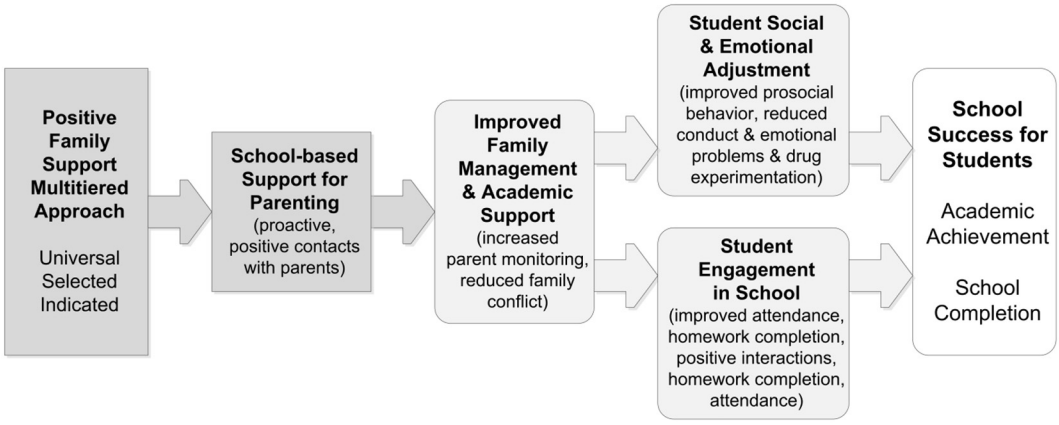

Fig. 2. Conceptual framework for the Positive Family Support intervention.

Family management and academic support strategies, in turn, are expected to have a positive impact on student social and emotional adjustment (e.g., fewer conduct and emotional problems, reduced experimentation with substances, positive interactions with peers) and improved student engagement in school (e.g., attendance, homework completion, positive attitudes about school). Previous research has demonstrated the efficacy of the combination of primary and secondary family management strategies on reductions in marijuana use into early adulthood (Véronneau, Dishion, Connell, & Kavanagh, 2016). Van Ryzin and Dishion (2012) found reductions in youth antisocial behavior through high school for a high-risk sample. In a replication of the multilevel FCU approach, effects were not found on reductions in student problem behavior in middle school, but complier average causal effect (CACE) analyses, which estimate a treatment effect among those families that engaged in the FCU, revealed decreases in substance use initiation, antisocial behavior, deviant peer affiliations, family conflict, and risk behavior (Fosco et al., 2012; Van Ryzin, Stormshak, & Dishion, 2012). CACE models also suggested that engagers in the FCU had less growth in depression and family conflict (Fosco et al., 2016). These social, emotional, and school engagement outcomes were then hypothesized to lead to students' success in high school (e.g., academic achievement and school completion). Another CACE model revealed improvement in school grades and attendance through high school (Stormshak et al., 2009). The results of prior research on the FCU suggest that, at least for families engaged in the FCU process, students may improve their behavioral, social, and emotional outcomes.

1.4. An effectiveness trial

In this study we sought to evaluate the effectiveness of the PFS intervention when implemented by school personnel under routine conditions. The study examined the impact of PFS within a cluster randomized controlled trial that randomly allocated 41 Oregon public middle schools to receive the PFS intervention either immediately ($n = 21$) or after a delay of 3 to 4 years ($n = 20$). School staff members and administrators received training and coaching about how to prepare a family resource center (FRC) in their buildings, how to increase parent–school communication, and how to provide parents with the opportunity to participate in the FCU. In an effectiveness evaluation (Gottfredson et al., 2015) intended to test PFS in real-world settings, school personnel implemented PFS interventions with students and their families.

In addition to examining student outcomes, the study also examined implementation fidelity, processes, and sustainability through a multi-stakeholder process evaluation. The blending of effectiveness and implementation research components in this way constitutes an effectiveness–implementation hybrid design, as described by Curran, Bauer, Mittman, Pyne, and Stetler (2012), and specifically, a Hybrid Type 1 design. The process evaluation, conducted during the rollout of the PFS model, investigated the barriers and facilitators to implementation to further our understanding of treatment heterogeneity. These implementation findings have been presented in previous reports: Fosco et al. (2014) present the history of PFS, its integration within PBIS, and details about its components and implementation, including lessons learned through work with the first 21 schools. Stormshak et al. (2016) extend the work with a discussion of challenges and barriers encountered taking PFS to scale in middle schools, such as limited resources, lack of staff training on key skills, and administrator turnover. Dishion et al. (2016) discuss the three primary barriers and potential solutions that use digital technology that may help schools provide tailored and proactive parent support.

As an effectiveness trial, the project required an evaluation by a team external to the PFS developers. The evaluation team conducted random assignment, collected all data, and conducted statistical tests for this report. The full team, including developers and interventionists, chose the measures that best represented the intervention targets that align with the conceptual framework presented in Fig. 2. This approach abides by standards of evidence for effectiveness trials in prevention science research (Gottfredson et al., 2015). Specifically, we aimed to meet the desirable standard that “a researcher who is neither a current nor past member of the program developer's team should conduct data collection and analysis” (Gottfredson et al., 2015, p. 912).

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Schools assigned to the immediate-intervention condition (hereafter *intervention*) were compared with schools assigned to the delayed-implementation condition (hereafter *control*) on student- and parent-reported behavior, teacher report of school-based family practices, and school archival academic outcomes. The first of two primary research questions asked whether students in schools provided with PFS improved on measures of constructs depicted in Fig. 2. Because well-adjusted students and well-managed families would not likely require the supports offered through PFS, and because the research base suggested the importance of engaging high-risk families, we hypothesized that level of risk would moderate intervention effects; that is, those students with greatest risk are most likely to participate in aspects of PFS (e.g., Stormshak et al., 2009) and be the most likely to benefit. This also represented a primary research question.

We also had several secondary questions. Because we recruited two successive cohorts of students within each school, we tested for moderation effects by cohort, but had no a priori hypothesis that one cohort would benefit more from PFS than would the other. We also tested gender and minority status as moderators, but again we had not hypothesized that the effects of PFS would differ by these student characteristics (Barrera, Castro, & Biglan, 1999; Gonzales et al., 2012).

2. Method

This study was designed to test the effectiveness of the PFS intervention by using a cluster randomized controlled trial that nests students and staff within middle schools that had implemented key features of schoolwide PBIS systems. Investigators had planned to recruit 40 to 44 schools that met inclusion criteria and agreed to participate, and then assign half to each of two conditions: immediate PFS implementation intervention or delayed implementation control. The design allowed for the detection of effect sizes (Hedges' *g*; Hedges, 1981) in the range of 0.30 to 0.39, with a conservative Type I error rate (α) of 0.001 to account for multiple tests.

2.1. Study design

The design matched the original specification, with only minor exceptions. Participating schools were enlisted into the study in three annual recruitment waves rather than two as planned. Project staff recruited and randomized 14 schools before the 2009–2010 academic year, 13 schools before the 2010–2011 academic year, and 14 schools before the 2011–2012 academic year. We randomly assigned schools to immediate or delayed PFS implementation within districts and matched on total enrollment. Single schools within a district were matched with other single schools by enrollment, and in the 2010–2011 school year, one school was unmatched and assigned at random condition by itself. Schools assigned to the immediate intervention condition began implementation 1 year after recruitment and randomization. Schools assigned to the delayed control condition began implementation 3 years after recruitment and randomization. Fig. 3 depicts the timeline and Fig. 4 presents a school and participant flow diagram.

Within each school, we recruited two successive cohorts of sixth grade students. Cohort 1 entered sixth grade immediately after recruitment and randomization, 1 year before PFS implementation in the intervention schools. Cohort 2 began sixth grade the next year, 1 year after recruitment and randomization and during the first implementation year in intervention schools. Within intervention schools, all students in Cohort 1 finished sixth grade before implementation, and all students in Cohort 2 began sixth grade after implementation. We followed each cohort through eighth grade, which means that students in Cohort 1 received

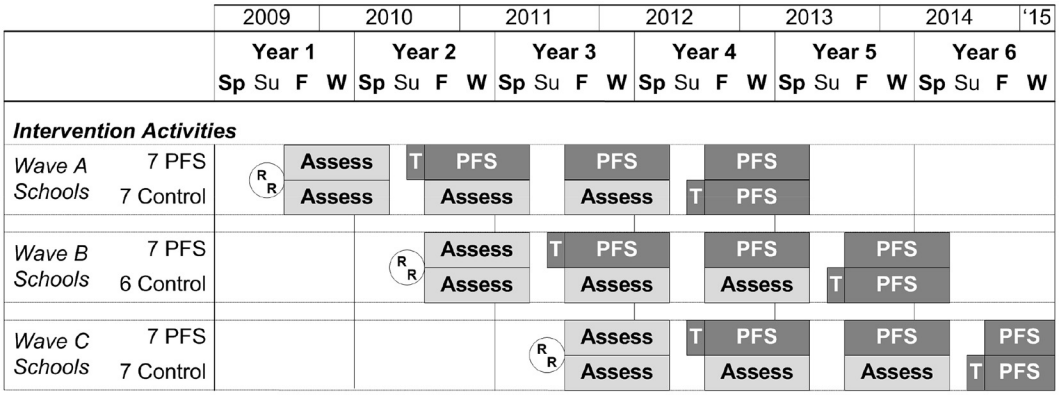

Fig. 3. Positive Family Support study timeline. The timeline depicts the three waves of recruitment and randomization ($^{R}_{R}$) and the intervention timing for immediate-intervention (PFS) and delay (Control) schools. Each PSF school participated in assessments only (Assess) in their first year, received training (T) and ongoing coaching in the Positive Family Supports model before their second year of participation, and continued to implement PFS and participate in assessments thereafter. Control schools participated in only assessments during their first 3 years and then received the same training and coaching in the beginning of their fourth year. Within each wave of schools, we followed two cohorts of students. Cohort 1 entered sixth grade during the first assessment year and exited middle school in the third year of each wave. Cohort 2 entered sixth grade in the second year, after implementation began in PFS schools, and completed eighth grade in the fourth year of a schools participation.

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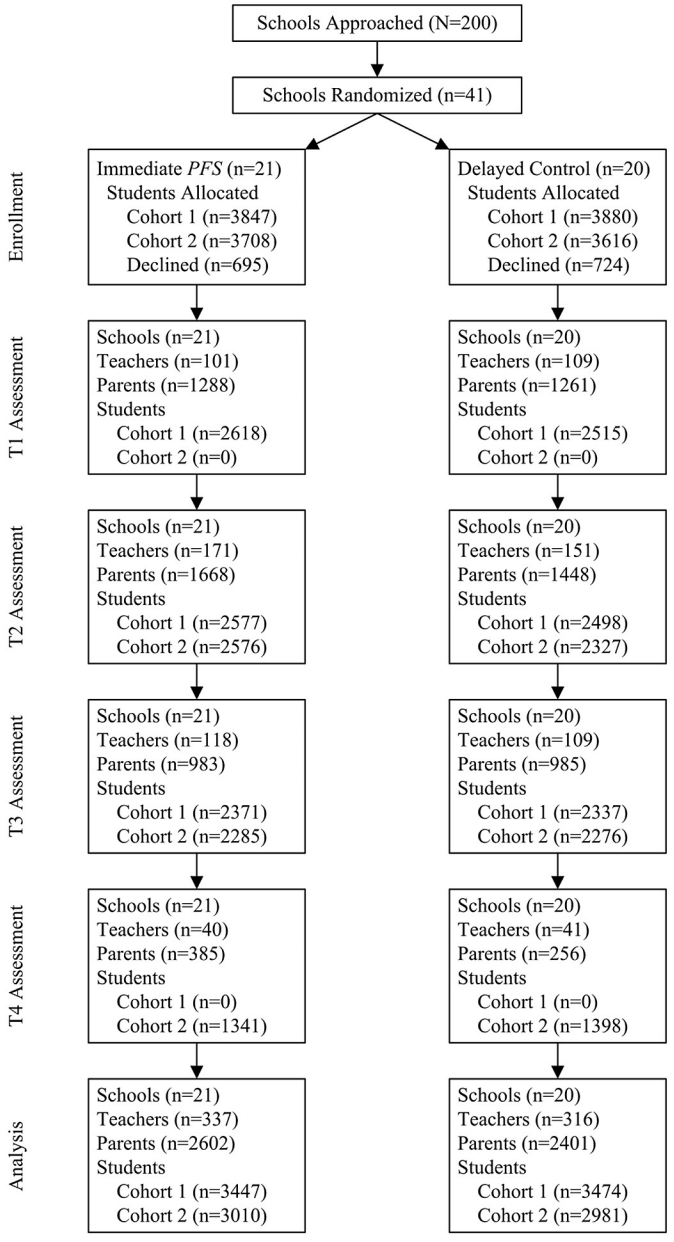

Fig. 4. Number of schools approached (approximate) for participation and assigned to condition. Each arm indicates the number of schools, teachers, parents, and students allocated and who participated by time and recruitment wave.

2 years of exposure to intervention activities and students in Cohort 2 received 2 years of exposure. The final wave of schools, however, did not complete the eighth grade assessment for Cohort 2 because of insufficient time.

2.2. Participants

2.2.1. Schools

Schools with a minimum of 50 students in sixth grade that had implemented schoolwide PBIS systems were eligible for the study. We identified approximately 200 schools that met study inclusion criteria and contacted administrators at each of the schools with an invitation to participate in the study. After receipt of district approval, researchers made on-site presentations and held phone conferences to describe the study to schools that had expressed interest in the study. Schools that agreed to participate in the study signed a memorandum of understanding.

This effectiveness study included 41 middle schools in 27 school districts in the Pacific Northwest region of the United States. The average enrollment of participating schools ranged from 151 to 1037, with five schools considered small (<250 students), 18

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considered medium (251 to 500 students), and 18 considered large (>500 students). The proportion of students who received free or reduced-price lunch ranged from 29% to 94% (median 58%). The proportion of English language learners ranged from 0% to 37% (median 3%). The proportion of minority students ranged from 5% to 82% (median 28%). The average total Schoolwide Evaluation Tool (SET; Horner et al., 2004) score was 81.6 ($SD = 13.2$), implying that the average school met implementation standards for schoolwide PBIS. Schools were found to be comparable across the two study conditions with regard to each of these baseline characteristics (all p-values > 0.16).

2.2.2. Teachers

Within each school, we recruited teachers to provide reports about their students, contacts with parents, and related information. We targeted teachers with the most contact with students (e.g., homeroom teachers). The 653 participating teachers were most often male (64%), Caucasian (93%), had a master's degree (69%), and had been teaching an average of 13.8 years ($SD = 8.7$). Table 1 describes the teacher sample by study condition; teachers from both conditions were comparable on all characteristics (all p-values > 0.45).

2.2.3. Students

As described previously, this study included two cohorts of students, with 6921 in Cohort 1 and 5991 in Cohort 2. To recruit students, we used a passive (waiver of) consent process. The parents of 14,331 students received a letter that described the study along with a decline postcard they could return if a parent did not want his or her student to participate. The parents of 1419 students (9.9%) returned the decline card, leaving 12,912 participating students. Students were on average age 11.9 years ($SD = 1.4$) at their first report. About half were female (51%) and most were Caucasian (65%). A sizable proportion reported their families had "just enough money to get by" (45%). Table 1 describes the student sample by study condition; students from both conditions were comparable on all characteristics (all p-values > 0.10), with the exception of report of how much money their family had ($p < 0.001$).

Table 1
Teacher and student sample characteristics by treatment condition.

	PFS intervention	Delayed control
Teacher sample characteristics		
Sample, *N*	337	316
Female, %	34.7	36.7
Race or ethnicity,[a] %		
American Indian or Native American	5.3	2.5
Asian	0.3	1.9
Black or African American	0.6	0.6
Hispanic or Latino	2.4	3.2
Native Hawaiian or Pacific Islander	0.0	0.3
White or Caucasian	92.0	93.3
Highest degree obtained, %		
High school diploma	1.2	2.9
Associates	5.6	5.9
Bachelors	22.6	22.8
Masters	70.3	68.1
Doctorate or law degree	0.3	0.3
Years teaching professionally, mean (*SD*)	13.7 (8.3)	14.0 (9.1)
Years teaching at this school, mean (*SD*)	8.0 (6.4)	8.4 (6.2)
Student sample characteristics		
Sample, *N*	6457	6455
Female, %	48.5	49.0
Race or ethnicity,[a] %		
American Indian or Native American	19.8	20.2
Asian	6.2	5.9
Black or African American	6.0	6.6
Hispanic or Latino	22.1	26.3
Native Hawaiian or Pacific Islander	3.0	3.3
White or Caucasian	69.8	65.4
Other	13.6	13.0
How much money does your family have? %		
Not enough to get by	5.6	5.8
Just enough to get by	43.9	46.7
We only have worry about money for fun	34.2	34.0
We never have to worry about money	16.3	13.7
Age at first assessment, mean (*SD*)	12.0 (1.7)	11.9 (0.9)

[a] Multiple responses allowed.

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2.2.4. Parents

Of the 12,912 students who participated, 5003 parents (38.7%) completed at least one survey. No parent demographic data were collected because they were not the focus of our study hypotheses.

2.3. Intervention

The PFS school-based intervention was adapted to align with the three-tier model that is based on the systemic concatenation strategy described by Dishion (2011). The PFS is tailored according to the level of risk, with graded intervention intensity to address students at the universal, selected, and indicated levels.

2.3.1. Universal level

There are three core intervention elements at this level. First, each school established an FRC as a base of operations from which trained school personnel can disseminate evidence-based parenting information, such as brochures, books, worksheets, and videos. These materials offer parents approaches to problem solving, improving home–school communication, encouragement, supervision, setting limits, getting to know the friends and peers of their teens, and communication. School personnel can also be available to offer basic informational and consultation services to all families of children at the school, including assistance with accessing online grades or connecting with teachers. Second, family–school partnerships were promoted through parent outreach activities, parenting topic nights, family activities at the school, and positive family contacts about student successes. Third, a schoolwide multiple-gating system was implemented to facilitate early detection of problems and efficient referral to more intensive support as needed (Dishion & Patterson, 1993; Loeber, Dishion, & Patterson, 1984). Ideally, this process was accomplished throughout the year with parent school-readiness screening surveys, teacher behavioral screening surveys, and attendance and disciplinary referral data monitoring.

2.3.2. Selected level

At the second tier of the program, schools were trained to implement an enhanced version of the Check-In/Check-Out system (Crone, Hawken, & Horner, 2010), which includes a family incentives component to promote student behavioral change at school. Traditionally, this system enlists students and teachers to track standardized behavioral goals throughout the day, such as remaining seated and quiet unless otherwise permitted, and allows students to check out with their behavioral tracking sheets and receive rewards for meeting goals. PFS capitalizes on this opportunity to explicitly define parental involvement in supporting positive behavioral change and to integrate parents into the early stages of school-based behavioral concerns. Additional supports included home–school family management videos and worksheets to foster effective structuring and supervision of homework and attendance. The worksheets on homework, for example, provided specific behavioral guidance for designating a standard time and place to work and reducing distractions.

2.3.3. Indicated level

Interventions at the third tier offered more intensive support for high-risk students or those for whom selected-level supports were unsuccessful. Intervention is delivered via the FCU, which we modified to include two brief, family-centered sessions to motivate parents to change parenting practices and use intervention services that address their specific needs. The FCU draws on motivational interviewing principles (Miller & Rollnick, 2002) to help parents effectively implement family management strategies to address student behavioral concerns. During the first session, a parent consultant asked parents about their goals, concerns, and motivation for change. Next, parents complete a survey to identify the ecological, family, and youth dimensions that underlie student risk or resilience in the school setting. Based on this information, parent consultants give strengths-based feedback, describing the assessment results in a way that supports parent motivation to change and helps identify appropriate evidence-based intervention options (e.g., school-based supports for the student, family support programs focusing on parenting skills, community referrals). Families, then, select only those program components they are motivated to engage in. Families can elect to receive more intensive family support derived from the Everyday Parenting Curriculum (Dishion et al., 2011), including assistance with positive behavior support, parental monitoring, limit setting, and family negotiations.

2.3.4. Training and technical support

Because organizational change requires staff motivation (Fixsen, Blase, & Van Dyke, 2011), we conducted workshops with all school staff members prior to implementation. Our goals were to provide information about the PFS model, to assess school staff needs, and to identify areas of family support the staff were particularly motivated to engage in. To decrease reliance on school counselors who had little time to conduct the interventions, we shifted program delivery from a single family resource specialist, the method used in prior research, to a range of school staff, including school administrators, instructional and educational assistants, school receptionists, and teachers.

The PFS implementation plan included a combination of the school training workshops and technical assistance for school personnel. Implementation started with 2-day workshops before the start of the school year. The focus of these workshops included the universal and selected levels of the PFS model. Following these workshops, project trainers provided ongoing support and technical assistance to ensure ease and efficiency of implementation of the core components at universal and selected levels. After the universal-level intervention was in place, school staff received additional workshops about teacher–parent communication and training support for implementing selected-level family supports, with schools that were interested and ready to

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implement beyond universal-level interventions. Next, school staff members were trained to implement the tertiary-level PFS interventions, including the FCU and follow-up training modules. To encourage staff to use these indicated PFS strategies, an individualized mentorship model was used. As school staff members gained competence conducting FCUs, consultant support was gradually decreased and shifted to a consultation model of implementation described next.

The ongoing technical support strategies consisted of at first, weekly, and at the least, monthly (often dictated by proximity and school staff schedules/availability) consultation meetings with school staff. Depending on the particular school, consultation meetings consisted of group meetings and participation during which increased family involvement was encouraged and specific suggestions were offered, in ongoing PBIS team meetings, team meetings with designated PFS staff, individual consultations with counselors or other staff working to implement various aspects of the PFS model, and consultations with administrators about entire PFS implementation progress. Second, consultants also responded to any school staff who requested support, additional materials, or information via e-mail or phone. Third, midyear and end-of-year (during the first and second years of implementation) fidelity and progress consultations were conducted with PFS teams or administration. We used these feedback sessions to collaboratively set goals for the coming academic year.

Consultations were supported by a structured implementation manual (Dishion, Fosco, Moore, Falkenstein, & Stormshak, 2015). The manual was supported by digital materials available from the University of Oregon Child and Family Center, and was given to schools on DVD. Parent engagement materials included template letters to parents that could be adapted to local conditions for administrators to use, parent information night materials, PowerPoint presentations for staff discussions with parents, Spanish translations of parent materials, Excel spreadsheets for sorting and analyzing parent-report screeners, and video support materials for positive behavior support in the third tier, including specific strategies for reinforcing homework completion, attendance and positive behavior at school, monitoring and setting limits on problem behavior, and negotiating and solving conflicts between parents and adolescents.

Following the initial workshops, which were standard across all schools, individual consultations were tailored to meet the specific needs of school staff across the 21 intervention schools. Tailoring of consultation was based on the number of school staff members who could allocate time to give parents PFS support and number of school staff members trained in behavioral principles. When staffing resources were lean, the project staff members helped school teams develop a feasible PFS strategy that focused on increasing the level of universal supports to parents, often involving brief workshops to teachers about strategies for parent engagement and proactive, positive communication.

With respect to Tiers 2 and 3, project trainers provided direct modeling and demonstration of parent engagement in the Check-In/Check-Out and FCU processes. Trainers advised school staff to begin Tiers 2 and 3 supports with parents of students who had minor behavioral problems, until staff skill levels became fluid and they were able to extend PFS practices with parents of students with more significant problem behaviors at school. The greatest challenge to implementation was encouraging staff to use Tiers 2 and 3 strategies in the context of middle schools that had scarce resources, and other professional practices were prioritized over proactive consultations with parents. Often district statutes regarding suspension and expulsion took precedence over meetings with parents and other family members.

To offset implementation costs and secure dedicated staff time during the second year, schools received a total of $10,000 in payments split across 4 years, which is similar to the incentives offered by the Oregon Department of Education (ODE) in their PBIS initiatives (e.g., Chaparro, Smolkowski, Baker, Hanson, & Ryan-Jackson, 2012). Schools in the control condition conducted business as usual, including all practices associated with schoolwide PBS and with individual systems. Control schools received access to PFS training systems at the conclusion of the study, including the implementation payments.

2.4. Procedures

The appropriate Institutional Review Board approved study procedures. Participating schools provided parent/guardian contact information. On behalf of the child's school, parents were mailed a description of the study, two consent forms, and a decline card. The first consent form requested child participation in an annual in-class confidential survey and permission for an annual confidential teacher evaluation of their child. The second consent form asked parents to agree to their own participation in an annual confidential mail survey. Parents had the choice to decline their child's or their own participation in the study. Consent forms were translated to accommodate non-English-speaking parents (e.g., Spanish, Russian).

Students whose parents did not decline their participation were administered a survey during the winter term. Prior to administration students were given the opportunity to decline participation. Teachers were present during the student survey assessment, but a study research assistant administered the survey to protect confidentiality. Teachers and parents completed surveys each spring. Student and teacher surveys were administered in paper-and-pencil format and via a secure web-based data collection program. Parents and teachers received monetary compensation for their participation. Spanish versions of surveys were administered when requested.

2.5. Measures

Data collection primarily addressed student academic and behavioral outcomes, with measures collected from students, parents, teachers, the ODE, and fidelity of implementation interviews and direct observation. Consistent with effectiveness trials (Flay et al., 2005), implementation measures assessed schools' support for parents, in general, and exposure to and use of PFS, specifically. Thus, we collected data about (a) student grades, attendance, engagement in school, and problem behavior; (b)

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parent contact with schools, use of family services, family functioning, and parenting behaviors; (c) teacher contact with parents, their use of family services in their school, and school climate; and (d) PFS and PBIS implementation fidelity.

2.5.1. Student report data

Student report data were obtained from the annual student surveys, and the following eight scale scores were designated as primary outcomes: parental monitoring, family conflict, conduct problems, emotional problems, substance use, positive peers, school participation, and positive school structure. Basic student demographic characteristics were also collected as part of the annual surveys, and students' gender and race were designated as moderators of the primary outcomes.

2.5.1.1. Parental monitoring. Parental monitoring was assessed with nine items from the expanded version of the Parent Monitoring scale (Metzler, Biglan, Ary, & Li, 1998) and seven items from the modified Caretaking and Family Routines scale (Metzler et al., 1998). Students were asked how often at least one of their parents monitored their daily behavior (e.g., who you hang out with during your free time). Response items were on a 4-point scale ranging from 1 (*never or almost never*) to 4 (*always or almost always*), and a mean score was computed (sample $\alpha = 0.91$).

2.5.1.2. Family conflict. Family conflict was assessed with a four-item Family Conflict scale (Stormshak et al., 2009) that asked students how many times in the past month a conflict situation had occurred between family members (e.g., we got angry at each other). Students responded with a 7-point scale ranging from 1 (*never*) to 7 (*8 or more times*), and we computed the mean score (sample $\alpha = 0.78$).

2.5.1.3. Conduct problems and emotional problems. Conduct problems and emotional problems were assessed with five items from the Strength and Difficulties questionnaire (Goodman, 2001). Students were asked how true statements were about misconduct in the past 6 months (e.g., I get very angry and often lose my temper) and emotional symptoms (e.g., I worry a lot). Response options were on a 3-point scale ranging from 1 (*not true*) to 3 (*certainly true*), with a mean score computed for conduct problems (sample $\alpha = 0.63$) and emotional problems (sample $\alpha = 0.69$).

2.5.1.4. Substance use. Substance use was assessed with three items from the Problem with Students scale (Metzler, Biglan, Rusby, & Sprague, 2001). Students were asked how often they used tobacco, alcohol, and marijuana or other drugs. Response options were on a 5-point scale ranging from 1 (*not at all*) to 5 (*very often*), with a mean score computed for analysis (sample $\alpha = 0.87$).

2.5.1.5. Positive peers. Positive peers measures included three items modified from the Child Peer Social Skills questionnaire (Dishion & Kavanagh, 2003) that asked students how many of the students they know had engaged in positive school behaviors (e.g., take school seriously). Students responded on a 5-point scale ranging from 1 (*very few*) to 5 (*almost all*), and we calculated a mean score (sample $\alpha = 0.77$).

2.5.1.6. School participation. Measures of school participation included four questions that asked if students liked going to school, completed assignments and homework on time, missed or arrived late for school (reversed), and got along with teachers and staff. Students responded on a 5-point scale in which 1 = *not at all*, 3 = *sometimes*, and 5 = *very often*. The mean had score reliability of $\alpha = 0.56$.

2.5.1.7. Positive school structure. Positive school structure was assessed with 13 items that asked about rule clarity, school response to breaking rules, requests to work on special projects, chance to participate in discussions or activities, feelings of safety, recognition for doing a good job, and similar content. Students responded using a 5-point Likert scale ranging from 1 (*strongly agree*) to 5 (*strongly agree*), and we analyzed the mean (sample $\alpha = 0.86$).

2.5.2. Parent report

Parent report data were obtained from annual parent surveys, and the following seven scale scores were designated as primary outcomes: school success, student risk, parental monitoring, parent involvement, negative school contact, positive school contact, and school structures.

2.5.2.1. School success. School success was assessed with eight items from the Secondary School Readiness Inventory, designed as part of the current study. Items included aspects of behavior (e.g., my child behaves well at school), academics (e.g., my child gets grades that are appropriate for his or her skills), attention related to school success (e.g., my child stays on task), and late or absent from school. Parents were asked to rate each item on a 10-point scale ranging from 1 (*an area that needs support*) to 10 (*an area of strength*). A mean score was computed (sample $\alpha = 0.90$).

2.5.2.2. Student risk. Student risk was assessed with six items from a modified version of the Teacher Risk Assessment (TRISK; Soberman, 1994). Parents were asked to rate their level of concern for their child using a 4-point scale ranging from 1 (*no concern*) to 4 (*serious concern*) in areas of internalizing behavior (depressed, anxious, or irritable) and externalizing behavior (spends time with students who break school rules), attention (able to focus and stay on task in class), sociability (relations with other

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students), and adherence to rules (follows classroom rules; completes homework and assignments on time). A mean score was computed (sample $\alpha = 0.82$).

2.5.2.3. Parental monitoring. Parental monitoring was assessed with six items from the modified version of the Caretaking and Routines scale (Metzler et al., 1998). Parents were asked how often in the past month they had engaged in monitoring behavior (e.g., check in with your child after school about his/her day). Response options were on a 3-point scale ranging from 0 (*not at all*) to 3 (*very often*), with a mean score computed for analysis (sample $\alpha = 76$).

2.5.2.4. Parent involvement. Parent involvement was assessed with six items from the Parent Teacher Involvement Questionnaire–Parent version (Conduct Problems Prevention Research Group, 1991). Parents were asked how often they interacted with their child's teacher or school (e.g., called your child's teacher; attended a special event at your child's school). Response options were listed on a 4-point scale ranging from 0 (*never*) to 3 (*weekly or more*), and we computed a mean score for analysis (sample $\alpha = 0.66$).

2.5.2.5. Negative and positive school contact. Negative school contact and positive school contact were each assessed with one item designed to tap into targeted areas of the intervention. Parents were asked how often someone from the school had contacted them about their child's negative or positive behavior. Response options were listed on a 4-point scale ranging from 0 (*never*) to 3 (*weekly or more*).

2.5.2.6. School structures. School structures were assessed with three items designed for our study. Parents were asked to what extent they agreed with statements that their child's school had structures in place so they could easily monitor their child's homework, attendance, and behavior. Response options were listed on a 4-point scale ranging from 0 (*strongly disagree*) to 3 (*strongly agree*), and a mean score was computed (sample $\alpha = 0.77$).

2.5.3. Teacher report

Teacher report data were obtained from annual teacher surveys that asked teachers for their opinions about their school and to report about individual student-level characteristics.

2.5.3.1. School readiness. School readiness was a primary study outcome and a scale was developed for the purposes of this study. The four-item scale asked teachers how much they agreed with school-level statements specific to PFS: my school (a) is a "family friendly" school or (b) has an effective approach for working with parents to manage student behavior; parents are (c) contacted before child behavior problems get out of hand or (d) regularly informed about their student's positive behaviors. Response options were listed on a 6-point scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*), and a mean score was computed (sample $\alpha = 0.78$).

2.5.3.2. Student risk. Student risk was assessed with the six-item TRISK (sample $\alpha = 0.89$), which is the same scale used with parents and described previously under "parent report" measures. This measure was designated as a moderator of the primary study outcomes.

2.5.4. State data

State data for individual students were obtained from the ODE each academic year of the study and three scores designated as primary outcomes: end-of-year math scores, end-of-year reading scores, and number of days absent from school. The math and reading raw scores were converted to a scale score called a *Rasch unit* or *RIT score* (ODE, 2012).

2.5.5. Fidelity of implementation

Fidelity of implementation data were collected in the spring of each academic year by independent trained raters on two measures: a PFS Fidelity instrument and the Schoolwide Evaluation Tool.

2.5.5.1. PFS implementation fidelity. The PFS Fidelity evaluation tool is a 33-item assessment developed for this study as an overall indicator of school readiness and implementation of key components of the PFS intervention. All schools were assessed with this fidelity measure. Raters interviewed the school principal or vice principal and, if available, members of the positive behavior support team. Twenty-two items were used to assess universal components of the intervention (e.g., does your school use a system for identifying students who are struggling behaviorally), 22 items were used to assess selected or indicated components of the intervention (e.g., are parents contacted when students are identified as struggling behaviorally), and 11 items were used to assess the presence of suggested resources to include in the FRC (e.g., phone to make calls for community resources). Response options included a "yes or no" format (yes = 1, no = 0) and four category response options (1 = *never*, 4 = *always*). Four category response options were recoded as "0" if a component of the intervention was never in place and "1" if partially or fully in place. Three fidelity scale scores were computed by summing responses to universal, selected, or indicated items, and resource items, thus reflecting the number of components of the intervention partially or fully implemented. Fidelity scores showed acceptable to excellent score reliability (α) and interrater reliability (intraclass correlation, ICC): universal (sample $\alpha = 0.88$, ICC = 0.98), selected or indicated (sample $\alpha = 0.65$, ICC = 0.99), and number of resources (sample $\alpha = 0.94$, ICC = 0.93).

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2.5.5.2. Schoolwide evaluation tool. The SET is a research-validated instrument designed to assess and evaluate the critical features of schoolwide effective behavior support across a school (Todd et al., 2012). The SET includes 28 questions across seven features, including (a) expectations defined, (b) behavioral expectations taught, (c) acknowledgment procedures, (d) correction procedures, (e) monitoring and evaluation, (f) management, and (g) district-level support. Responses were gathered through a review of school records, direct observations, and staff and student interviews. Horner et al. (2004) documented score reliability (α) of 0.96, test–retest agreement at 97%, interrater agreement at 99%, and construct validity correlation with scores from the Effective Behavior Support Self-Assessment Survey of 0.75 (see also Vincent, Spaulding, & Tobin, 2010). For our study, interrater reliability was excellent, ICC > 0.99.

2.6. Statistical analysis

We assessed implementation fidelity after the third year for each recruitment wave with analysis of covariance (ANCOVA) models with study condition as a two-level predictor and baseline fidelity scores as a continuous covariate. We assessed intervention effects on each of the primary outcomes with a random coefficients analysis (RCA; Murray, 1998) or growth model with students, parents, and teachers nested within schools to account for the intraclass correlation. The analysis tests for condition differences on growth in outcomes from T1 to T4. The basic statistical model includes time, condition, and the Time × Condition interaction, with linear time coded 0, 1, 2, and 3 at T1, T2, T3, and T4, respectively, and condition coded 0 for control and 1 for intervention. With 41 schools, tests of Time × Condition used 39 degrees of freedom (*df*).

The intervention effects' models were expanded to include moderators to test for differential response to the intervention. To test moderation, we expanded the model to include a predictor, its interaction with condition and time, and the three-way interaction between the predictor, time, and condition. The three-way interaction provides an estimate of whether the condition effect varied by the predictor. The analysis included dichotomous and continuous predictors, and we used continuous variables whenever possible.

2.6.1. Model estimation

We fit intervention effects models to our data with SAS PROC MIXED version 9.2 (SAS Institute, 2009) using restricted maximum likelihood (ML) and included all available data, whether or not scores were present at all four time points following the recommendations of Allison (2012). ML estimation with all available data produces potentially unbiased results even in the face of substantial missingness, provided the missing data were either missing completely at random or missing at random, meaning that missing data likely did not depend on unobserved determinants of the outcomes of interest (Graham, 2009; Little & Rubin, 2002; Schafer & Graham, 2002). In our study, most missing data were missing by design and therefore missing completely at random and ignorable. Students in Cohort 1 within each school provided data from T1 through T3, and Cohort 2 provided data from T2 to T4. Most other missing data represented absences on assessment days (e.g., illness, family vacations, truancy) or students who transferred to a new school between years. Most project schools, however, were in rural communities, so transfers required moves to a new town. The transfers were more likely associated with parental decisions, such as employment change, financial challenges, or changes in family configuration, and hence balanced across conditions. We therefore believe that most missing data, although not missing completely at random, did not represent a meaningful departure from the missing at random assumption. Nonrandom missingness was nonetheless possible, but Graham (2009) notes that "[missingness not at random] alone is often not sufficient to affect the internal validity of an experimental study to any practical extent" (p. 568; see also Collins, Schafer, & Kam, 2001).

The models assume independent and normally distributed observations. We addressed the first assumption (van Belle, 2008) by explicitly modeling the multilevel nature of the data. Regression methods have been found quite robust to violations of normality, and outliers have a limited influence on the results in a variety of multilevel modeling scenarios (Bloom, Bos, & Lee, 1999; Donner & Klar, 1996; Fitzmaurice, Laird, & Ware, 2004; Hannan & Murray, 1996). Murray et al. (2006) showed that violations of normality at either or both the individual and group levels do not bias results as long as the study is reasonably balanced at the group level.

2.6.2. Multiple tests

As noted previously, the project was designed to detect effect sizes (Hedges' *g*) in the range of 0.30 to 0.39 with a Type I error rate (α) of 0.001 and Type II error rate (β) of 0.20. In school-based, cluster randomized trials, the tradeoff between Type I and II error rates represents a delicate balance. The cost of a false positive conclusion, a Type I error, such as the assumption that PFS improved student behavior in school when it in fact did not, can lead to false expectations about improvements in student behavior and increased costs associated with implementation of ineffective programs. Conversely, false negatives, or Type II errors, can obscure the value of a potentially effective curriculum. Both types of errors can mislead.

To balance concerns about Type I and Type II errors, we recommend two interpretations of the results. First, for patterns of results, we describe the likely number of Type I errors. With 19 primary outcomes and the usual criterion α of 0.05, we anticipated a 62% chance of one or more Type I error, a 25% chance of two or more, and a 7% chance of three or more Type I errors. We therefore interpret patterns of results for multiple items. Alternatively, we expect zero to three errors with 95% confidence. Second, for the interpretation of an individual test by itself, we recommend a criterion α of 0.003. For the exploration of differential effects, we tested four moderators for each of the 19 outcomes. For these 76 tests, we expect between one and eight Type I errors due to chance with 95% confidence. For example, there was a 53% chance of four or more Type I errors and an 18% chance of six

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or more errors. For the interpretation of an individual test, we recommend a criterion of 0.001. To allow for both interpretations, we describe results for all tests that were statistically significant using an unadjusted *p*-value.

2.6.3. Effect sizes

To ease interpretation, we computed Hedges' *g* (Hedges, 1981) for each intervention fixed effect according to the What Works Clearinghouse (2014) standards. Hedges' *g* is comparable to Cohen's *d* (Cohen, 1988). Both represent individual-level effect sizes, but we suggest caution during interpretation, as this study is designed for inferences about schools. An interpretation of school-level effects at the individual-student level may be an instance of the ecological fallacy (Snijders & Bosker, 2012).

3. Results

Tables 2, 3, and 4 describe the student-reported, parent-reported, and academic measures. The following sections address schoolwide PBIS implementation, PFS implementation fidelity, attrition and baseline equivalence, tests of efficacy, differential response to the PFS intervention, and exploratory analyses.

3.1. Schoolwide PBIS context

We report schoolwide PBIS fidelity via SET scores to set the context for the results, given that all schools reported implementing, at a minimum, the universal, schoolwide tier of PBIS in order to qualify for the study. Schools averaged an 81.6 on the SET, with 25 of the 41 schools passing the "80/80" criterion for full implementation: 80 or better overall and 80 or better on for behavioral expectations taught (Vincent et al., 2010). Neither metric was different, statistically, between conditions. Among PFS intervention schools, subscale score means were (a) 75 for expectations defined (range: 25 to 100), (b) 89 for behavioral expectations taught (60 to 100), (c) 87 for acknowledgment procedures (50 to 100), (d) 65 for correction procedures (25 to 88), (e) 94 for monitoring and evaluation (63 to 100), (f) 79 for management (31 to 100), and (g) 79 for district-level support (0 to 100). Many schools had fully implemented schoolwide PBIS, but several were missing key features, notably, expectations defined and posted, correction procedures (e.g., consequences for behavior problems with staff agreement), and to a lesser extent, management (e.g., behavior team membership, regular meetings, use of action plans).

Table 2
Descriptive statistics for student report dependent variables at Year 1 (T1) to Year 4 (T4).

		Positive Family Support			Control			Percentiles for full sample				
		M	*SD*	*N*	*M*	*SD*	*N*	Min	25th	50th	75th	Max
Parental monitoring	T1	3.07	0.67	2520	3.08	0.66	2414	1.00	2.62	3.15	3.62	4.00
	T2	3.05	0.67	4844	3.03	0.67	4612	1.00	2.62	3.08	3.58	4.00
	T3	2.98	0.70	4481	2.95	0.69	4481	1.00	2.46	3.00	3.54	4.00
	T4	2.96	0.70	1274	2.88	0.71	1343	1.00	2.46	3.00	3.46	4.00
Family conflict	T1	2.58	1.40	2542	2.58	1.40	2444	1.00	1.50	2.25	3.50	7.00
	T2	2.59	1.37	5006	2.57	1.40	4715	1.00	1.50	2.25	3.50	7.00
	T3	2.57	1.33	4561	2.66	1.38	4553	1.00	1.50	2.25	3.50	7.00
	T4	2.45	1.30	1313	2.56	1.35	1378	1.00	1.50	2.25	3.25	7.00
Conduct problems	T1	1.38	0.37	2429	1.40	0.37	2348	1.00	1.00	1.40	1.60	3.00
	T2	1.37	0.36	4653	1.37	0.36	4522	1.00	1.00	1.20	1.60	3.00
	T3	1.37	0.37	4331	1.38	0.37	4401	1.00	1.00	1.20	1.60	3.00
	T4	1.33	0.36	1241	1.38	0.36	1322	1.00	1.00	1.20	1.60	3.00
Emotional problems	T1	1.49	0.42	2434	1.49	0.42	2346	1.00	1.20	1.40	1.80	3.00
	T2	1.51	0.43	4659	1.50	0.42	4532	1.00	1.20	1.40	1.80	3.00
	T3	1.54	0.45	4337	1.55	0.45	4409	1.00	1.20	1.40	1.80	3.00
	T4	1.53	0.45	1242	1.58	0.46	1320	1.00	1.20	1.40	1.80	3.00
Substance use	T1	1.04	0.24	2573	1.05	0.31	2435	1.00	1.00	1.00	1.00	5.00
	T2	1.06	0.35	5097	1.06	0.36	4770	1.00	1.00	1.00	1.00	5.00
	T3	1.11	0.47	4594	1.12	0.50	4594	1.00	1.00	1.00	1.00	5.00
	T4	1.12	0.49	1330	1.11	0.45	1385	1.00	1.00	1.00	1.00	5.00
Positive peers	T1	3.17	1.02	2497	3.22	1.03	2396	1.00	2.33	3.33	4.00	5.00
	T2	3.21	1.00	4783	3.19	0.99	4555	1.00	2.33	3.33	4.00	5.00
	T3	3.19	1.02	4415	3.15	0.99	4431	1.00	2.33	3.33	4.00	5.00
	T4	3.28	1.00	1254	3.11	0.98	1325	1.00	2.33	3.33	4.00	5.00
School participation	T1	3.93	0.70	2595	3.96	0.70	2497	1.00	3.50	4.00	4.50	5.00
	T2	3.94	0.66	5133	3.96	0.65	4809	1.00	3.50	4.00	4.50	5.00
	T3	3.88	0.68	4622	3.90	0.66	4634	1.00	3.50	4.00	4.33	5.00
	T4	3.91	0.66	1336	3.86	0.65	1390	1.00	3.50	4.00	4.25	5.00
Positive school structure	T1	2.34	0.60	2607	2.29	0.62	2506	1.00	1.92	2.23	2.62	5.00
	T2	2.39	0.64	5122	2.37	0.62	4804	1.00	1.92	2.31	2.77	5.00
	T3	2.57	0.67	4617	2.54	0.63	4630	1.00	2.15	2.50	3.00	5.00
	T4	2.54	0.64	1333	2.62	0.61	1390	1.00	2.15	2.54	2.92	5.00

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Table 3
Descriptive statistics for parent report dependent variables at Year 1 (T1) to Year 4 (T4).

		Positive Family Support			Control			Percentiles for full sample				
		M	*SD*	*N*	*M*	*SD*	*N*	Min	25th	50th	75th	Max
School success	T1	7.74	1.77	1282	7.77	1.81	1257	1.00	6.75	8.25	9.13	10.00
	T2	7.71	1.84	1666	7.74	1.83	1484	1.00	6.75	8.25	9.13	10.00
	T3	7.80	1.85	979	7.81	1.82	981	1.00	6.88	8.27	9.25	10.00
	T4	7.98	1.74	384	7.86	1.81	256	1.00	7.13	8.38	9.13	20.00
Student risk	T1	1.68	0.64	1280	1.67	0.66	1257	1.00	1.17	1.50	2.00	4.00
	T2	1.66	0.63	1665	1.70	0.65	1484	1.00	1.17	1.50	2.00	4.00
	T3	1.63	0.60	978	1.65	0.62	981	1.00	1.17	1.50	2.00	4.00
	T4	1.58	0.53	384	1.70	0.67	256	1.00	1.17	1.50	2.00	4.00
Parental monitoring	T1	2.53	0.45	1279	2.49	0.48	1259	0.00	2.33	2.67	2.83	3.00
	T2	2.48	0.47	1659	2.43	0.52	1480	0.00	2.17	2.50	2.83	3.00
	T3	0.38	0.50	975	2.37	0.52	977	0.00	2.17	2.50	2.83	3.00
	T4	2.40	0.50	385	2.40	0.47	256	0.00	2.17	2.50	2.83	3.00
Parent involvement	T1	1.13	0.47	1283	1.09	0.46	1255	0.00	0.83	1.00	1.33	3.00
	T2	1.13	0.47	1654	1.13	0.48	1481	0.00	0.83	1.00	1.33	3.00
	T3	1.11	0.45	976	1.07	0.46	976	0.00	0.83	1.00	1.33	3.00
	T4	1.11	0.46	382	1.11	0.54	252	0.00	0.83	1.00	1.33	3.00
Negative school contact	T1	0.42	0.70	1276	0.37	0.64	1242	0.00	0.00	0.00	1.00	3.00
	T2	0.42	0.67	1651	0.42	0.68	1469	0.00	0.00	0.00	1.00	3.00
	T3	0.39	0.63	973	0.34	0.60	973	0.00	0.00	0.00	1.00	3.00
	T4	0.33	0.56	381	0.42	0.63	248	0.00	0.00	0.00	1.00	3.00
Positive school contact	T1	0.71	0.70	1276	0.71	0.74	1242	0.00	0.00	1.00	1.00	3.00
	T2	0.73	0.70	1651	0.70	0.71	1472	0.00	0.00	1.00	1.00	3.00
	T3	0.68	0.65	972	0.68	0.69	969	0.00	0.00	1.00	1.00	3.00
	T4	0.66	0.67	380	0.82	0.76	250	0.00	0.00	1.00	1.00	3.00
Positive school structures	T1	2.24	0.67	1272	2.23	0.69	1244	0.00	2.00	2.33	2.67	3.00
	T2	2.22	0.69	1648	2.18	0.70	1474	0.00	2.00	2.33	2.67	3.00
	T3	2.21	0.68	973	2.20	0.68	968	0.00	2.00	2.33	2.67	3.00
	T4	2.16	0.66	381	2.10	0.69	250	0.00	1.67	2.00	2.67	3.00

3.2. PFS implementation fidelity

We examined differences between conditions in PFS fidelity scores from the second year after implementation with baseline as a pretest covariate to determine if the PFS intervention had been delivered as expected. All schools were assessed on PFS fidelity. Schools that implemented PFS had significantly greater scores for universal, $F(1, 40) = 17.34$, $p < 0.001$, $g = 1.07$, selected or indicated, $F(1, 40) = 6.55$, $p = 0.015$, $g = 0.32$, and number of resources available to parents, $F(1, 40) = 10.88$, $p = 0.002$, $g = 1.65$. Posttest adjusted means showed the significant and large condition effects favored PFS schools for each fidelity score: universal (17.72 vs. 12.74), selected or indicated (20.11 vs. 18.88), and number of resources (7.92 vs. 3.73).

Table 4
Descriptive Statistics for Oregon Department of Education (ODE) and teacher report variables at Year 1 (T1) to Year 4 (T4).

		Positive Family Support			Control			Percentiles for full sample				
		M	*SD*	*N*	*M*	*SD*	*N*	Min	25th	50th	75th	Max
Math score (ODE)	T1	224.1	15.6	2526	223.8	13.8	2322	88.0	218.0	225.0	232.0	265.0
	T2	228.6	13.4	4932	228.3	13.1	4426	91.0	222.0	230.0	236.0	279.0
	T3	233.5	13.7	4459	233.1	13.6	4289	95.0	226.0	234.0	240.0	285.0
	T4	234.8	13.1	1302	235.7	12.2	1366	88.0	228.0	236.0	242.0	279.0
Reading score (ODE)	T1	225.2	13.9	2516	224.5	13.4	2316	93.0	219.0	226.0	232.0	261.0
	T2	228.4	13.3	4915	228.5	12.0	4416	98.0	223.0	229.0	236.0	274.0
	T3	232.1	12.4	4427	231.8	11.9	4283	99.0	227.0	233.0	239.0	277.0
	T4	233.4	10.1	1300	232.5	10.4	1275	117.0	227.0	234.0	239.0	271.0
Days absent (ODE)	T1	8.50	7.72	2554	8.04	7.35	2339	0.00	3.00	6.50	11.50	77.00
	T2	9.39	8.60	5020	8.43	7.95	4546	0.00	3.00	6.50	12.00	100.0
	T3	8.91	8.99	4516	8.64	8.67	4462	0.00	2.50	6.50	12.00	82.00
	T4	9.08	8.61	1312	8.61	8.80	1374	0.00	3.00	6.50	12.00	71.00
School readiness (teacher report)	T1	4.38	0.84	109	4.18	0.98	100	1.25	3.75	4.25	5.00	6.00
	T2	4.34	0.83	151	4.37	0.85	170	1.25	3.75	4.50	5.00	6.00
	T3	4.09	0.93	107	4.35	0.85	117	1.50	3.50	4.25	4.88	6.00
	T4	4.07	1.02	41	4.21	1.02	40	1.75	3.50	4.25	5.00	6.00

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3.3. Attrition and baseline equivalence

Attrition was defined as the 5133 students with preintervention data (i.e., Cohort 1 students assessed at T1) who were missing data at either T2 or T3. We did not examine attrition at T4 because most missingness was by design. We experienced 42% cumulative attrition by T3, with 1075 students missing T2 or T3 data in comparison schools and 1076 missing T2 or T3 data in intervention schools. Attrition rates did not differ between conditions ($\chi^2 = 1.42$, $df = 1$, $p = 0.232$).

Although differential rates of attrition are undesirable, differential scores by condition present a greater threat to validity (Barry, 2005). We conducted an analysis to test whether student scores were differentially affected by attrition across conditions. We examined the effects of condition, attrition status, and the interaction between the two on pretest scores within a mixed-model analysis of variance (Murray, 1998), which nests T1 scores within schools and condition. We tested all T1 outcomes and found no evidence of differential attrition for any of our dependent variables: $p > 0.122$ for all tests.

We tested the difference between conditions at baseline within the models that test efficacy. The condition effect (not crossed by time) shows the difference between conditions at pretest (see Tables 5, 6, and 7). This difference was not statistically significant for any of the student-, parent-, teacher-, or state-reported data.

3.4. Effectiveness

3.4.1. Main effects

To address the first of our primary research questions about overall treatment effects, we tested whether students in intervention schools would perform better on social, behavioral, and academic measures than would students in comparison schools. Tables 5, 6, and 7 present the results of all tests of main-effect tests of treatment efficacy for student, parent, and state and teacher reports, respectively. The Time × Condition row represents the critical test of condition on growth for each measure from T1 to T4, and the bottom two rows in each table show the effect sizes and *p*-values for that critical test. Students in schools that implemented PFS appeared to outperform students in comparison schools on student report of positive peers ($g = 0.10$), although the test did not meet our criterion α given multiple tests. Most importantly, the slope for the control condition was −0.045 and the slope for PFS schools was 0.014 or 0.059 more than the control slope. Table 5 presents the full model. No other significant Time × Condition effects were detected.

3.4.2. Differential effects

Our second primary research question asked whether students' behavioral risk moderated intervention effects. To address the secondary research questions, we tested whether gender, minority status, and student cohort moderated differences in student social, behavioral, and academic outcomes across intervention conditions. In the following paragraphs we present only the statistically significant moderation effects.

Table 5
Results from mixed-model Time × Condition analysis of condition effects on student-reported outcomes.

Effect or statistic			Parental monitoring	Family conflict	Conduct problems	Emotional problems	Substance use	Positive peers	School participation	Positive school structure
Fixed effects	Intercept	β_{00}	3.0965****	2.5803****	1.3862****	1.4736****	1.0307****	3.2195****	3.9884****	2.238****
			(0.0263)	(0.0401)	(0.0131)	(0.0102)	(0.0075)	(0.0529)	(0.0308)	(0.0250)
	Condition	β_{01}	−0.0125	0.0429	−0.0056	0.0062	−0.0056	−0.0767	−0.0419	0.0424
			(0.0369)	(0.0563)	(0.0184)	(0.0143)	(0.0106)	(0.0742)	(0.0431)	(0.0351)
	Time	β_{02}	−0.0731****	0.0431*	0.0036	0.0429****	0.0441****	−0.0446*	−0.0614****	0.1509****
			(0.0010)	(0.0184)	(0.0050)	(0.0068)	(0.0068)	(0.0188)	(0.0112)	(0.0148)
	Time × Condition	β_{03}	0.0126	−0.0463	−0.0033	−0.0058	0.0025	0.0588*	0.0114	−0.0085
			(0.0138)	(0.0258)	(0.0070)	(0.0010)	(0.0095)	(0.0264)	(0.0166)	(0.0208)
Variances	School intercept	τ_{30}	0.0114****	0.0218***	0.0027***	0.0011**	0.0005*	0.0501****	0.0164****	0.0103***
			(0.0030)	(0.0069)	(0.0008)	(0.0004)	(0.0002)	(0.0125)	(0.0042)	(0.0030)
	School slope	τ_{31}	0.0018**	0.0037**	0.0003**	0.0006**	0.0005**	0.0052***	0.0020***	0.0037***
			(0.0004)	(0.0014)	(0.0001)	(0.0002)	(0.0002)	(0.0016)	(0.0006)	(0.0010)
	Student intercept	τ_{20}	0.2148****	0.8953****	0.0597****	0.0823****	0.0006	0.3952****	0.2121****	0.1750****
			(0.0050)	(0.0203)	(0.0014)	(0.0021)	(0.0012)	(0.0105)	(0.0048)	(0.0041)
	Student slope	τ_{21}	0.0153****	0.0161**	0.0027****	0.0077****	0.0279****	0.0124****	0.0076****	0.0118****
			(0.0014)	(0.0055)	(0.0004)	(0.0006)	(0.0008)	(0.0030)	(0.0013)	(0.0012)
	Residual	σ^2	0.2018****	0.9486****	0.0656****	0.0896****	0.1015****	0.5426****	0.2115****	0.1887****
			(0.0029)	(0.0128)	(0.0009)	(0.0013)	(0.0013)	(0.0073)	(0.0029)	(0.0026)
Hedges' *g*	Time × Condition	*g*	0.036	−0.074	−0.043	−0.024	0.004	0.101	−0.012	0.027
p-Values	Time × Condition	*p*	0.368	0.081	0.647	0.550	0.789	0.031	0.496	0.233

Note. Table entries show parameter estimates with standard errors in parentheses except for intraclass correlations (ICCs), Hedges' *g* values, and *p*-values. Tests of fixed effects (first four rows) used 39 *df* to account for the school as the unit of analysis. ICC = intraclass correlation coefficient. ICCs calculated as proportion of variance in change over time due to students within the same school ($\tau_{31} / [\tau_{21} + \tau_{31}]$).

* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.
**** $p < 0.0001$.

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Table 6
Results from mixed-model Time × Condition analysis of condition effects on parent-reported outcomes.

Effect or statistic			Parental monitoring	Parent involvement	Student risk	School success	Negative school contact	Positive school contact	School structures
Fixed effects	Intercept	β_{00}	2.4962****	1.7201****	7.610****	1.1427****	0.4328****	0.7259****	2.2115****
			(0.0236)	(0.0245)	(0.0685)	(0.0245)	(0.0291)	(0.0303)	(0.0314)
	Condition	β_{01}	0.0344	−0.0151	0.0373	0.0122	0.0191	0.0276	0.0277
			(0.0333)	(0.0344)	(0.0963)	(0.0345)	(0.0408)	(0.0426)	(0.0441)
	Time	β_{02}	−0.0629****	−0.0076	0.0203	−0.0118	−0.0114	−0.0011	−0.0185
			(0.0079)	(0.0101)	(0.0237)	(0.0077)	(0.0113)	(0.0141)	(0.0133)
	Time × Condition	β_{03}	−0.0029	−0.0028	−0.0413	−0.0036	−0.0011	−0.0180	−0.0003
			(0.0110)	(0.0141)	(0.0329)	(0.0106)	(0.0158)	(0.0197)	(0.0185)
Variances	School intercept	τ_{30}	0.0080***	0.0067**	0.0535**	0.0091***	0.0109**	0.0115**	0.0133**
			(0.0023)	(0.0023)	(0.0196)	(0.0026)	(0.0039)	(0.0038)	(0.0041)
	School slope	τ_{31}	0.0002	0.0006	0.0019	0.0002	0.0007	0.0011	0.0010
			(0.0002)	(0.0004)	(0.0024)	(0.0003)	(0.0005)	(0.0008)	(0.0007)
	Student intercept	τ_{20}	0.1178****	0.2743****	2.5664****	0.1185****	0.2598****	0.1605****	0.1841****
			(0.0046)	(0.0080)	(0.0669)	(0.0042)	(0.0086)	(0.0094)	(0.0091)
	Student slope	τ_{21}	0.0036**	0.0034	0.0520***	0.0011	−0.0065**	0.0035	0.0009
			(0.0014)	(0.0019)	(0.0157)	(0.0012)	(0.0023)	(0.0027)	(0.0027)
	Residual	σ^2	0.1097****	0.1392****	0.7530****	0.0954****	0.1858****	0.3325****	0.2811****
			(0.0031)	(0.0042)	(0.0255)	(0.0027)	(0.0056)	(0.0087)	(0.0176)
Hedges' *g*	Time × Condition	*g*	0.053	−0.040	−0.049	0.003	0.027	−0.038	0.040
p-Values	Time × Condition	*p*	0.792	0.844	0.217	0.739	0.944	0.365	0.989

Note. Table entries show parameter estimates with standard errors in parentheses except for intraclass correlations (ICCs), Hedges' *g* values, and *p*-values. Tests of fixed effects (first four rows) used 39 *df* to account for the school as the unit of analysis. ICC = intraclass correlation coefficient. ICCs calculated as proportion of variance in change over time due to students within the same school (τ_{31} / [τ_{21} + τ_{31}]).

** $p < 0.01$.
*** $p < 0.001$.
**** $p < 0.0001$.

The Time × Condition effect appeared to be moderated by the teacher-reported student risk score for student-reported parental monitoring ($p = 0.025$), emotional problems ($p = 0.029$), and school participation ($p = 0.015$); state-reported math score ($p = 0.049$); and parent-reported negative school contacts ($p < 0.001$). Only the latter moderation effect for parent-reported negative school contacts met our criterion for statistical significance for a single test given the analysis of multiple measures. To help interpret results for the continuous moderators, Fig. 5 provides graphs of condition effects by student risk scores.

Fig. 5, Panel A, shows the moderation results for student risk score on student report of parental monitoring. Students with lower risk scores (left side of Fig. 5, Panel A) did not differ by condition on parental monitoring, which is apparent from the mean difference (center, heavier line) of about zero and 95% confidence bounds (outer, lighter lines) that include zero. Moving from left to right, the 95% confidence bounds includes zero for scores from 6 to about 15 and excludes zero for student risk scores of about 15 and higher, implying a statistically significant difference between conditions for students who had risk scores >15. It is important to interpret the moderation effects in the context of the distribution of student risk scores. At least 85% of the students had a risk score of 15 or less, so we estimate that the difference between conditions is statistically significant for the students at

Table 7
Results from mixed-model Time × Condition analysis of condition effects on academic and teacher-reported outcomes.

Effect or statistic			Math score	Reading score	Days absent	School readiness
Fixed effects	Intercept	β_{00}	221.99**** (0.7096)	223.85**** (0.5735)	8.5934**** (0.3383)	4.4425**** (0.0975)
	Condition	β_{01}	0.3184 (0.9929)	−0.0864 (0.8036)	0.2084 (0.4730)	−0.1483 (0.1383)
	Time	β_{02}	5.1781**** (0.2490)	3.7132**** (0.0749)	0.3768 (0.2233)	−0.0832 (0.0589)
	Time × Condition	β_{03}	−0.1784 (0.3477)	0.1432 (0.1028)	−0.0294 (0.3126)	0.0819 (0.0842)
Variances	School intercept	τ_{30}	8.9515**** (2.2424)	5.7204**** (1.4306)	1.8842*** (0.5364)	0.0940** (0.0395)
	School slope	τ_{31}	1.0666*** (0.2879)		0.8857**** (0.2309)	0.0277** (0.0118)
	Student intercept	τ_{20}	162.32**** (2.4452)	127.57**** (1.9429)	43.6733**** (0.8589)	0.3236**** (0.0473)
	Student slope	τ_{21}	1.0850** (0.3656)		3.6818**** (0.2302)	0.0037 (0.0122)
	Residual	σ^2	33.9580**** (0.5526)	34.7117**** (0.4306)	20.7805**** (0.3193)	0.3348**** (0.0361)
Hedges' *g*	Time × Condition	*g*	−0.017	0.033	0.014	0.095
p-Values	Time × Condition	*p*	0.611	0.172	0.926	0.337

Note. School readiness was rated by teachers; all other measures provided by the Oregon Department of Education. Table entries show parameter estimates with standard errors in parentheses except for intraclass correlations (ICCs), Hedges' *g* values, and *p*-values. Tests of fixed effects (first four rows) used 39 *df* to account for the school as the unit of analysis. ICC = intraclass correlation coefficient. ICCs calculated as proportion of variance in change over time due to students/teachers within the same school (τ_{31} / [τ_{21} + τ_{31}]). Due to challenges with model convergence, the school- and student-level slope variances were fixed to nonnegative values for the reading score dependent variable.

** $p < 0.01$.
*** $p < 0.001$.
**** $p < 0.0001$.

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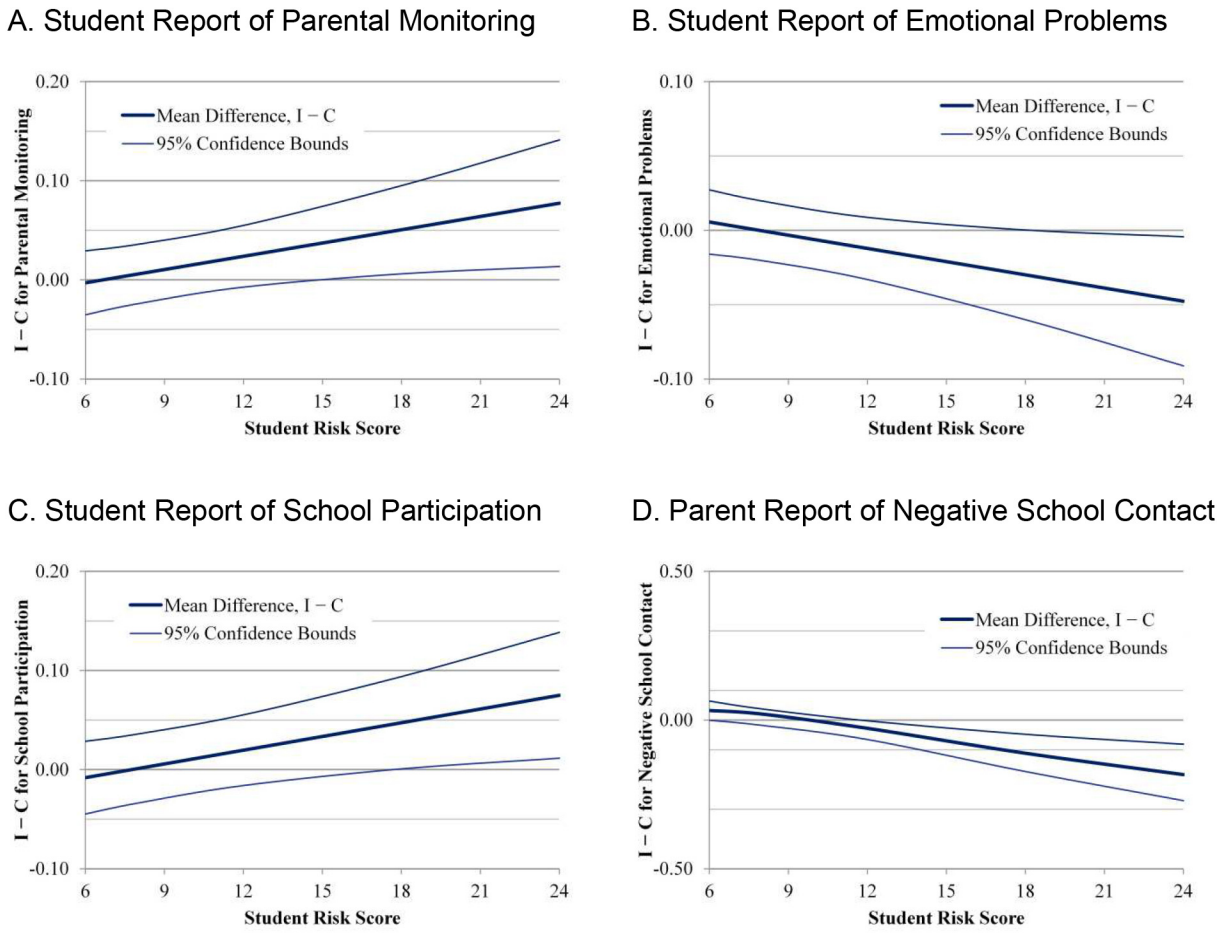

Fig. 5. Differences between conditions on four outcomes plotted by teacher-reported student risk of behavior problems. The vertical axis shows the difference between conditions (I − C) on gains in each scale across the range of the student scores; a gain of zero represents no difference between conditions. The heavy line depicts the mean difference estimate. The two thin, outer lines show the 95% confidence interval around the mean estimate.

highest risk who comprise about 15% of the student sample. Fig. 5, Panel B, shows significantly lower student-reported emotional problems for PFS students with a risk score of about 18 or greater, and Panel C shows significantly greater school participation for student with a risk score of about 18 or greater. A risk score of 18 includes only the students most at risk. As shown in Panel D, 5% of the student sample shows significantly lower parent-reported negative school contacts for PFS students at a risk score of 12.0 and greater, approximately 25% of the student sample. The effect for state-reported math score moderated by student risk is not shown in Fig. 5 because the 95% confidence interval included zero across the full range of risk scores. That is, although math scores were moderated by risk status, with a small negative difference for students at low risk and small positive difference for students at high risk, the confidence bounds included zero, implying no statistically significant difference between conditions, at all levels of risk.

The Time × Condition effect was not moderated by student gender or minority status for any study outcomes except possibly student-reported positive school structure ($p = 0.031$), which did not meet criterion with multiple tests. The interaction suggested positive change for males in PFS schools compared with males in control schools and negative change for females compared with those in control schools, but an examination of subgroups produced nonsignificant Time × Condition effects for both females ($t = 0.34$, $p = 0.738$) and males ($t = -1.34$, $p = 0.264$).

The Time × Condition effect was moderated by cohort for student-reported conduct problems ($p = 0.003$) and emotional problems ($p = 0.015$), math score ($p < 0.001$), reading score ($p = 0.023$), and number of days absent ($p = 0.035$). With our criterion ($\alpha < 0.001$) for multiple tests, cohort moderated only math scores; we report all six results to allow for the interpretation of patterns. Cohort 2 showed differences between conditions in growth on student-reported conduct problems ($t = -2.26$, $p = 0.030$) and state-reported math scores ($t = -2.08$, $p = 0.044$), whereas no significant changes on these measures were found for Cohort 1. For conduct problems, we found an increasing slope for Cohort 2 students in control schools ($t = 3.39$, $p = 0.002$) but no change across time for Cohort 2 students in intervention schools or for Cohort 1 students in either condition; slopes also differed significantly between cohorts within only control schools ($t = 3.79$, $p < 0.001$). The pattern was similar, yet less extreme, for emotional problems, with a difference in slopes between cohorts within only control schools ($t = 2.51$, $p = 0.016$). Math

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scores increased at a slightly higher rate for Cohort 2 students in control schools than for either Cohort 2 students in intervention schools, noted above, or Cohort 1 students in control schools ($t = 4.66$, $p < 0.001$). Finally, no statistically significant findings were detected for either study cohort for state-reported reading score or days absent. Tests of moderation by cohort may have been a result of implementation, in that implementation may have improved over time within each school. The two cohorts, however, differed in three other important ways: (a) the grade at which they were first exposed to the intervention, seventh grade for Cohort 1 versus sixth grade for Cohort 2; (b) the number of years of exposure, 2 years for Cohort 1 versus 3 for Cohort 2; and (c) the availability of pretest assessment data, with Cohort 2 providing data only after implementation. Moreover, the effects were mixed, with improved conduct and emotional problems for Cohort 2 students in the PFS condition but worse math scores in the PFS condition for those same students.

3.4.3. Exploratory analyses

The analyses described previously tested measures and moderators selected a priori as potential targets of the PSF intervention. Upon finding limited support for the effects of PFS on outcomes selected before we began the analysis, we tested seven additional measures: student reports of parent involvement, depression, problems with other students, deviant peers, prosocial behavior, coping, and perceived future career. The main effects were statistically significant for coping but not for any of the other student measures or the moderation tests. We also tested universal PFS implementation fidelity as a moderator. PFS implementation fidelity moderated condition effects for parent-reported parental monitoring and positive school contacts. In both cases, the statistically significant condition effects appeared between schools with the lowest fidelity scores, and parents of control school students reported lower scores than did parents of intervention school students. The exploratory analyses added 61 new tests: 42 tests of seven exploratory measures for efficacy and moderation (five moderators) plus 19 tests of a priori measures with the exploratory moderator. Because only three of the 61 additional tests (4.9%) were statistically significant, we assumed they were likely Type I errors.

4. Discussion

The purpose of this study was to examine the effectiveness of the PFS model when implemented by school staff under routine conditions. As described by Dishion (2011), the intervention was designed to fit within schools that had adopted schoolwide PBIS. Systemic concatenation was used to align the core principles of PBIS and PFS, as shown in Fig. 1. The effectiveness–implementation hybrid design enabled us to examine the hypothesized intervention outcomes on the basis of the conceptual model presented in Fig. 2. It also enabled us to examine implementation fidelity and the factors that may have affected the implementation of the PFS tiered supports that emerged from the process evaluation and interviews with school staff.

4.1. Effectiveness of PFS

This effectiveness evaluation addressed two primary research questions: Did students in schools provided with PFS improve on outcomes when compared with students in control schools, and did the level of risk moderate intervention effects? With respect to the first question, students reported improvement in their peers' positive involvement in school emerged as the only potentially significant Time × Condition effect ($p = 0.031$, $g = 0.10$). Given the number of measures tested, however, this difference did not meet our criterion for statistical significance, nor could the single result constitute a pattern. Although the results were disappointing with respect to the overall impact of the PFS model on parental school involvement, student engagement in school, and student social and emotional adjustment, the prior research on components of the PFS model had demonstrated the most success with students at risk for problem behavior (e.g., Stormshak et al., 2009). Because the evaluation of the PFS model occurred at the school level, the sample included a substantial portion of students with well-managed families, normal social and emotional adjustment, and positive school engagement. Hence, the putative intervention mechanisms may not have had a measurable impact on such students and families.

The investigation of moderation effects demonstrated that among the top 15% to 25% of students at risk for behavior problems, as reported by their teachers, students in intervention schools outperformed those in control schools on parent-reported negative school contacts and student-reported parental monitoring, emotional problems, and school participation. Fig. 4 shows that as teacher-reported behavioral risk increased for students, the difference between the intervention and control conditions improved for each of these measures. These results are consistent with previous research that suggests risk behavior leads to greater parent engagement, and subsequently, increased effectiveness of parenting interventions over time (Shelleby & Shaw, 2014). Moderation effects for only one dependent variable, however, met our criterion for statistical significance of a single test ($\alpha < 0.003$): parent-reported negative school contacts. Similarly, the Benjamini-Hochberg (BH) correction (Benjamini & Hochberg, 1995) for the multiple tests, recommended by the What Works Clearinghouse (2014; see also Gottfredson et al., 2015), also suggested that student risk only moderated the effect of condition on parent-reported negative school contacts (BH-corrected $p = 0.006$). The BH-corrected p-values were 0.139 each for risk-moderated student reports of parental monitoring, emotional problems, and school engagement. These results were nonetheless consistent with the conceptual model presented in Fig. 2 with respect to putative treatment mechanisms (parental monitoring) and proximal outcomes of student adjustment (emotional problems, negative school contacts). Prior research had shown effects on emotional problems and school engagement, for example, with CACE models that test effects for those families that engaged in the FCU (e.g., Fosco et al., 2016), although our results did not replicate effects on all measures (e.g., substance use, family conflict, antisocial behavior). In our study, schools may not have provided PFS

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to a sufficiently large number of behaviorally at-risk students (see the implementation subsection). In such a case, the tests of moderation by risk may have underestimated the potential of PFS had schools implemented its components more consistently and broadly. Hence, although the effectiveness results were not robust, the pattern of the findings was partially consistent with findings from previous research on the PFS components and conceptual framework.

The evaluation also addressed several secondary research questions captured by tests of moderation by cohort, gender, and minority status. Cohort moderation yielded mixed results. Two tests suggested differences between Cohort 2 students in PFS schools and control schools on conduct and emotional problems. Increased problems among students in control schools, however, appeared to drive the differences between conditions for Cohort 2 rather than a decrease in conduct and emotional problems among students in intervention schools. Conduct and emotional problems among intervention students in Cohort 2 were similar to those reported by students in Cohort 1 in either the intervention or control condition. Another test suggested decreased math scores for the same students, but this, too, appeared (paradoxically) to lead to larger increases in math scores among Cohort 2 students in the control schools than among the other three Cohort × Condition groups. Two other moderation tests, those for reading score and days absent, produced equivocal results, with no statistically significant difference between conditions for either cohort. Because of the differences between cohorts in implementation, age at onset, exposure, and data available only at posttest, these effects are difficult to interpret.

4.2. Implementation

The comparison of PFS implementation between intervention and control schools yielded large differences for the universal components of PFS and resources available to parents ($g = 1.07$ and 1.65, respectively), indicating that the intervention schools were able to implement these components effectively. For implementation fidelity for the selected or indicated levels, we found smaller differences between conditions than expected ($g = 0.32$). As described in previous reports (Dishion et al., 2016; Fosco et al., 2014; Stormshak et al., 2016), several challenges to implementation emerged from the implementation process evaluation and interviews conducted with the PFS school staff. These offer potential hypotheses that might help explain the weak fidelity of implementation for the selected and indicated components, as described next.

The implementation of PFS occurred during a time of economic recession and financial hardship in the state of Oregon. As a result, schools were limited in a number of ways. At the beginning of the study, many schools suffered significant cuts in funding, which limited resources available to implement PFS. As the study progressed, the state of Oregon reduced school funding by about 10% each year (Oregon State Legislature, 2013). Schools were required to cut staff, implement costly teacher and administrator evaluations, cut services, and reallocate space to accommodate growing student populations (Stormshak et al., 2016). Oregon schools also had one of the lowest high school graduation rates in the country (68%), which placed academic supports at high priority, and yet one of the highest student–teacher ratios (U.S. Department of Education, 2012). Schools participating in this project received funding to support the development of FRCs and offer services such as the FCU at a level similar to that offered by some state initiatives (e.g., Chaparro et al., 2012). These funds, however, were insufficient to cover costs of all PFS activities, and we were unable to direct those funds exclusively toward PFS activities. Moreover, principal turnover in more than half of the intervention schools (12 of 21) limited administrator support, critical for successful implementation of innovative approaches to behavioral or academic supports within their schools. In this context, implementing PFS was particularly challenging in that ideal implementation would have required staff training, space for FRCs, parent screeners to inform about their students and home environments, and increased staff time to work with parents and families.

Given that many school administrators and staff members saw the implementation of PFS as yet one more program, we had expected that the integration within a tiered behavior support system such as PBIS would minimize the additional burden and allow for more efficient provision of family management supports. About 60% of participating schools achieved acceptable implementation of schoolwide PBIS, but in several, the schoolwide components of PBIS were not fully in place. Some of the challenges with PFS implementation stemmed from limited schoolwide PBIS implementation, which required time from PFS interventionists to shore up schoolwide systems and practices. It is also possible that the successful integration of PFS within PBIS systems, an assumption on which our study rested, was too resource intensive or otherwise untenable for schools. Future research should delve into the implementation dynamics of merging two independent and ostensibly compatible systems in order to more systematically uncover the synergies and barriers within school systems.

Improving fidelity likely requires improvements in training, simplification of the model, or reduced demands on the schools. Dishion et al. (2016) have discussed how the PFS model has been simplified and how online training and web-based supports might alleviate some implementation challenges. Our study included schools that had implemented PBIS, but only at the universal, schoolwide level and not necessarily to criterion. Schools that meet high fidelity standards for all three PBIS tiers, however, would most likely offer better targets for PFS implementation. As recommended by implementation science frameworks (e.g., Meyers, Durlak, & Wandersman, 2012), conducting a capacity or readiness assessment would have helped gauge whether the schools had the necessary structure and supports in place for successful implementation of the PFS model. Furthermore, given the small differences between study conditions in implementation fidelity reported for Tiers 2 and 3 of PFS, enhanced training procedures and technical assistance may be required to improve both implementation and effectiveness outcomes. In some PBIS implementations, for example, trainers or coaches attend monthly school meetings on student behavior for 2 years to develop a solid core of in-school expertise that can sustain implementation in light of key staff member or administrator turnover (Horner et al., 2009).

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Finding the optimal blend of implementation fidelity and adaptation (Durlak & DuPre, 2008) will require additional research. Striving to attain perfect fidelity to implementation may be unrealistic, but if future work could disentangle the intervention's theory of change from more pragmatic aspects, it may engender adaptations that improve effectiveness. Sundell, Ferrer-Wreder, and Fraser (2014) discuss the unanticipated influences of the contexts in which interventions may be placed. Although all schools work toward improving academic achievement, they frequently have different missions or emphases, vary in their social and behavioral norms and language, and include diverse populations of students and families in terms of not only race and ethnicity, but culture, politics, religion, and other factors that may influence the adoption and implementation of PFS practices. Finding ways to build on the culture and language of individual schools may help achieve greater buy-in and adherence to the model. Schools also need measures of implementation fidelity at each tier that assess the key theoretical components. A comparison with schoolwide PBIS may be instructive, because implementation has shifted from individual schools to entire districts to establish district-level trainers and coaches who understand both the dynamics of their school and the fundamentals of the behavior support model. The economic analysis of schoolwide PBIS programs by Blonigen et al. (2008) suggests that districts should not only train staff members at the school and district level and collect intensive fidelity measures, but also create a district-level leadership team to coordinate services and contract for an external evaluation of implementation.

Finally, the real-world implementation of PFS, required by this effectiveness trial, necessarily introduced more noise in the data than efficacy trials because we could not control the implementation of PFS activities conducted by school staff members or collect important information about them. Implementation data about the families who received PFS supports from the schools were not available to the program evaluators. Hence, it was not possible to evaluate the specific effects of each of the PFS tiered levels of support or conduct analyses on only families that engaged in PFS components. Although the moderation analyses provide some evidence that at-risk students benefited more from the PFS intervention than did lower risk students, the effects associated with the specific levels of tiered support cannot be determined from the current trial. Implementation data for Check-In/Check-Out also were unavailable, leaving open questions about whether the training and consultation activities changed schools' use of the intervention. Nor could we track or control for all other interventions or supports offered by schools to students or their families. Students in every school were placed on behavior support plans or individualized education programs, or received other interventions or services (e.g., mental health counseling). Cataloging all these interventions, in addition to all aspects of PBIS and PFS, while cost prohibitive, would have allowed for a more sensitive evaluation.

4.3. Limitations

Several limitations of this study warrant discussion. The measurement and sampling procedures raised additional limitations. The score reliabilities of a subset of the outcome measures were marginal, such as conduct problems ($\alpha = 0.63$) and emotional problems ($\alpha = 0.69$). These reliability levels were consistent with other reports of the measure (e.g., Kovacs & Sharp, 2014). Although "there is no specific criterion of acceptability" for reliability values (Rosenthal & Rosnow, 2008), the low score reliabilities may have reduced the sensitivity to intervention effects. Similarly, measures of positive and negative school contact by parents with unknown psychometric qualities. This is notable given the only statistically significant result, after controlling for multiple tests, was a reduction to parents' reports of negative school contacts and for only a subset of parents.

The low rates of parent survey completion raises questions about the representativeness of the respondent sample and the potential for biases. Inherent to most longitudinal school-based research, different teachers reported on the students over time, which could have shifted the longitudinal trajectories of student functioning across the assessment periods. Student surveys may also have included biases associated with self-report. We aimed to mitigate these challenges by including multiple sources of information, including objective measures of academic outcomes and attendance, but it is noteworthy that the only statistically significant finding involved parents' self-report of negative school contacts. Student attrition rates were also rather substantial and may have had an influence on the study findings. We implemented analysis procedures that minimize bias associated with attrition, but because students at highest risk for behavioral and academic problems tend to be the most mobile, and because many PFS components target high-risk students and their families, student transience may have concealed or limited intervention effects among at-risk youths.

The discussion about challenges with implementation has been inferred from interviews with school administrators, anecdotal reports from research personnel, and from implementation fidelity data. Any conclusions have yet to be verified experimentally and should therefore remain tentative until further support can be obtained. In addition, given the limited support for PFS from this study, we cannot claim that the effects were solely associated with PSF and not schoolwide PBIS or other activities of the schools.

4.4. Conclusion

The PBIS framework allowed for the systematic concatenation of PFS with PBIS (Dishion, 2011), and it may continue to serve as a framework for further research on implementation of systems to improve parent management and other parent supports and increase parent–school involvement. Although the findings derived from this research were weaker than expected across the effectiveness and implementation outcomes, this study contributes to the field of prevention science by furthering our understanding of implementing effective prevention and intervention into schools. Preventing problem behavior and supporting youth success is a complex enterprise and requires a commitment of financial resources on the part of state systems. A change in our policies, structure of schools, and resource distribution is needed to successfully prevent problems at the school level. Prior

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research demonstrates that prevention is a cost-effective means of reducing later problem behavior, substance use, and risk behavior in adults. In fact, cost-effectiveness research suggests than an investment of one dollar returns more than five dollars when prevention is successful (Kuklinski, Briney, Hawkins, & Catalano, 2012). Our efforts to continue to support schools in implementation of evidence-based programs to reduce problem behavior are critical for changing this financial model and for restructuring education to support the success of all students.

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