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Increasing Efficacy in a Population-level Implementation

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Abstract

This study examines the changes in teacher efficacy and interaction effects based on perceived effectiveness and level of implementation for teachers trained in the PAX Good Behavior Game and subsequent PAX Next Steps professional development training as measured by the Teachers' Sense of Efficacy Scale. Previous studies have shown improved outcomes for teachers with the PAX Good Behavior Game including a reduction in teacher stress and improved teacher efficacy among in-service and pre-service teachers. This study found that PAX Next Steps professional development training increased overall teacher efficacy as well as efficacy in instructional strategies, student engagement, and classroom management for teachers already trained in the PAX Good Behavior Game regardless of their own level of implementation or their perceived effectiveness of the PAX Good Behavior Game program. These outcomes highlight the importance of culturally competent professional development as a key feature in the sustainability of a population-level implementation of any evidence-based program.

Keywords: Prevention, Evidence-based Program, Professional Development, Teacher Education

Introduction

This paper describes the impact of professional development training in the implementation of the PAX Good Behavior Game (PAX GBG) on teacher efficacy. PAX Next Steps training was designed to provide additional support for implementing PAX GBG, an evidence-based universal preventive intervention for those teachers who had already received initial training and had begun to implement PAX GBG in their classrooms. The study was carried out to determine whether PAX Next Steps training could add to teachers' sense of efficacy above and beyond the increase in efficacy attributed to their PAX GBG Initial Training (Fruth & Huber, 2015).

Teacher Efficacy

Teachers' sense of efficacy represents the confidence, capacity, and utility to meet the challenges of the classroom. This is consistent with Bandura's (2001) social cognitive theory in associating self-efficacy with a belief in the ability to carry out an action. Teacher efficacy is a powerful predictor of a number of educational outcomes, including teaching performance and commitment, as well as student achievement (Chesnut & Burley, 2015; Klassen & Tze, 2014). In addition, teachers reporting higher efficacy also report lower job stress and job burnout (Skaalvik & Skaalvik, 2007, Schwarzer & Hallum, 2008), and reducing stress and burnout are vital to maintaining an effective workforce. Nearly one third of educators leave the profession within the first three years of service, and nearly one-half leave within the first five years of service (Brill & McCartney, 2008). High teacher turnover causes a disproportionately high level of stress on schools' finances, culture, teacher outcomes, and even student achievement (Ronfelt, Lankford, Loeb, & Wyckoff, 2011).

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Schools and communities have a vested interest in maintaining and improving their teachers' efficacy (Caprara, Barbaranelli, Steca, & Malone, 2006, Klassen & Chiu, 2010).Huber, Fruth, Avila-John, & Ramirez (2016) proposed a transactional relationship between students and teachers that goes a long way in explaining teacher outcomes and student achievement with a basis in teacher efficacy. That is, teachers and students experience a bi-directional or reciprocal relationship in which the teacher's behaviors and choices are predicated first upon the teacher's efficacy but also affected by student responses to the teacher's behaviors and choices. Students are also affected by the teacher's encouraging or derogatory responses as well in a dynamic exchange predicated upon their own teacher efficacy. This transactional process, first suggested by Sameroff (1995) to explain interactions between parents and children, is quite useful in explaining the dynamic environment in which teacher efficacy's effect on students and their responses predict student outcomes. Students benefit both socially and academically with these increased positive interactions and transactions between the teacher and students (Boyd, et al., 2008, Caprara, et al., 2006, Ronfelt, et al., 2011, Van Dinther, et al., 2013). Ultimately, teachers with higher efficacy stand a better chance of having higher teacher outcomes, student achievement, and teacher retention (Huber, Fruth, Avila-John, & Ramirez, 2016).

PAX Good Behavior Game

The Good Behavior Game (PAX GBG) is a well-researched strategy for promoting cooperation and prosocial behavior in elementary school classrooms. In this intervention, children are put into small groups to carry out normal classroom tasks cooperatively. Teams that meet co-created criteria for appropriate behavior during a fixed period of time (criteria that they devise along with their teacher)receive rewards that reinforce their cooperative behavior. Engaging in PAX GBG has been shown to produce immediate reductions in disruptive behavior and subsequent benefits in the prevention of psychological and behavior problems. Specifically, students exposed to PAX GBG have demonstrated reductions in bullying, juvenile delinquency, and violent school injuries from initial implementation through middle school (Kellam, et al., 1994, Kellam, et al., 1998, Ialongo, et al., 1999, Embryet al., 1996, Kellam, Reid, & Balster, 2008). These increases in pro-social behavior and reductions in problematic behavior have persisted beyond the intervention's application to provide ongoing protective factors for young people into adolescence (Ialongo, et al., 1999, Jiang, Santos, Mayer, & Boyd 2015, Petras, Masyn, &Ialongo, 2011, Smith, Osgood, Caldwell, Hynes, & Perkins, 2013).

These ongoing protective factors have led to improved academic outcomes and increased high school graduation and college entrance rates (Fruth, 2014, Weis, Osborne, and Dean, 2015, Bradshaw, Zmuda, Kellam, & Ialongo, 2009). Students exposed to PAX GBG also demonstrated reductions in tobacco, alcohol, opioid and other drug use in adulthood (Kellam, et al., 2014, Furr-Holden, Ialongo, Anthony, Petras, & Kellam, 2004). Students receiving PAX GBG during their schooling also went on to experience fewer psychiatric disorders, take part in fewer risky sexual behaviors, and experience less suicide ideation and fewer attempts (Wang, et al., 2009, Kellam, et al., 2012, Wilcox, et al., 2008, Katz, et al., 2013).The PAX Good Behavior Game is the commercially-available version of the Good Behavior Game utilized in multiple cohorts of efficacy trials at Johns Hopkins University. The PAX GBGalso includes a set of behavioral health strategies that teachers implement within their daily maintenance of the classroom, known as *Evidence-based Kernels*(Embry and Biglan, 2008).These kernels help students define prosocial vs. disruptive behaviors and commit to increasing prosocial behavior. These kernels also include strategies that help teachers manage potentially stressful or chaotic times such as selecting students for questions or tasks, gaining students' attention, and transitions like lining up to leave the classroom or changing activities. Providing research-based strategies for these more difficult scenarios ensure that both teacher and students share a framework for troubleshooting and improving their behavior during these problematic times (Embry, et al., 2010). Reinforcement for prosocial behavior is enhanced through kernels that include praise notes to other students, recognition of classmates as "PAX Leaders," and opportunities to engage in brief, fun activities in the classroom contingent on teams' successful completion of an activity.PAX GBG has shown to reduce disruptive behavior and promote prosocial behavior (Embry, 2002, & Poduska, et al., 2008).

Prior Research on the Impact of PAX GBG Training on Teacher Efficacy

Previous studies have revealed effects of PAX GBG initial training on teacher efficacy and its various sub-areas. In a set of quasi-experimental studies, formal instruction in PAX GBG and its behavioral health strategies increased overall teacher efficacy in pre-service elementary teacher candidates and middle childhood teacher candidates as compared to the control groups who received "business-as-usual" pre-service instruction and experienced no change in efficacy.

PAX GBG also increased efficacy in the sub areas of instructional strategies, student engagement, and classroom management for the pre-service candidates trained in PAX GBG (Fruth & Huber, 2015, Fruth, Huber, &Avila-John, 2016). Candidates receiving PAX GBG instruction during their pre-service experience also reported feeling "More confident interviewing and entering the field" after PAX GBG training(PAXIS, 2019).PAX GBG instruction has also previously improved efficacy among in-service teachers. These teachers showed significant increases in overall efficacy and efficacy in student engagement after receiving training. These gains in efficacy were experienced across all years of service from beginning to experienced teachers (Huber, Fruth, Avila-John, and Rodriguez, 2016). However, in each of these studies, gains in efficacy were demonstrated among teachers receiving initial instruction in PAX GBG. It is not known how additional instruction in the evidence-based practice in the form of a PAX Next Steps professional development for in-service teachers already trained in PAX GBG would affect efficacy, nor what variables may moderate this relationship. Thus, we wished to evaluate the effects of additional training on teacher efficacy and whether these effects were moderated by the level of implementation and perceived effectiveness of PAX GBG.

Method

Sample

Participants who opted into this study were a part of a state-funded population level expansion of PAX GBG classroom programming. This expansion was in coordination with the 2016 authorization of the 21st Century Cures Act to treat and prevent factors contributing to the opioid epidemic. The state of Ohio utilized this federal funding to develop "Ohio Cures," which among other treatment and prevention objectives, provided resources for local mental health, substance abuse prevention, and education entities to provide PAX GBG training to teachers in their jurisdiction. Opportunities to receive this training were marketed through each of these networks as well as various state and local social media. This opportunity was available to all Ohio teachers grade PreK-6th. Teachers registered online to attend a scheduled training in their area. In all, the initiative funded over 4,800 Ohio teachers and related support personnel for training in various PAX GBG programming and support strategies during the 2-year period.

Throughout the initiative, 755 teachers who had already received PAX GBG Initial Training during previous initiatives underwent PAX Next Steps professional development training. Of these 755 participants, 371 opted to respond to a customized post training survey enquiring about their PAX GBG implementation. Subsequently, 476 participants opted to respond to the Teachers' Sense of Efficacy pretest upon registration for the PAX Next Steps professional development training in August 2018. Finally, 297 participants responded to the Teacher's Sense of Efficacy Scale posttest after their PAX Next Steps professional development training by Spring 2019. In all, 130 participants completed all three: post training survey, efficacy pretest, and efficacy posttest (N = 130).

Procedure

The PAX Next Steps professional development training provides teachers who were previously trained in PAX GBG with enrichment and extension strategies. This 1-day, in-person professional development training expands on the lessons from PAX GBG Initial Training and the original PAX Manual for up to 40 teachers. This training explores advanced strategies and methods in the PAX Manual that are not provided in the PAX GBG initial training. This training also gives teachers access to a certified PAX trainer to help troubleshoot implementation issues they may have faced implementing PAX GBG in the classroom. The PAX Next Steps training also provides explicit instruction for using PAX strategies and corresponding data collection in tiered instruction. This includes tier 2 and tier 3 variations of the PAX strategies that participants are already familiar with. PAX Next Steps training also provides assistance with integrating PAX GBG strategies with existing School wide Positive Behavior Interventions and Supports (PBIS) and Trauma-informed Classrooms initiatives.

Measures

Teacher Efficacy. We used the Teachers' Sense of Efficacy Scale – short form as a pretest upon registration for training in August 2018 and again as a posttest following their training in Spring 2019 (Tschannen-Moran & Woolfolk Hoy, 2001). The scale contains 12 items asking about teachers' sense of their own ability to achieve their goals as educators in terms of instructional strategies, student engagement, and classroom management. Sample items include "How much can you do to control disruptive behavior in the classroom?" and "How much can you do to motivate students who show low interest in school work?". Response options range from *Nothing* (1) to *A Great Deal* (9).

Item scores are averaged to form a composite of teacher efficacy, with higher scores indicating more efficacy. Cronbach's alpha was .94 at pre-test and .93 at post-test. *Implementation and perceived effectiveness*. Immediately after PAX Next Steps training, participating teachers were given a survey enquiring about their PAX GBG implementations. They were asked about their level of implementation and perceived effectiveness of PAX GBG. The corresponding items were "To what extent have you been implementing PAX GBG in your classroom before Next Steps training?" and "How well has PAX GBG been working in your classroom before Next Steps training?", respectively. For the first question, response choices included (1) *Periodically implementing some kernels*, (2) *Often implementing many kernels and some games*, and (3) *Regularly implementing kernels and games each day*. For the second question, response choices included (1) *PAX GBG has not been working well in my classroom*, (2) *PAX GBG has been working with some of my students*, (3) *PAX GBG has been working with most of my students*, and (4) *PAX GBG has been working with my entire classroom*.

Analysis plan

We used a two-way mixed effects ANOVA to test whether level of implementation or perceived effectiveness moderated change over time in teacher self-efficacy. The within-subjects effects on self-efficacy were measured before and after the training. The variables representing level of implementation and perceived effectiveness were the between-subjects effects; the two variables were used separately in two different ANOVA models. The analysis was performed using SPSS 23.0 for Windows.

Results

Table 1 shows pre- and post-score averages as well as p-values and effect sizes for the Teachers' Sense of Efficacy Scale and each subscale. Independent and paired sample *t*-tests were used to determine change in efficacy for participants as measured by the Teachers' Sense of Efficacy Scale. Independent sample *t*-tests determined an increase in efficacy from pre- to post in overall efficacy (7.0 vs. 7.8), instructional strategies subscale (6.7 vs. 7.6), student engagement subscale (7.2 vs. 7.9), and classroom management (7.0 vs. 7.9). Each increase in efficacy was statistically significant.

Table 1Change in efficacy – Independent samples

Variables	Pretest (N=476)	Posttest (N=297)		
	Pre Mean	Post Mean	p-value	Effect Size
Overall efficacy	7.0	7.8	< .01	.80
Instructional strategies	6.7	7.6	< .01	.74
Student engagement	7.2	7.9	< .01	.68
Classroom management	7.0	7.9	< .01	.73

Note: The higher the score, the greater the sense of efficacy.

Table 2 shows pre- and post-score averages as well as p-values and effect sizes for the Teachers' Sense of Efficacy Scale and each subscale. Paired sample *t*-tests determined an increase in efficacy from pre- to post for matched pairs in overall efficacy (7.0 vs. 8.0), instructional strategies subscale (6.8 vs. 7.7), student engagement subscale (7.3 vs. 8.1), and classroom management (7.1 vs. 8.1). Each increase in efficacy was statistically significant.

Table 2Change in efficacy – Paired samples

Variables	Pretest (N=81)	Posttest (N=81		
	Pre Mean	Post Mean	p-value	Effect Size
Overall efficacy	7.0	8.0	< .01	.79
Instructional strategies	6.8	7.7	< .01	.85
Student engagement	7.3	8.1	< .01	.84
Classroom management	7.1	8.1	< .01	.97

Note: The higher the score, the greater the sense of efficacy.

Two models were developed to determine interaction effects of two variables from the post training survey on efficacy according to the Teachers' Sense of Efficacy scores for the same participants. Level of implementation was the first variable tested for interaction effects with sense of efficacy. For the first model, in which the implementation question was used as a moderator of change in self-efficacy, we found that 57 teachers responded with a 1 (signifying a low level of implementation), 50 responded with a 2 (moderate level of implementation), and 20 responding with a 3 (high level of implementation). Results indicated that the interaction effect of implementation and time on self-efficacy was not significant, $F(2,127) = 1.24$, $p = .29$. The main effect of implementation on self-efficacy was not significant, $F(2,127) = 1.79$, $p = .17$, but the main effect of time on self-efficacy was significant, $F(1,127) = 147.17$, $p < .001$, partial $\eta^2 = .54$, indicating a substantial gain in self-efficacy during the training course, regardless of the level of implementation. Levene's test indicated that the assumption of homogeneity of variance was not violated at the pre-test, $F(2,127) = 2.24$, $p = .11$, or the post-test, $F(2,127) = 2.61$, $p = 08$.

Perceived effectiveness of the PAX GBG was the second variable tested for interaction effects with sense of efficacy. For the second model, in which the perceived effectiveness question was used as a moderator of change in self-efficacy, we initially found that only 2 teachers responded with a 1 (signifying a very low level of perceived effectiveness) and only 14 teachers responded with a 4 (signifying a very high level of perceived effectiveness). Thus, we collapsed the four groups into two by combining the lower two and upper two responses. As a result, we had 49 teachers who responded 1 or 2 (signifying a low level of perceived effectiveness), and 81 teachers who responded 3 or 4 (signifying a high level of perceived effectiveness). Results indicated that the interaction effect of perceived effectiveness and time on self-efficacy was not significant, $F(1,128) = .38$, $p = .54$. The main effect of implementation on self-efficacy was significant, $F(1,128) = 11.65$, $p < .001$, partial $\eta^2 = .08$, indicating that self-efficacy of the two groups across both time point was different; the group indicating a high level of perceived effectiveness was consistently higher at pre-test (7.07 vs. 6.64) and at post-test (8.05 vs. 7.52) when compared to the group indicating low perceived effectiveness. Finally, similar to the above results, we also found that the main effect of time on self-efficacy was significant, $F(1,128) = 149.82$, $p < .001$, partial $\eta^2 = .54$, indicating a substantial gain in self-efficacy during the training course. Levene's test indicated that the assumption of homogeneity of variance was not violated at the pre-test, $F(1,128) = .85$, $p = .36$, or the post-test, $F(1,128) = 3.88$, $p = .051$.

Discussion

The results of this study showed that PAX Next Steps Professional development training increased teachers' ratings of their own efficacy according to the Teachers' Sense of Efficacy Scale. This was true for overall efficacy scores as well as efficacy scores in all 3 subscales: instructional strategies, student engagement, and classroom management. The increase in overall efficacy as well as efficacy in each of the subscales was shown when all participants' pre- and post-scores were included in independent sample *t*-tests as well as when only matched pre- and post-pairs were included in paired sample *t*-tests. The increase in efficacy also occurred regardless of the teachers' level of PAX GBG implementation or their perception of the effectiveness of PAX GBG. This increase in efficacy is remarkable in that these teachers had already undergone PAX GBG Initial Training and experienced a significant increase in teacher efficacy as discussed in Huber, Fruth, Avila-John, and Ramirez (2016).

The PAX Next Steps professional development training augments the evidence-based intervention by allowing practitioners who have been formally trained in PAX GBG to recalibrate their own implementation after a period of time using the intervention in their own classroom. PAX Next Steps training again provides a certified PAX trainer skilled in teaching, supporting, and troubleshooting PAX implementations. This allows participants access to an expert to help facilitate the integration of PAX GBG into existing educational, behavioral health, and policy initiatives, such as Positive Behavior Interventions and Supports (PBIS), Social Emotional Learning (SEL), Trauma-informed Classrooms, and even other commercially available schoolwide or classroom-based interventions. This gathering of practitioners trained in PAX GBG also provides an opportunity for dialogue around modifications or variations of strategies that allow the intervention to work effectively within the culture of the school and community. This cultural competence accounts for the transferability of the intervention with successful implementations in urban, rural, suburban, and indigenous communities in the United States as well as additional population-level implementations in Canada and Europe. The increases in efficacy found in this study are likely due in part to the dialogue with the certified expert and fellow practitioners regarding cultural variation in the strategies to increase the use and outcomes from the intervention in the classroom. The gains in efficacy made in this professional development of PAX GBG represent an important cog in disseminating population-level implementations of evidence-based programming.

Interventions that have proven ripe for population-level dissemination, as PAX GBG has, need an array of maintenance mechanisms to ensure outcomes, sustainability, and growth beyond the efficacy or effectiveness environments. As a classroom-based intervention implemented by classroom teachers, this and other effective interventions implemented on the population level require effective marketing and awareness, initial training, on-site coaching, on-going professional development, community support, and local and regional evaluation. Pre-service institutions of teacher education can also play a role in facilitating population-level implementations by incorporating the evidence-based interventions into their pre-service curricula. These same institutions also likely serve as hubs for professional development in education and related professions and can incorporate evidence-based interventions into those curricula as well.

Conclusion

In sum, our results indicate that PAX Next Steps training can enhance overall teacher efficacy as well as efficacy in instructional strategies, student engagement, and classroom management for teachers already trained in the PAX Good Behavior Game regardless of their own level of implementation or their perceived effectiveness of the Good Behavior Game program. These results confirm that PAX Next Steps training can provide an important contribution to instructional quality, with potential for downstream effects on issues such as teacher performance and commitment to teaching, as well as student achievement. This increase in teacher efficacy also has important implications for teacher burnout and retention, a growing issue in many school districts nationwide. We suggest that such on-going professional development plays a key role in the dissemination and effective use of evidence-based programs and can contribute to enhancing the effectiveness of these programs and, in turn, creating population-level effects on public health.

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