

Teaching Prevention: The Impact of a Universal Preventive Intervention on Teacher Candidates

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Abstract

This study examines the impact of delivering a universal preventive intervention to pre-service early childhood teacher educator candidates. Multiple studies list classroom impacts of the PAX Good Behavior Game on students' proximal and distal outcomes including decreased disruptive behaviors, decreased substance abuse, alcohol dependence, and tobacco use. However, little is known about the impact of PAX GBG on teachers. This randomized control study included a group of teacher candidates who received PAX GBG as part of their teacher education instruction and a control group that received traditional teacher education instruction. The results showed that the PAX group reported significantly higher levels of self-efficacy in all areas after the intervention and also when compared to the control group.

Keywords: PAX Good Behavior Game, classroom management, teacher efficacy, pre-service teachers

Introduction

Persuasive evidence has accumulated over the past three decades revealing the relationship between teachers' sense of efficacy (TSE) and various academic outcomes. The relationship between TSE and student outcomes has roots in Bandura's (1977) social cognitive theory, where a sense of efficacy refers to a person's beliefs about their capabilities to successfully carry out a particular course of action. Consequently, dating back to the mid-1970's there is strong evidence that supports the relationship between TSE and student learning (Klassen et al., 2009; Tschannen-Moran & Hoy, 2007).

Different interventions and trainings have shown to increase TSE (Watson, 2006). However, there is no known research detailing the impact of a universal preventive intervention aimed at increasing student outcomes on TSE of the teachers executing the intervention.

Universal Preventive Intervention

The PAX Good Behavior Game (PAX GBG) is a classroom-based universal preventive intervention made up of several research-based behavioral strategies with ties to Applied Behavior Analysis (ABA) including purposefully arranging antecedents, applying effective reinforcement, and developing shared relational frames (Embry, 2002). This intervention appears in the 2009 Institute of Medicine Report (IOM, 2009) as well as the Substance Abuse and Mental Health Services' National Registry of Evidence-based Programs and Practices (NREPP, 2014). The intervention targets elementary classrooms with the intention of having teachers apply its evidence-based practices with students during the developmental stages to build lasting skills for a lifetime of protection from mental, emotional, and behavioral disorders and promote positive lifetime outcomes.

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Multiple randomized control trials carried out by Johns Hopkins University confirm proximal and longitudinal outcomes from the intervention when implemented in the first grade classroom. Kellam, Rebok, Mayer, Ialongo, & Kalodner, (1994) show a stabilization and decrease in depressive symptoms. Kellam, Rebok, Ialongo, & Mayer, (1994) show a decrease in aggressive behaviors. These classrooms also demonstrated fewer disruptions per hour (Kellam et al., 2008). Classrooms utilizing the intervention also showed increased attention and on-task behavior (Dolan et al., 1993). These proximal outcomes mean a great deal to schools, teachers, parents, and the children themselves. However, as follow-up longitudinal tracking of the students involved in the initial trials would show, these proximal outcomes have great predictive value for the important lifetime and long-term outcomes the intervention produces (Kellam et al., 2008).

When first exposed to PAX GBG in first grade and then re-evaluated 14 years later at the ages of 19-21, student outcomes compared to control classrooms were significant.

These included 50% fewer males dependent on drugs, 68% fewer males using tobacco, 35% fewer students dependent on alcohol, 32% fewer males involved in criminal behavior, 40% fewer males needing any service use for drug or mental health disorders, and 50% fewer females with suicidal thoughts (Kellam et al., 2011). One year later, the same group demonstrated a significant decrease in risky sexual behaviors by both girls and boys (Kellam et al., 2012).

The research-based strategies of PAX GBG have been packaged in a way to coincide with effective, research-based classroom management, student engagement, and instructional strategies for teachers. Thus, by carrying out PAX GBG as a part of their daily instruction, elementary and early childhood schoolteachers can implement rigorous behavioral strategies once thought reserved for trained behavior therapists in only the most rigid clinical environments. This positions PAX GBG as a best practice and as an inextricable part of teaching as opposed to an additional program or curriculum. With the increasing emphasis on high-stakes testing, increasing rigor of teacher evaluation systems, and the introduction of new curriculum guidelines with the Common Core, finding interventions that act in concert with and augment and support these new initiatives as opposed to having to work in addition to such initiatives is a priority for teachers and administrators. PAX GBG meets these criteria as it has shown to increase test scores (Fruth, 2014), decrease aggressive behaviors (Kellam, Ling, Merisca, Brown, & Ialongo, 1998), and decrease disruptive behaviors in children (Poduska et al., 2008). This format for dissemination allows schoolteachers to execute scripted universal prevention strategies while carrying out daily tasks such as providing reading instruction, giving a spelling test, or lining up and walking to lunch. Over time, the teachers' use of arranging antecedents, providing reinforcement, and unifying relation frames works to delay gratification, increase self-regulation, and decrease impulsivity in students. While these qualities predict the longitudinal outcomes described earlier, the proximal outcomes of increased attention, increased teamwork, decreased disruptions and behavioral infractions are of particular interest to teachers and schools.

Further, the soft team competition used in the intervention encourages developing a role in community and group success as opposed to pitting an eventual winner and loser against each other among a group of relative unequals. This soft team competition has its origins in the research of Saunders, Barrish, and Wolf at Kansas University (Embry, 2002).

In 1967, Saunders, a 4th grade substitute teacher, took over a classroom of students who demonstrated what could be classified as "out-of-seat behavior" 80-96% of the time. Through observation, they found that the students demonstrated the best behavior when engaged in games and competitions. With this in mind, Barrish, Saunders and Wolf (1969) used ABA principles, to develop the first iteration of GBG in which students "competed" to decrease the number of disruptive behaviors for a given amount of time. This competition linked with positive reinforcement dramatically decreased the number of disruptive behaviors exhibited by the students.

Subsequently, teachers were able to handle more of the discipline situations that did arise, as there was a decrease in office referrals for student behavior as well (Barrish, Saunders, & Wolf, 1969).

For this GBG aspect of PAX, the teacher announces that the game will be played during the ensuing classroom activity, which may be doing seat work, reading a book together, or even transitioning to another activity or part of the building. Together, the teacher and class review reasonable expectations for behaviors during the activity as well as what possible infractions might look like. The time of the game is announced, as students are divided into teams of four or five. Throughout the activity, students focus heavily on their behavior while the teacher monitors and records infractions. At the conclusion of the game, the scores are tallied, and teams with three or fewer disruptions participate in a group positive reinforcement. Teams exceeding the three-infraction limit sit out during the reinforcement. This game is carried out four times per day during different classroom activities and when all the teams can win for that amount of time, game time extends. This increases students' ability to self-regulate for extended periods, while the teamwork aspect reinforces their ability to recognize their roles as part of a larger community, and the light team competition uses positive peer pressure for the execution of appropriate behaviors.

In addition to the game, PAX GBG employs research-based behavioral strategies useful for classroom management, student engagement and instructional strategies throughout the day. These strategies arrange antecedents, provide reinforcement, and unify relational frames.

These include *Beat the Timer* for reduced allocated time (Wurtele&Drabman, 1984), *PAX Stix* for random calling (Embry, Flannery, Vazonyi, Powell, &Atha, 2010), *PAX Quiet* and *PAX Voices* for non-verbal cues (Rosenkoetter& Fowler, 1986), *See, Hear, Feel, Do* for relational frame language (Embry et al., 1996), *Tootle Notes* for home notes and public posting of results (Parsons, 1982, Kelley, et al., 1988, & Skinner, Cashwell, & Skinner, 2000), and *Granny's Wacky Prizes* for interdependent group contingencies and randomized reinforcers (Murphy, Theodore, Alric-Edwards, & Hughes, 2007). The cues also include *OK/NOT OK* for low emotional response to negative behavior (Abramowitz, Cote, & Berry, 1987) and *PAX Hands* and *PAX Feet* for further relational frame development. All these evidence-based behavioral strategies are useful for the teacher to help students regulate their own behavior and recognize their membership in a community.

In all, there are numerous studies supporting the success of PAX GBG as well as the individual strategies that make up the total intervention. The studies serve as evidence that the intervention has a resoundingly positive impact on children's proximal and longitudinal outcomes. However, there is very little research on the impact that the intervention has on the teachers who execute it. The teachers' self-efficacy certainly represents a construct necessary to impact, especially in beginning and pre-service teachers. Self-efficacy, or the strength of one's ability to achieve goals and complete tasks, plays an important role in the approach or behaviors selected for specific tasks (Omrod, 2006). For example, Philip, Merluzzi, Zhang, and Heitzmann (2013) found self-efficacy to mediate the relationship between symptoms and depression in post treatment cancer survivors, and therefore, an important component for intervention. In teaching, this translates to the degree to which the teachers believe they can increase students' academic performance and other non-academic variables. Thus, increasing efficacy is an essential part of professionalism and essential to development (Ross & Bruce, 2007).

Importance of Teacher Self-Efficacy

Tschannen-Moran and Hoy (2007) show that predictably, novice teachers generally demonstrate lower mean sense of efficacy than experienced career teachers. Thus, increasing pre-service and novice teachers' sense of efficacy is vital in teacher education and professional development programs. Research exists matching the development of teacher competencies consistent with TSE in first year student teachers.

Further, the research shows that the TSE as a whole succeeded in predicting student teacher outcomes (Van Dinther, Dochy, Segers, & Braeken, 2013). Additional research showed a causal relationship between TSE and student achievement (Caprara, Barbaranelli, Steca, & Malone, 2006). This relationship demonstrates the importance of training and experiences to increase TSE. This is especially important for pre-service and novice teachers, who have shown lower TSE. This additional training and experience will increase their skillsets and success in the field. An additional outcome predicted by TSE is burnout or job stress. Retaining the master teachers who have been trained and developed is a goal for administrators in all schools, over a quarter of teachers do not stay in the profession past three years (Gold, 1996). Schwarzer & Hallum (2008) found that indeed TSE predicted job stress, which then predicted job burnout. Thus, finding a mediator or intervention to increase teacher efficacy could have a resounding impact on the profession by dramatically impacting the effectiveness of the professionals, the retention of those professionals, and in turn, student performance and outcomes.

In addition, research demonstrates the strength of early intervention on behavior through the transactional nature of teacher and student interactions (Sameroff, 1983; Sutherland & Oswald, 2005). Teachers' behavior not only influences students, but is also influenced by student behavior in an ongoing dynamic exchange. Evidence suggests that behavior patterns honed during these interactions may carry forward into future interactions with others; not only carry forward but multiply (Sutherland & Oswald, 2005).

Hypothesis

Given the resounding evidence of early intervention on teaching management techniques and the nature of teacher-student interactions impacting each other in both positive and negative ways, the purpose of this study was to determine the effect of delivering PAX GBG as part of a pre-service teacher education course for early childhood teacher candidates on TSE levels. We hypothesized that the teacher candidates receiving PAX GBG would report significantly higher overall TSE scores than the control group as well as higher levels on the three subscales, instructional strategies, student engagement, and classroom management. In addition, we believed that those in the treatment group would have an increase in their self-efficacy after the course was completed.

Methods

Participants

The participants in this study were part of the undergraduate early childhood education program in the department of teacher education at a public Midwestern University of approximately 18,000 students. These undergraduate pre-service teacher candidates were all in the 2013-2014 early childhood educator cohort. As a member of a cohort, each student in the study took an identical course schedule for each term. The classroom management courses that were involved in this study were required in the third (junior) year of study. This cohort consisted of 31 (30 women, 1 man) junior undergraduate early childhood education majors. Four students withdrew from the control course, and one student withdrew from the treatment course before the conclusion of the study. These withdrawals were all due to common circumstances causing college students to drop college courses. Their data was not factored into the final results, and the total number involved in the study was $N=26$.

Design

This study utilized a randomized control design whereby candidates were randomly placed into either the treatment group or the control group. The intervention group received PAX GBG instruction and its accompanying evidence-based kernels and research-based cues, while the control section received the traditional or "business-as-usual" classroom management instruction. No preference was given to any student, and both groups had identical day and time designations.

At the conclusion of registration, section 01 was assigned “heads” and section 02 was assigned “tails” and a coin was flipped to determine that the 16 students of section 02 were to receive the intervention treatment of PAX GBG instruction and the 15 students of section 01 were to receive the traditional “business-as-usual” classroom management instruction and serve as the control. Of note, 15 pre-service teachers finished the treatment course and 11 finished the control course.

Materials and Procedures

The materials necessary for this study include an alternate curriculum and instructional methods for use in the intervention course.

These materials were derived from the original PAX GBG training materials that were designed for 1-3-day trainings/workshops. The course materials were further developed into a 15-week undergraduate early childhood classroom management course with the addition of student-directed research, online learning modules and assessments, mid-term and final exams, in-class research presentations, and school-based field experiences. A fulltime assistant professor of education who also teaches courses in inclusive practices and the foundations of special education within the Department of Teacher Education taught the treatment (PAX GBG) course. The control (“business-as-usual”) undergraduate early childhood education classroom management counterpart course utilized the traditional classroom management curriculum and text, standard in-class and out-of-class assignments, and projects in addition to a midterm and final exam. This control course was taught by a fulltime professor of education who also teaches courses in diversity and educational foundations within the department of teacher education.

Measures

The Teachers’ Sense of Efficacy Scale (TSES) is a 24-item survey designed to measure overall teaching self-efficacy and three 8-item subscales of self-efficacy: student engagement, instructional strategies, and classroom management (Tschannen-Moran & Woolfolk-Hoy, 2001). The items use a 9-point Likert scale ranging from 1-Nothing, 3-Very Little, 5-Some Influence, 7-Quite A Bit, and 9-A Great Deal. The instructions direct the teacher to, “Please respond to each of the questions by considering the combination of your current ability, resources, and opportunity to do each of the following in your present position.” In previous research, reliability for the full scale was .93 and ranged from .84 to .88 for the subscales (Tschannen-Moran & Woolfolk-Hoy, 2007). Sample items for each subscale included inquiries into teacher candidates’ confidence in their ability to: provide an alternative explanation or example when students are confused, control disruptive behavior in the classroom, or motivate students who show low interest in schoolwork – to name a few.

Results

Independent *t*-tests and paired *t*-tests were used to determine the differences between the two teaching groups as well as the within changes among the candidates in the PAX GBG group.

Within these analyses, the total score of the TSES and the three subscales, instructional strategies, student engagement, and classroom management, were analyzed. All analyses examine the impact of the PAX GBG on the TSE of teaching candidates. Independent *t*-tests on the pre-score measures between the two groups showed no differences at baseline. After the courses were completed, significant differences were found between the PAX GBG group and the “business-as-usual” group on all study outcomes. The means and standard deviations for the two groups on the self-efficacy variables are presented in Table 1. Independent *t*-tests indicated that teachers who received the intervention rated themselves significantly higher on overall self-efficacy (197.2 vs. 187.0) as well as on the three subscales: Instructional strategies (64.7 vs. 62.2), student engagement (65.0 vs. 62.2) and classroom management (67.4 vs. 62.5) when compared to the control group.

Table 1: Means and Standard Deviations of SELF-Efficacy for PAX GBG and Control Group

Variables	Control group (n=11)		Treatment group (n=15)	
	Mean	SD	Mean	SD
Total score	187.0	21.3	197.2**	8.3
Instructional strategies	62.2	7.3	64.7**	3.6
Student engagement	62.2	8.3	65.0**	3.9
Classroom management	62.5	6.2	67.4*	2.0

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

*p<.01.

**p<.001.

The means and standard deviations for the within group changes among the teachers in the intervention group are presented in Table 2. Paired *t*-tests indicated that teachers who received the intervention rated themselves significantly higher on overall self-efficacy (197.2 vs. 163.5) as well as on the three subscales: Instructional strategies (64.7 vs. 54.0), student engagement (65.0 vs. 54.7) and classroom management (67.4 vs. 54.7) after the intervention.

Table 2: Means and Standard Deviations of Self-Efficacy for the PAX GBG Group

Variables	Pre Score (N=15)		Post Score (N=15)	
	Mean	SD	Mean	SD
Total score	163.5	18.8	197.2**	8.3
Instructional strategies	54.0	6.6	64.7**	3.6
Student engagement	54.7	6.6	65.0**	3.9
Classroom management	54.7	7.1	67.4**	2.0

Note: The higher the score, the greater the sense of efficacy. **p<.001.

Discussion

This study sought to determine the impact of PAX GBG on TSE of pre-service teachers compared to their peers who have not received the intervention. This study differs from past PAX GBG studies in that the training occurred during candidates' college education whereas the traditional format for PAX GBG training typically consists of one-day "workshop-style" training of practicing early childhood teachers of varying experience and ability levels as would be expected from a single school building. Those studies have demonstrated tremendous effects on proximal outcomes for children such as significant decreases in disruptive and aggressive behaviors when implemented in the classroom (Ialongo et. al, 1999). In addition, the intervention has shown significant impact on longitudinal outcomes such as alcohol use, tobacco use, illegal drug use, and suicide ideation (Kellam et. al, 2011).

The specifics of this study required PAX GBG to be embedded within a classroom management course for pre-service early childhood teachers. This course required teacher candidates take part in group discussions and training, online literature reviews, and experiences with the intervention in the field. Additionally, the participants in this study received this instruction at the same early stage in their academic development from a university professor trained in PAX GBG.

Teacher Efficacy and the Transactional Model

Previous research has shown that TSE impacts teacher performance, teacher retention, and even student academic outcomes (Klassen & Chiu, 2010). This study demonstrated a statistically significant increase in TSE among pre-service teachers who received training in PAX GBG.

Teacher candidates who received PAX GBG training also demonstrated significantly higher mean TSE than the control group who received traditional classroom management instruction both overall and in three areas; instructional strategies, student engagement, and classroom management.

Sutherland and Oswald (2005) propose a transactional framework may be useful in posing and answering relevant research questions and in improving teacher training and educational practice. Their research and that of others illustrates how the transactional model originally proposed by Sameroff (1983, 1995, 2000) based on the early interactions of mother and child, can be applied to examine teacher development during training as well as practicing teachers. Prior to graduating and becoming teachers, pre-service candidates interact with other students, professors, and mentors. An increase in their TSE via a management technique class impacts their interactions and has the potential to further increase their TSE in a multiple non-linear manner.

In the transactional model, development of any process in the individual is influenced by interplay with processes in the individual's context over time. The development of the teacher's TSE is a product of the continuous dynamic interactions of the student and the experience provided by his or her social settings (Sameroff, 2000) within the classroom. For example, more positive teacher responses might result in a slight improvement in students' classroom behavior (e.g., a decrease in disruptive behaviors), which further increases the likelihood of positive teacher-student interactions. A change in teacher behavior (e.g., more social reinforcement and decreased reprimands) may result in further improved student achievement and decreased disruptive behaviors.

Further, Patterson's coercive interaction cycle mirrors this approach (Patterson, Reid, & Dishion, 1992). A student may disrupt class, thereby receiving less instruction, and the teacher may subsequently make fewer academic demands in order to escape or avoid the disruptive behavior and negative interactions. In theory, those students who exhibit problem behavior may receive less instruction than those students who do not exhibit problem behavior.

Likewise, students who are engaging receive more positive instruction and interactions. Patterson's logic follows, teachers tend to promote further classroom engagement of students who are engaged, and interact less with disengaged students in a way that increases the likelihood of further disengagement. Skinner and Belmont (1993) describe these effects as magnificatory; that is, positive student behavior elicits positive teacher behavior and increases interactions with students, while negative behavior results in fewer teaching interactions. The same applies to pre-service teacher candidates in that those with high TSE will elicit positive interactions with their professors, fellow students, and mentors while those with low TSE elicit fewer interactions.

Implications for Training, Research and Distal Outcomes

Understanding and implementing Sameroff's transactional framework can aid in the design of effective interventions and teacher training programs. As discussed, teachers' behavior not only influences, but is also influenced by, student behavior in an ongoing dynamic exchange. Evidence suggests that behavior patterns associated with TSE may carry forward into future interactions with others and the students they teach. A better understanding of the transactional processes in classrooms for students transcends typical unidirectional models of teaching and learning and has important implications for research, training, and practice. However, if research continues to be restricted to individual student measures alone at one point in time, the processes involved in this ongoing reciprocal interchange are missed. A linear research approach limits the conclusions, which may be inaccurate or incomplete. Ineffective practices might be recommended because other factors that contribute to a significant effect have not been measured (Sutherland & Oswald, 2005).

The reciprocal nature of teachers and student interactions go a long way in explaining the dramatic impact that GBG had on first classroom behavior and then eventually lifetime outcomes of the cohorts initially studied by Johns Hopkins University. When an evidence-based universal preventive intervention (like PAX GBG) is taught as a pedagogical skillset, teachers are equipped with strategies for troubleshooting, differentiating instruction, and engaging learners in such a way to make incremental improvements in student performance and behavior almost immediately. This improvement reinforces and increases the teachers' use of these effective evidence-based practices (i.e. making them better teachers for more students for longer periods of time).

This increased teaching efficacy only further increases students' academic and behavioral performance throughout their exposure to the trained teacher. Further, these student skillsets and habits extend throughout their schooling and create positive exchange with future teachers causing an increase in teaching performance and interaction even for those teachers not trained in the intervention. This ripple effect of improved interaction and performance permeates the student's life with not only educators but with parents and the community.

A transactional approach highlights the tremendous longitudinal impacts seen in the original PAX GBG efficacy trials. These include increases in high school graduation and college entrance as well as decreases in crime rates, alcohol, tobacco, drug, and overall service use (Kellam et al., 2011). These also include the tremendous return on investment to taxpayers as calculated by the Washington State Institute for Public Policy in 2011 in which numerous evidence-based programs and interventions were evaluated to determine effectiveness and efficiency. The enormous benefit-to-cost ratios of PAX GBG determined in this study as noted in Aos et al. (2011) include a total benefit of \$4,790 per student against costs of \$154 per student. The community, state, and nation benefit greatly from a well-adjusted young adult as opposed to one more likely to experience negative long-term outcomes. This benefit-to-cost ratio also justifies the early training of PAX GBG to teachers, especially at a pre-service stage. An increase in TSE created by PAX GBG training as shown in this study can start this transactional, reciprocal relationship of performance and interaction earlier and in more teachers than traditional training. This could set more students on a successful trajectory, again earlier, than ever before.

Thus, future research should include tracking the variables that TSE has historically predicted such as teacher performance, teacher retention, teacher satisfaction, and student performance with the pre-service teachers trained in PAX GBG. Additionally, the proximal and longitudinal outcomes for children impacted by these future teachers trained in PAX GBG should be and compared to the projections from the original efficacy trials (Kellam et al., 2011) and the Washington State Institute for Public Policy report (Aos et al., 2011). Based on the longitudinal evidence from the original efficacy trials that tracked the students' futures from GBG classrooms as compared to control classrooms, a teacher trained in PAX GBG could seriously impact society by merely replicating these early results.

Merely replicating those efficacy results would mean that a pre-service teacher trained in PAX GBG who teaches a classroom of 25 students each year for 30 years should see 109 additional students graduate from high school, 102 additional students enter the university, 72 fewer students develop serious drug addictions and 7 fewer students convicted of violent crimes. Using the Washington State Institute for Public Policy report predicts that teacher will also save families, schools, and local, state, and the federal government a total of \$3,577,000 over his or her career compared to a teacher who did not have PAX GBG training. The significant impact that PAX GBG training had on the pre-service teachers in this study as well as these potential long-term outcomes warrant additional study and confirmation.

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