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The Effects of Two Elementary School-Based Universal Preventive Interventions on Special Education Students' Socioemotional Outcomes

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Abstract

A group, randomized, comparative effectiveness trial of two elementary universal preventive interventions (PAX Good Behavior Game [PAX GBG] and the integration of PAX GBG with Promoting Alternative THinking Strategies [PATHS to PAX]) was carried out in general education classrooms in 27 urban elementary schools. Ialongo et al. report on results of the trial for all students. Here, we examine the outcomes of students receiving special education services ($N = 650$). A linear mixed model analysis of variance (ANCOVA) was conducted with school included as a random effect to examine planned comparisons between conditions. Significant interactions were probed using the Johnson–Neyman technique. For significant and trending results, effect sizes were calculated. Results demonstrated improvement for a number of socioemotional and behavioral variables for students in either intervention, however, the integration of PATHS to PAX appeared to have the most substantial impact for students in special education. Effect sizes ranged from 0.07 to 0.50.

Keywords

prevention, randomized trial, school-based, special education, aggression, urban

Introduction

Approximately 20% of youth have been estimated to experience mental health disorders with half of adult disorders believed to have begun during the school-aged years (Belfer, 2008). The importance of promoting healthy behaviors and mitigating risk during the early school years cannot be minimized. Developmental theory, specifically life-course developmental theory, highlights the importance of early intervention, as later competencies rely on earlier competencies which developed as a result of successful navigation of specific social task demands placed on an individual in a variety of contexts. Competencies in domains are also interdependent, as success (or failure) in one area influences others (Kellam & Rebok, 1992).

The dependence of these competencies results in a type of developmental cascade, whereby early disruption can substantially derail healthy development. Therefore, building important social and emotional assets (e.g., self-confidence, prosocial attitudes toward violence) early in life would be expected to provide protection against the development of later negative outcomes (e.g., conduct problems, emotional distress) and to promote healthy behaviors (e.g., healthy relationships, academic success; Taylor et al., 2017).

School-Based Universal, Social, and Emotional Learning Preventive Interventions

Schools offer a promising opportunity to address this need for prevention and early intervention. Indeed, the last several decades have provided strong empirical evidence for a number of school-based, universal preventive interventions on a variety of outcomes. These universal preventive interventions are by definition provided to an entire population (e.g., school) in an attempt to reduce risk factors and promote

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protective factors (Greenberg & Abenavoli, 2017). Recent meta-analyses and systematic reviews have supported their impact on social and emotional skills, attitudes, behavior, inter- and intrapersonal competencies, civic attitudes and behaviors, school climate and safety, and academic performance (Durlak et al., 2011; Grant et al., 2017). They have demonstrated decreases in depressive symptoms, internalizing and externalizing problems, and psychological distress (Dray et al., 2017). In addition, they have highlighted an impact on disciplinary outcomes (Grant et al., 2017) and the prevention of aggressive behaviors (Hahn et al., 2007).

In their review of 68 evidence-based, universal, social, and emotional interventions, Grant and colleagues (2017) indicated 60 of these interventions demonstrated a positive impact on at least one social and emotional competency with the majority of the interventions significantly affecting at least two. Taylor and colleagues (2017) recent meta-analysis of 82 universal, school-based social emotional interventions specifically investigated the long-term impact of these interventions on indicators of well-being at follow-up (which ranged from 56 to 195 weeks postintervention). These researchers found that the interventions resulted in significant and positive impact for participants across all social and emotional assets and positive and negative indicators of well-being. Importantly, there were no differences for participants based on race, ethnicity, or socioeconomic status. As the focus of the educational system is to maximize learning, the ability of these prevention efforts focused on behavioral risk to improve academic achievement for populations potentially at-risk is poignant (Durlak et al., 2011).

Two important manualized, universal, preventive interventions are the Good Behavior Game (GBG; Barrish et al., 1969) and Promoting Alternative Thinking Strategies (PATHS; Greenberg & Kusché, 2006). As the current study focused on a large, group randomized, controlled study utilizing these interventions, we will exclusively highlight these.

The GBG Intervention. Included in Taylor et al.'s (2017) meta-analysis was the GBG (Barrish et al., 1969). The GBG is essentially a group-based token economy, wherein the classroom is divided into evenly matched teams by the teacher, who, in turn, rewards the teams for obeying classroom rules, which are jointly developed by teachers and students. Several longitudinal, randomized-controlled, efficacy trials have accumulated rich evidence of the impact of the GBG on a diverse set of outcomes. Improvements in proximal targets (i.e., poor achievement and aggressive/disruptive behaviors; Dolan et al., 1993) have demonstrated changes in distal outcomes of aggressive/disruptive behaviors in elementary (Ialongo et al., 1999; Petras et al., 2011) and middle school (Ialongo et al., 2001; Petras et al., 2011), academic outcomes in high school (Bradshaw et al., 2009), and antisocial behavior, violent crime, substance abuse/dependence, and high school graduation in early adulthood (Kellam et al., 2008; Petras et al., 2008, 2011). Importantly, the effects of the intervention were most pronounced for those with elevated pretest levels of risk behaviors.

The benefit-to-cost ratio, for both individual and society, has also been demonstrated. Taylor et al. (2017) indicated that 6% more students in the intervention condition graduated from high school—resulting in a lifetime benefit of US$367,687 per student; 10.5% more students attended college (US$637,621); 6% fewer students were placed in special education (US$93,781); and 10% fewer students were diagnosed with conduct disorder (US$3,950,000).

PATHS Intervention. PATHS (Greenberg & Kusché, 2006), a second intervention of interest, is a socioemotional curriculum that Pre-K to fifth-grade teachers deliver primarily within the context of twice-weekly lessons designed to facilitate emotion regulation, social competence, and social problem-solving. Several multiyear, randomized, clustered efficacy trials have demonstrated an abundance of significant effects on a variety of important outcomes in the elementary school years. These outcomes have included reducing off-task and aggressive/disruptive behaviors and increasing prosocial behaviors, social competence, emotion regulation, math, reading and writing mastery scores, and verbal fluency (Conduct Problems Prevention Research Group [CPPRG], 1999, 2010; Fishbein et al., 2016; Greenberg et al., 2004; Riggs et al., 2006; Schonfeld et al., 2015). Of importance, effects have been particularly salient for at-risk students—those who come from economically disadvantaged schools and who have higher levels of problem behaviors.

Analysis by the Washington State Institute for Public Policy (WSIPP) specifically evaluated the GBG (WSIPP, 2018a) and PATHS (WSIPP, 2018b). The likelihood that these interventions resulted in benefits greater than costs were 75% and 63%, respectively. The total benefit-to-cost ratio was US$66:1 for GBG and US$22:1 for PATHS. Evidence is accumulating regarding the benefits of these interventions for both the individual and society.

GBG and PATHS With Special Education Students

The GBG has explicitly demonstrated an impact on reducing the need for special education services (Bradshaw et al., 2009). But what about students who are already placed in special education? Several researchers have examined the delivery of the GBG and PATHS with special education students in special education settings through the gold standard of randomized, controlled trials. First, Kam et al. (2004) used the PATHS curriculum, adapted and modified

by increasing the emphasis on teaching and reinforcing behavioral self-control and reducing the emphasis on problem-solving for use with special education students in a Special Day Class. These researchers followed 133, primarily Caucasian (66.2%) and male (72.9%), students in an urban area of the northwest United States (mean age of 8 years 8 months) for three successive years. Classrooms were randomized to receive the intervention or serve as a control. Results indicated that students who participated in the PATHS curriculum had significantly lower trajectories of externalizing and internalizing behaviors than their control group counterparts. Importantly, these improvements were found across raters (i.e., teacher and student) and continued for 2 years after implementation of the intervention. No differences were found between intervention and control students on social competence or social problem-solving skills (Kam et al., 2004).

Second, Breeman and colleagues (2016) evaluated the effects of the GBG for 389, primarily male (87%), elementary students with psychiatric disorders who were provided services in special education schools in the Netherlands (mean age of 10 years). Eleven primary schools were randomized and results indicated a significant effect of the intervention on teacher-rated emotional and behavioral problems. No significant differences were found on teacher–child relationships (teacher-rated) or social preference (student-reported; Breeman et al., 2016).

Both studies provide encouraging results for the use of these universal preventive interventions with students receiving special education support. However, these studies included implementation within a special education setting. The question remains as to whether students with disabilities benefit from having these types of manualized, universal, preventive efforts in a less restrictive setting with their typically developing peers. Including special education students in gold-standard, randomized-controlled trials, particularly within the general education context is not as common. There are challenges with including these students. First, the prevalence of special education in comparison to general education students is lower (13% nationally or two to three children in a classroom of 20; National Center for Education Statistics, 2017). The relatively low frequency might reduce the statistical power to detect intervention effects for this subpopulation in universal preventive intervention trials.

Second, the demands placed on schools to be hyper-curriculum or standards-driven, may result in the restriction of instructional time to achievement areas, such as reading and math (e.g., Dee & Jacob, 2010). Universal preventive intervention, particularly in the social and emotional development realm, might be seen to lie outside of academics. Periods of implementation of such curricula may be viewed as an optimal time for special education students to get an added dose of academics in something like a Resource Specialist Program.

A third explanation might be less benign. As students in special education may exhibit challenging behaviors and lack certain skills, they may be thought to require more intensive supports and therefore not benefit from, and potentially derail for others, these more universal efforts, resulting in them being pulled out during the time of implementation. Particularly during an intervention like the GBG, when behaviors of all students influence the ability of a team to "win," negative attitudes about the inclusion of special education by general education teachers (e.g., Berry, 2008) may result in them choosing to play when the children (e.g., special education children) who might alter the chances for a team to "win the game" are out of the room.

Adaptions and Integration of GBG and PATHS

Efforts have been made to adapt the original GBG with the aim of improving the effectiveness and readiness for wide-scale dissemination (Embry et al., 2003). The PAX GBG is an example of such an effort. As Embry and colleagues (2003) note, the PAX GBG features a central focus on "pax," which in Latin means peace, productivity, health, and happiness. Thus, increasing positive student behavior is a primary goal of the PAX GBG. In three randomized trials (Ialongo et al., 2019; Jiang et al., 2018; Streimann et al., 2020), the PAX GBG was found to result in significantly lower aggressive/disruptive behaviors at posttest in contrast to controls. Moreover, in Streimann et al. (2020), the PAX GBG ". . . had a positive lasting effect on teacher's self-efficacy and overall classroom behavior" (p. 234).

Recently, Domitrovich and colleagues (2010) proposed that the combination of PATHS with the PAX GBG (PATHS to PAX) would result in both additive and synergistic effects. This resulted in a large, group randomized, effectiveness trial conducted in 27 urban schools to investigate these effects via three conditions: PAX GBG, PATHS to PAX, and Control (Ialongo et al., 2019). Researchers demonstrated that the PATHS to PAX integration resulted in a broader array of benefits in terms of student behavior and socioemotional competence than the PAX GBG Alone. The effect sizes, however, were modest, ranging from 0.03 to 0.09. Moreover, the greatest impact was found for those students with lowest levels of prosocial behavior and social competence at pretest.

Current Study

The current study aimed to examine the proximal effects of two manualized, universal preventive interventions (the PAX GBG and PATHS to PAX) on the behavioral and socioemotional outcomes for students receiving special education in a large, mid-Atlantic, urban school district. The outcomes were selected based on their importance in

the developmental cascade related to the impact of both the PAX GBG and PATHS interventions. This is an investigation of a subpopulation (i.e., students receiving special education) included in a large, group randomized, controlled trial. We attempted to replicate the analyses of the initial study with this subpopulation of special education students, which evaluated the impact of these interventions on the full sample (Ialongo et al., 2019). Our primary research question is whether the students receiving special education services would benefit from the universal interventions provided within the general education setting, and whether the findings would replicate the synergistic impact of the combined PATHS to PAX intervention over PAX GBG Alone. Outcomes were compared within the three study conditions (i.e., PAX GBG, PATHS to PAX, and Control). As students receiving special education support may be hypothesized to manifest higher levels of these outcomes (e.g., Readiness to Learn), we hypothesized beneficial effects for special education students based on the findings from Ialongo et al. (2019) and previous studies of the GBG and PATHS suggesting that students manifesting higher levels of problems at pretest benefited the most from these interventions.

Method

Participants and Procedure

The design included three cohorts of nine elementary schools (i.e., 27 schools), with schools randomly assigned to one of the three conditions: (a) Comparison/Control, (b) PAX GBG, or (c) PATHS to PAX. Schools were kindergarten (K) through fifth or eighth grades (only K through fifth grade were used in the study). To ensure the equivalence of the conditions in terms of school characteristics, schools were randomized to one of the three intervention conditions from within matched sets. More specifically, schools were matched based on characteristics such as suspension rates, ethnic composition, and free and reduced meals (FARM) status. Written parent consent was obtained for 5,611 students to participate in the evaluation of the study outcomes. This research was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

From this larger study, our subgroup of special education students was identified through two sources. First, district-level information about receipt of special education services during the year of the intervention trial was accessed. Second, if school record data were missing, we used teacher-reported receipt of special education. Distinctions between eligibility type or services received were not made for this study.

As a result, $N = 650$ students (11.7% of the original sample) were identified for the current study. Males constituted 65.2% of the sample, with 89.1% African American, and 88.5% receiving FARM. Eighty (12.3%) kindergarten, 106 (16.3%) first-grade, 107 (16.5%) second-grade, 119 (18.3%) third-grade, 135 (20.8%) fourth-grade, and 103 (15.8%) fifth-grade students were included in the study. Participants were fairly evenly distributed among design condition (i.e., Control = 37.5%, PAX GBG = 31.8%, and PATHS to PAX = 30.6%). In comparison to those not included in the current study (i.e., not identified as needing or receiving special education), our sample was statistically significantly more likely to be male, $\chi^2(1, N = 4{,}869) = 65.32$, $p < .001$. No other statistically significant differences were noted in demographics for those in participating schools.

Measures

Covariates. Several covariates were entered into the model including gender, ethnicity, FARM, and cohort. Demographic variables were gathered via district-level reporting. Cohort was a function of the year entered into the study. Pretest levels of targeted outcomes were also included as covariates and moderators when probing interactions.

Outcomes. Outcome variables included teacher-reported and researcher-completed observations of academic, social–emotional, and behavioral constructs. These specific outcome variables were selected to be consistent with the primary targets of the interventions—aggressive/disruptive behaviors, readiness to learn, social competence, and emotion regulation.

Teacher-reported outcomes. Four teacher-reported variables were collected at pretest in the fall and at posttest in the late spring of the school year approximately 6 months later: Authority Acceptance, Readiness to Learn, Emotion Regulation, and Social Competence.

Teacher Observation of Classroom Adaptation–Revised. The *Teacher Observation of Classroom Adaptation–Revised* (TOCA-R) (Werthamer-Larsson et al., 1991) is a teacher report of children's adaptation to classroom task demands over a 3-week period. Behaviors are rated over a 6-point frequency scale (1 = *almost never* to 6 = *almost always*). Two subscales were utilized in the current study: (a) Authority Acceptance (or oppositional defiant behaviors) and (b) Readiness to Learn (or attention–concentration problems). The Authority Acceptance subscale included items such as "breaks rules" and "talks back to the teacher." Items were reverse-coded so that higher scores reflected fewer problems. The Readiness to Learn subscale included items such as "ready to learn," "stays on-task," and "concentrates." For both scales, higher scores reflected more desirable

behaviors. The mean of the teacher ratings across these subscale items was used in outcome analyses. The coefficient alpha values for the Authority Acceptance and Readiness to Learn subscales were .78 and .75, respectively. The 6-month test–retest intraclass reliability coefficients were .64 and .60, respectively.

Social Health Profile Social Competence Scale. The *Social Health Profile* (CPPRG, 1999) is also teacher-report of the frequency of observed behaviors over a 3-week period. Items are rated similarly to the TOCA-R based on a 6-point frequency scale. Two subscales were used: (a) Emotion Regulation and (b) Social Competence. Example items from the Emotion Regulation subscale included "controls temper in a disagreement," "appropriate expression of needs/feelings," "thinks before acting," "can calm down." The Social Competence subscale included items such as "resolves peer problems," "understands others," "suggests without bossiness." The mean across subscale items was used in analyses. The coefficient alpha values were .77 for the Emotion Regulation and .73 for the Social Competence subscale. The 6-month intraclass reliability coefficients were .63 and .58, respectively.

Independent observations of student behavior. Classroom observations of on-task behaviors, disruptive behaviors, physical aggression, and verbal aggression were completed at both pre- and posttest. Independent observers conducted classroom-based observations of student behavior on two separate occasions, 1-week apart at both pre- and posttests. Each student was observed, on average, for approximately 5 min at both pre- and posttests.

The observation system used was based in part on the one used in the Fast Track study (CPPRG, 1999; Tapp et al., 1995). Observers received 2 weeks of training in the observational system. The majority of the training consisted of coding video of student behavior and live observations in classrooms during which agreement with gold standard observers was established. Observer agreement with a gold standard observer was checked on a weekly basis over the course of the pre- and posttest observations. As the frequency of disruptive and aggressive behaviors was low, these three codes were collapsed into one for the purpose of calculating inter-rater agreement (i.e., calculated as the number of times observers agreed/sum of agreements + disagreements). Observers were blind to intervention condition. Behaviors were observed during 10-s intervals and recorded as present if they occurred at least once. Data on agreement with the gold standard observers were obtained for approximately 15% of the observations at both pre- and posttests. Over the six observation cycles, the percent agreement for on-task behavior was 95.4% and for aggressive/disruptive behaviors was 70.2%. The lower percentage of agreement for the aggressive/disruptive behaviors is likely a result of the low frequency of these events, making this calculation strongly influenced by smaller numbers of disagreements.

A single Total Problem Behaviors composite was derived for the analyses. This was constructed based on the number of intervals in which a student was engaged in off-task, disruptive, and/or aggressive (i.e., verbal or physical) behaviors. At each interval, the scores could range from 0 to 4, with 4 indicating that all and 0 if none of the target behaviors were observed during a 10-s interval. The composite used in analyses is the average score across the 10-s intervals for which the student was observed.

Analytic Strategy

We employed an intent to treat approach (Lachin, 2000)—whereby all student outcome data were included for intervention teachers regardless of level of teacher implementation. Intent to treat analysis ignores noncompliance, deviations from intervention protocols, or withdrawal, in an attempt to gain a closer assessment of "real-world" application (e.g., teachers will implement an intervention with varying degrees of integrity, this concept allows us to evaluate impact in those situations). For the full sample, the magnitude of intervention implementation across the PAX GBG conditions was not statistically significantly different. That is, in the PATHS to PAX condition, game play occurred 154.22 (SD = 106.46) times totaling 1,583.43 min whereas in the PAX GBG Alone condition, game play occurred 150.18 (SD = 94.92) times totaling 1,431.84 min. Approximately 71.80% (SD = 0.27) of PATHS lessons were implemented as scheduled. Related to quality of implementation, lessons were observed four, approximately bi-monthly, times throughout the school year (20% included observations to establish inter-rater reliability) using a 22-item rubric rated from 0 to 4, with higher scores representing more characteristics present. Intraclass correlation coefficients between raters reached or exceeded 0.80 for all items. No statistically significant differences were evident in the PAX GBG implementation (i.e., PAX GBG Alone average was 3.24 [SD = 0.57] and PATHS to PAX average was 3.20 [SD = 0.52]). PATHS implementation average was 3.40 (SD = 0.50; Ialongo et al., 2019). Again, as we used intent-to-treat analyses and randomization occurred at the school level (not teacher or student), implementation fidelity was not used as a covariate in this study.

Data analyses included linear mixed model analysis of covariance (ANCOVA) to examine the effects of the intervention on proximal outcomes while adjusting for pretest levels. Given that randomization occurred at the school-level, school was included as a random effect. Planned comparisons between intervention and Control conditions, and the two intervention conditions were conducted. Interactions were tested for gender, ethnicity, and pretest

level of outcomes (mean-centered) and probed using the Johnson and Neyman (1936) technique to determine potential regions of significance. Regions of significance are estimated via regression analyses and allow us to answer questions such as "At what level of social competence do students benefit more from interventions?" Following recommendations of reporting effect sizes regardless of *p*-values (Durlak, 2009), effect sizes of Cohen's *d* were reported for main effects and for interactions at a point 1 standard deviation (*SD*) either above or below the mean when *p*-values were approaching, or trending toward, significance. All analyses were conducted using IBM SPSS Statistics, version 22 (SPSS, 2013). Johnson–Neyman analyses were conducted with the PROCESS add-on in SPSS (Hayes, 2013).

Results

Preliminary Analyses

Initial comparisons between conditions at pretest revealed significant differences between the PAX GBG and the Control and PATHS to PAX conditions in terms of ethnicity, with fewer African American students than the other conditions; $\chi^2(2, N = 646) = 10.77$, $p < .01$, and FARM, with fewer students eligible for free and reduced lunch than Controls; $\chi^2(2, N = 619) = 12.00$, $p < .01$. There were no significant gender differences between conditions, $\chi^2(2, N = 649) = 3.83$, $p = .15$. In addition, significant differences were not evident between conditions on any pretest levels of the outcomes or on the percentage of students missing a posttest outcome measure. Finally, no significant differences were demonstrated in terms of baseline characteristics (i.e., gender, ethnicity, or FARMS) for those who had complete data versus pretest only on teacher ratings or observations.

Outcome Analyses

Table 1 includes the adjusted posttest means, standard deviations, *F*-statistics, and *p*-levels for main and interaction effects for the three conditions. If an interaction was present, the *F*-statistic reported is for that interaction. With the exception of the Observed Total Problem Behavior scale (a gender by intervention interaction in the PATHS to PAX vs. Control analysis) all interactions refer to pretest by intervention interactions. Any significant interactions (or interactions trending toward significance) were probed using Johnson and Neyman (1936) regions of significance analysis, whereby the pretest levels of the outcomes (Z) at which the slopes of the outcome posttest score (Y) on intervention condition (X) were significant at $p \leq .05$. To aid in interpretability, pretest levels of the outcomes (Z) were mean-centered. Table 2 displays the boundaries for the regions of significance.

PAX GBG versus Control. No main effects were found for the PAX GBG versus Control comparisons (see Table 1). A statistically significant interaction was demonstrated between PAX GBG versus Control condition × Pretest level of the outcome for the Readiness to Learn scale (interested readers are referred to Figure 1 in the Supplementary Materials for this interaction plot). Examination of the regions of significance analysis (see Table 2) revealed that when examining individuals with pretest scores at the transition point and higher, those in the PAX GBG intervention demonstrated statistically significantly higher readiness to learn scores at posttest than those in the Control condition. That is, with 95% confidence, we can assume that there is a nonzero difference between the two groups simultaneously for all points in the region (Potthoff, 1964; see Figure 2 in Supplementary Materials for this conditional effect). However, the size of the effect at +1 *SD* above the mean was small (Cohen's $d = .07$). No other interactions (i.e., condition by gender or ethnicity) were evident.

PATHS to PAX versus Control. After adjustment for pretest levels of outcomes, the planned contrasts between PATHS to PAX and Control conditions yielded a main effect for the Readiness to Learn scale, with those in the PATHS to PAX demonstrating significantly higher levels at posttest. The size of the effect was small with a Cohen's *d* of .24. In addition, a trend toward significance was evident for the Social Competence scale, with those in the PATHS to PAX condition demonstrating higher levels of competence post-trial (Cohen's $d = .18$).

Only one statistically significant interaction was evident in these comparisons: Gender × Condition, which indicated that PATHS to PAX females demonstrated fewer problem behaviors at posttest ($M = 0.10$) compared with those in the Control condition ($M = 0.20$; see Figure 3 in Supplementary Materials). This resulted in a medium effect size (Cohen's $d = .50$). This effect was not significant for males. In addition, the interaction for the Emotion Regulation scale also trended toward significance. Examination of the regions of significance analysis (see Table 2) indicated that when below the transition point on pretest levels, those in the PATHS to PAX condition were statistically significantly higher at posttest than their Control condition counterparts. The size of the effect at −1 *SD* below the mean was small (Cohen's $d = .19$).

PATHS to PAX versus PAX GBG. A main effect was demonstrated for the Readiness to Learn scale with those in the PATHS to PAX evidencing statistically significantly higher scores at posttest than those in the PAX GBG Alone condition (see Table 1) which resulted in a small effect size (Cohen's $d = .24$). The interaction effect for the Social Competence scale trended toward significance. Examination of the regions of significance (see Table 2) revealed

Table 1. Adjusted Posttest Mean Values, SDs, and Mixed Model *F*-Statistics, Significance Levels, and ESs for All Contrasts.

	PATHS to PAX versus Control			PAX GBG versus Control			PATHS to PAX versus PAX GBG		
	P2P	Control	*F*-statistic	GBG	Control	*F*-statistic	P2P	GBG	*F*-statistic
Variable	*M* (*SD*)	*M* (*SD*)	(ES)	*M* (*SD*)	*M* (*SD*)	(ES)	*M* (*SD*)	*M* (*SD*)	(ES)
Teacher ratings									
Readiness to learn	3.84 (1.27)	3.53 (1.34)	5.16[a]* (0.24)	3.67 (1.07)	3.58 (1.09)	3.82[b]* (0.08)	3.87 (1.00)	3.63 (0.99)	5.09[a]* (0.24)
Social competence	3.77 (1.48)	3.50 (1.59)	2.92[a]† (0.18)	3.66 (1.22)	3.55 (1.28)	0.74 (0.09)	3.82 (1.35)	3.64 (1.34)	2.94[b]† (0.13)
Emotion regulation	3.80 (1.35)	3.63 (1.44)	2.62[b]† (0.19)	3.77 (1.31)	3.70 (1.39)	0.21 (0.05)	3.83 (1.35)	3.73 (1.34)	0.44 (0.07)
Authority acceptance	4.57 (1.08)	4.61 (1.14)	0.13 (0.04)	4.61 (1.09)	4.65 (1.14)	0.09 (0.01)	4.61 (1.27)	4.62 (1.27)	0.98 (0.04)
Classroom observations									
Total problem behavior	0.17 (0.25)	0.20 (0.26)	4.32[b]* (0.50)	0.17 (0.28)	0.19 (0.29)	0.79 (0.07)	0.17 (.26)	0.17 (0.26)	0.00 (0.00)

Note. Sample sizes varied by comparison, however, overall P2P $n = 199$; GBG $n = 207$; Control $n = 244$. PATHS = Promoting Alternative Thinking Strategies; PAX GBG = PAX Good Behavior Game; P2P = PATHS to PAX; ES = effect size.

[a]Main effect. [b] Interaction effect.

†$p < .10$. *$p < .05$. **$p < .01$.

Table 2. Mean-Centered Pretest Values at Which the Slope of the Outcome on Intervention Condition Is Significant at $p \leq .05$.

Intervention contrasts	Outcomes	Pretest scores at or above	Pretest scores at or below
PATHS to PAX versus Control	Teacher-rated emotion regulation	–2.70 (1.00)	0.16 (3.85)
PAX GBG Alone versus Control	Teacher-rated readiness to learn	0.77 (4.30)	2.47 (6.00)
PATHS to PAX versus PAX GBG Alone	Teacher-rated social competence	–2.00 (1.53)	0.78 (3.60)

Note. Values outside of the parentheses are mean-centered values of the moderator, Z. Values within the parentheses are the actual scale values when the value is within the range of possible scale values. PATHS = Promoting Alternative Thinking Strategies; PAX GBG = PAX Good Behavior Game.

that when examining individuals with pretest scores at the transition point and below, those in the PATHS to PAX intervention demonstrated significantly higher social competence scores at posttest than those in the PAX GBG Alone condition. The size of the effect at −1 *SD* below the mean was small (Cohen's $d = .13$). No other main or interaction effects were found.

Discussion

The current study explored the impact of the PAX GBG and PATHS to PAX on proximal outcomes for students receiving special education support. We investigated a subsample within a larger intervention trial, which was powered to find effects within that larger sample, and the interventions were delivered without modifications or accommodations for the special education students. While our findings are modest, they are important to highlight.

Both interventions had an impact on teacher-rated measures of readiness to learn, with the PATHS to PAX demonstrating benefit above and beyond the PAX GBG Alone. As hypothesized, it appears that the synergistic effects of the PATHS to PAX were superior to that of PAX GBG Alone for special education students. The PAX GBG in isolation had an impact above those in the Control condition for students who were on the higher end of readiness to learn at pretest. Readiness to learn included several dispositional (e.g., students viewed as ready to learn) and behavioral (e.g., on-task, concentrates) aspects of self-regulation. It is an important predictor of academic success that is believed to function through the integration and development of social, emotional, and behavioral skills (Bettencourt et al., 2018). These skills are also linked to social competence, as the capacity to attend allows students to process important social information, such as nonverbal skills, inhibit potentially inappropriate responses, and plan for coping with challenges (Demopoulos et al., 2013). Those challenged in this arena are typically the least liked or understood students and are at increased risk of being identified for special education and to experience negative outcomes such as suspension, retention, criminal arrest, and conduct disorder diagnoses (Baker, 2005; Bettencourt et al., 2018; Darney et al., 2013; de Boer et al., 2012). For those students in the PATHS to PAX GBG, the PAX GBG intervention may have increased their readiness to learn, making them more available for the PATHS lessons focused on social competence and emotion regulation.

For a universal preventive intervention to have a proximal effect on readiness to learn and cognitive self-regulation for students receiving special education support is, therefore, notable. In addition, for this type of intervention to have this impact while being provided in a general education setting with typically developing peers is encouraging. The mandate of educating students in the least restrictive environment encourages educational systems to provide as much support with typically developing peers as possible. The opportunity to address behaviors and dispositions that prime students for academics in this general education context is encouraging. After considering that early receipt of special education services may not directly influence academic outcomes, but indirectly improve academics through small effects on approaches to learning (Morgan et al., 2010), incorporating PATHS to PAX may heighten the effects on these skills, dispositions, and behaviors to prime students for learning tasks and enhance their interactions with peers.

In conjunction with its affective counterpart, emotion regulation, these cognitive aspects of self-control are longitudinally related to health, wealth, and criminal outcomes (Moffitt et al., 2011). It is proposed that these two aspects of self-regulation operate in a bidirectional manner—the top-down, volitional aspect of cognitive regulation is important for fostering motivation and managing the effortful processing of information needed for learning, while the bottom-up, more automatic regulation of emotional and stress responses can override cognitive regulation abilities when overwhelmed (Ursache et al., 2012). Students in special education are typically the most challenged in both these aspects of regulation, and research suggests that these deficits place these students at particular risk for negative experiences such as victimization (O'Brennan et al., 2015). Although not statistically significant, a trend toward significance was found for the integrated PATHS to PAX on teacher-rated emotion regulation. In comparison to students in the Control, those in the PATHS to PAX intervention experienced improvements following the intervention. This

effect was particularly salient for those students who were rated lower at pretest. Again, the influence of the PATHS to PAX intervention on both aspects of regulation is notable and may provide an avenue to indirectly change trajectories of social functioning in addition to promoting academic achievement, all while in a general educational context.

In addition, the PATHS to PAX demonstrated a statistical trend toward a significant main effect directly on measures of teacher-rated social competence. That is, following the intervention, students in the PATHS to PAX intervention had higher social competence scores than those in the Control condition. For a subset of children—those with lower levels of social competence at pretest—those in the PATHS to PAX experienced greater improvements than those in the PAX GBG Alone. Clear evidence has indicated that the ability to navigate the social world results in increased academic achievement (Durlak et al., 2011). Students in special education may be at greater risk for being mired in a negative feedback loop whereby difficulties understanding and responding to social situations result in less effective development of positive relationships with teachers and peers, and fewer opportunities for peer collaborations may limit the important learning of how to understand and respond to social situations (Sutherland et al., 2008).

Again, the delivery context may offer important benefits for these socially relevant variables. For example, Kam et al. (2004) and Breeman et al. (2016) provided either PATHS or GBG adapted for special education students in a special education setting and neither study demonstrated statistically significant effects on socially relevant variables (e.g., social competence, social problems, or social preferences). However, when delivered in the general education setting, without adaptations, our study was able to demonstrate an impact on important, teacher-rated, social competence behaviors. It may be that, when expectations for socially appropriate behaviors are higher, as they might be when surrounded by typically developing peers, special education students capitalize on the benefits of these preventive interventions. Of course, not having information about the types of disabilities to compare (e.g., students in a Special Day Class setting may have more extreme learning needs than those in a Resource Specialist Program setting) limits the opportunity to draw any conclusions, but it is of note that delivery in the general education setting can result in meaningful change for special education students who are present.

An interesting finding was the impact of the PATHS to PAX on observer-rated problems for females but not males (i.e., Total Problem Behaviors). Results from GBG trials have indicated that the greatest proximal impact has been for boys (Dolan et al., 1993). The rate of these off-task, aggressive and/or disruptive problem behaviors was quite small however, and while the effect size was modest, the change in frequency was minor. Based on limitations related to these observations, we would need to see replication of these findings.

Significant effects were not found for teacher-rated aggressive/disruptive behaviors (i.e., the Authority Acceptance Scale) for either intervention. This is of interest as PAX GBG and PATHS have both demonstrated a significant impact on these behaviors (CPPRG, 1999; Dolan et al., 1993). Results from evaluation of the entire sample did result in an impact on these behaviors, particularly for students with more frequent problem behaviors, the PATHS to PAX resulted in improvement over the intervention time period; however, the effect size for this was small (Cohen's $d = .03$). In addition, for those students who evidenced fewer aggressive/disruptive behaviors on the teacher-rated Authority Acceptance Scale at pretest, worse scores were demonstrated at posttest in the PATHS to PAX in comparison to those in the Control condition (Ialongo et al., 2019). It may be that for students in special education it is through the influence of the interventions on readiness to learn, emotion regulation, and social competence over time that aggressive and disruptive behaviors will be affected.

As predicted, the integrated PATHS to PAX intervention demonstrated benefits above the PAX GBG Alone. More specifically, PATHS to PAX affected a greater variety of outcomes in comparison to PAX GBG. Ialongo et al. (2019) hypothesized that it was through the synergistic effect of the integration of the PAX GBG and PATHS this would occur. That is, it was thought that the PAX GBG would increase student attention and on-task behavior, thereby allowing for more substantial acquisition of the skills taught in PATHS, which in turn would allow the student to be able to engage successfully in the PAX GBG over time. To place our findings in the larger context of the overall sample, Ialongo et al. indicated that the interventions were most beneficial for students on the lower end of pretest constructs—those students arguably most in need. Means on pretest outcomes were lower for our sample of students in special education than for the general education students, which extends the finding that the intervention is more effective for those lower on these constructs to include those who have educational disabilities—arguably an even more vulnerable population. While the larger study indicated a broader impact (e.g., more statistically significant results), effect sizes for our study were larger (e.g., range of 0.03–0.09 vs. 0.07–0.50). As the intervention seemed to have the largest impact on those with more challenges, our population may have reflected that. Regardless, we believe we have demonstrated that it is possible for students in special education to benefit from these types of manualized, universal preventive interventions in a least restrictive, general education classroom.

The size of the significant effects included in this study was modest, ranging from 0.07 to 0.50. However, it is important to note that these effects were similar to effects

found in other studies regarding these universal preventive interventions (Breeman et al., 2016; Ialongo et al., 2019; Kam et al., 2004). As there is not a straightforward relationship of *p*-value to effect size (magnitude; Durlak, 2009), when *p*-values were approaching significance, we decided to probe those interactions or calculate an effect size for the main effect. If we had not, several important findings would have been overlooked. While these effects are small, we still believe them to be meaningful and socially valid. For example, Taylor et al. (2017) demonstrated that "small" effect sizes can have a significant impact through long-term changes, such as increasing high school graduation (effect size of 0.12 resulting in a savings of US$367,687 per case). It is hypothesized that through a developmental cascade, which sets our special education students up for success by priming them for learning, encouraging their self- and emotion regulation, and improving their peer relationships, that the impact will be felt in a variety of domains throughout their lives. However, it is only through longitudinal research that we can answer these questions.

As with all studies, there are limitations to consider. First, dosage of the intervention for special education students is unknown. While information regarding the fidelity of implementation was collected, as special education students may have been pulled from the general education classroom during times when the PAX GBG was played or the PATHS lessons were taught, it is unclear if their exposure to the intervention was similar to their nondisabled peers, or if exposure was uniform across special education students in any of the conditions. Dosage of the intervention is an important function in the effectiveness of the interventions and if students are not participating in the intervention, which condition they are randomly assigned to becomes moot. However, despite not knowing dosage, several meaningful, statistically significant, or trending toward significance, results were present with improvements noted for special education students in the interventions versus Control. An interesting perspective might be that as students improve their ability to stay on-task and minimize their disruptions in the class, teachers may actually be more inclined to include them in other aspects of the intervention.

Second, information regarding students' qualifying educational disability was not collected. Therefore, discussions about the impact of the interventions for specific disabilities, or the level and type of services they received, cannot occur. Type of disability might moderate the impact of such interventions. It can be assumed that special education students in the trial spent at least a portion of their day in the general education classroom, although as noted above, it is unclear if or how much of that portion included exposure to the intervention. However, across those students who did spend at least a portion of their day in the general education setting, regardless of their disability, there were improvements on several teacher-rated measures.

Third, as discussed in Ialongo et al. (2019) teacher- and classroom-level variables may have influenced the results. For example, variation existed in terms of how many minutes the PAX GBG was played. However, based on current best practices, an intent-to-treat approach (Lachin, 2000) was employed and all data were utilized to prevent bias. In addition, the majority of measures were teacher-reports. It may be that factors outside of the intervention influenced teacher's perceptions of a student's disposition and behaviors. Furthermore, the observations of behavior were somewhat limited in the length of time each student was observed, the low frequency of behaviors, and the percentage of agreement for these observations was lower than would be preferred. Incorporating self-, peer-, and caregiver-ratings may help to create a more complete picture of the impact of these interventions on variables of interest. The randomization of schools, inclusion of a Control condition, and a large number of schools, students, and teachers are strengths that do help us continue to draw meaningful conclusions despite these limitations.

Conclusion

We believe important implications about the benefit of including special education students in these manualized, universally implemented, preventive interventions are presented. While being powered for a larger sample (and thus this subsample being essentially underpowered), the integration of PATHS with the PAX GBG resulted in benefits for students' cognitive and emotion–regulation, preparing them to better engage with academic work and to interact with their peers. The students in this integrated intervention were viewed by their teachers as better prepared for learning, socially competent (trending toward statistical significance), and in control of their emotions (trending toward statistical significance). Future research is encouraged to address the limitations identified and to more readily include special education students in these types of manualized universal preventive interventions. Through collaboration between general education and special education teachers, we can focus on how to capitalize on these benefits. In addition, follow-up studies can focus on the longitudinal impact of these types of interventions on more distal outcomes (e.g., high school graduation) and to increase the sample size to capture significant results that might otherwise be missed.

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Celene Domitrovich is an author on the PATHS Curriculum and has a royalty with Channing Bete. This has been reviewed and managed by Penn State's Individual Conflict of Interest Committee. Dennis Embry is an author of the PAX Good Behavior Game and the president and senior scientist of PAXIS Institute, which owns the intellectual property of the PAX Good Behavior Game. PAXIS Institute supplies the materials, training, and technical supports for the PAX Good Behavior Game. He did not participate in data collection or data analysis.

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