Impact of a Computerized Social-Emotional Learning Intervention On African American and Latino Students When Implemented In Lieu Of Academic Instruction: A Randomized Controlled Trial

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ABSTRACT

This randomized controlled trial (N=31) examined the impact on low achieving students of Ripple Effects' self-regulated, computerized, social-emotional learning intervention, when the training was in lieu of academic instruction, three times per week over seven weeks. Baseline adjusted ANOVAs indicated treatment group students' GPA gains were significantly greater than the control group's, moving from 1.1 to 2.4. Treatment students had significantly fewer tardies. Fifty-seven percent fewer discipline referrals were substantively, not statistically significant. Impacts on attitudes about marijuana, alcohol, and locus of control were not significant. At one-year follow-up, twice as many students in the treatment group were still enrolled in school, p<.05. Although this study's generalizability is limited by the small sample size, the findings suggest that this non-academic, computerized social-emotional training can be an effective way to boost academic achievement among low performing students with multiple risk factors.

KEY WORDS: at-risk youth; achievement gap; disproportionality; social-emotional learning; educational technology

BACKGROUND

The academic achievement gap between African American and Latino students, and their Caucasian counterparts, has been well documented and exists independently of other socio-economic measures (McCall, Hauser, Cronin, Kingsbury, & Houser, 2006). Disproportionate discipline reflects the same pattern (Skiba, Michael, Nardo, & Peterson, 2002). Poverty is an independent risk factor and—because of the overlay of class and ethnicity—exacerbates both academic and perceived behavioral differences between minority and majority students. Neighborhood and family-level violence are risk factors in their own right and are sources of emotional trauma, yet another risk factor. Trauma is linked to conduct problems (Greenwald, 2002), as well as to substance abuse, both of which further reduce the chance of school success (Kilpatrick et al., 2003). Thus, low-income African American and Latino students from problem-ridden families in violent neighborhoods have a mound of risks for school failure, including the related, higher risk of substance abuse and other mental health problems. Those same risk factors predict disproportionate contact with the juvenile justice system, early and often (Lipsey & Derzon, 1998).

Academic and behavioral achievement gaps have roots in societal influences, which are not under individual control. However, both are also correlated with social-emotional competence, which *can* be under personal

control (Zins, Weissberg, Wang, & Walberg, 2004) and is linked to resilience in the face of trauma (Benard, 2004). A growing body of evidence suggests that development of social-emotional competence can work both to address behavior problems and also to promote academic achievement (Durlak & Weissberg 2007; Elias & Arnold, 2006; Fleming, Haggerty, Catalano et al., 2005; Osher, Sprague, Axelrod, et al., 2007; Zins et al., 2004). Social-emotional competency does not cause school success, but in many cases it enables it (Elias & Arnold, 2006; Zins et al., 2004). Several states have mandates to provide social-emotional learning (SEL), creating tension between accountability for academic outcomes and mandates for use of instruction time for non-academic purposes. Many schools also face challenges delivering SEL with fidelity (Devaney, et al., 2006; Fixsen et al., 2005).

Ripple Effects is a student-centered, self-regulated, evidence-based, computerized SEL intervention designed to overcome some of these obstacles. It can be configured to promote self-efficacy, as well as for other primary, secondary and tertiary interventions. It is designed to be easier to implement with fidelity. It is used in more than 500 school districts, including 25 of the 50 largest urban districts in the United States. By 2002, data from two prior studies indicated the program had promising, but not proven, positive effects on both academic and behavioral outcomes, when used independently by students, without adult mediation of content (Ray, 1999; Stern & Repa, 2000).

It is counter-intuitive to think that computer technology might be advantageous for delivery of social-emotional training, when computer-based training has had mixed results in impacting academic outcomes (Dynarski, et al., 2007; Kulik, 2003; Schacter, & Fagnano, 1999). Computers are unfeeling, not self-aware, often lack nuance, miss non-verbal cues, and in most case, don't provide an environment for physical rehearsal of new skills. All are factors in implementer effectiveness of SEL programs (Devaney, et al., 2006).

Nonetheless, there is a growing body of evidence that technology-based training can be effective for some psychosocial interventions (Andersson, et al., 2005; Bandura, 2005; Bosworth, et al., 1994.Carlbring et al.; 2005; Christensen et al., 2004; Clark et al. 2005; Marsch et al., 2006; Ybarra et al., 2005; Zabinski et al., 2003). There is not published research that shows the impact of computerized health and behavioral interventions on school outcomes, especially academic performance. Nor is there research that has tested the efficacy of coupling standardized group training for children or adolescents, with self-directed individualized, therapeutic interventions to address personal risk and protective factors. In 2002, the National Institute on Drug Abuse (NIDA) funded review, revision, and scientific study of the real-world effectiveness of Ripple Effects. This study is an effort to begin the fill that gap.

Purpose

The purpose of this real-world study was twofold: to assess implementation process fidelity, and to evaluate intervention efficacy of Ripple Effects computerized program on internal and external school-related outcomes, when the training was delivered to underperforming youth in lieu of academic instruction.

METHOD

Research Design

The school-level study was a longitudinal, repeated-measures (pretest, posttest, follow-up) randomized controlled trial conducted under real world conditions, without any direct involvement of program developers in delivery of the intervention. Success was measured by the extent to which exposure to Ripple Effects changed students' attitudes, behavior and academic performance. Individual students were the unit of analysis.

We tested these hypotheses: (1) Under real world school conditions, if given the opportunity and access to technology: a) students would comply with group level

requirements for use of the software; b) with no more than three hours of training on the intervention, staff would monitor and ensure that use; and c) students would accept an invitation to explore additional tutorials of personal interest. (2) If treatment students had three or more hours of exposure to the computerized SEL intervention, their: a) school outcomes would improve; b) perceptions of harm and norms against use of alcohol and marijuana would increase; and c) internal locus of control scores would increase, all when compared with control group students.

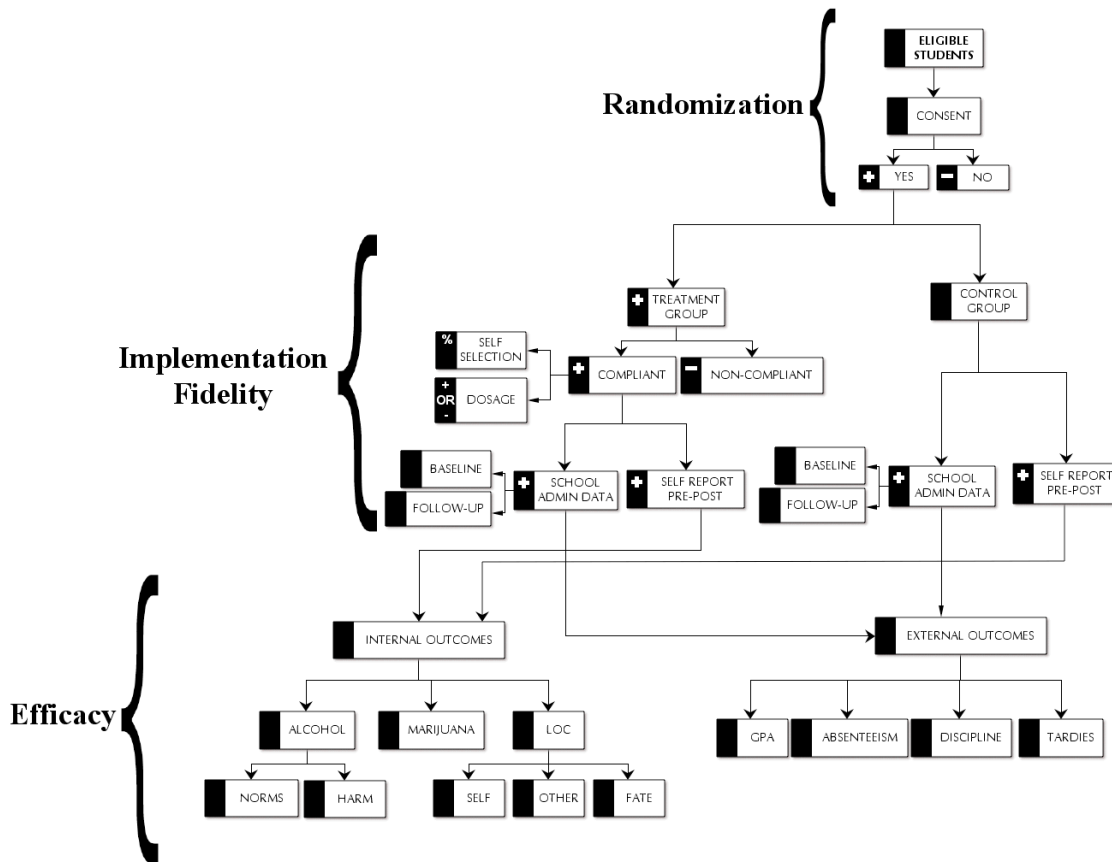Figure 1 provides a flowchart of the research design.

Figure 1: Flowchart of the Research Design

Method of Assignment to Condition

A school staff member assigned all consenting eighth grade students to the treatment group (TG) or control group (CG) based on odd or even month of birth, without reference to any other variable. Fifteen students were randomly assigned to the treatment condition, and 16 to the control condition.

Condition of Use

Treatment condition. Students from the TG were pulled out of Language Arts or Math class and sent to the computer lab for 45 minutes, three times per week, for seven weeks. A social worker assigned 42 tutorials (roughly 10.5 contact hours) to complete during that time, and monitored their electronic scorecards to verify compliance. After completing their assigned tutorials, students were free to use the remaining time to explore any of the other 136 tutorials to build strengths or address personal risk factors.

Control condition. CG students participated in "business as usual" during their academic classes. They received instruction in core academic subjects. The Ripple Effects intervention was made available to them at the end of the study.

Setting

The study took place over twelve weeks in a small, alternative middle school in a violence-ridden neighborhood of a large city. The school serves 90 low-performing students, predominantly African American, of low socioeconomic status (SES), who had experienced prior school failure. The principal described these students as "having no ways to cope with being upset." She said that she and her staff spent the majority of their time dealing with behavior problems. Defiance, profanity, impulsivity and graffiti topped the list.

Study Sample

The principal invited all 34 eighth grade students to participate in the study. Three chose not to participate. The remaining 31 students comprised the sample group: 75% African American, 18% Latino, 3.5% Asian, and 3.5%

mixed ethnicity. Fifty-four percent were male, 92% were age 14 and older, and 100% were eligible for free or reduced lunch, a marker for low SES. Fourteen percent were English language learners.

Intervention

Overview. The intervention was a subset of tutorials from Ripple Effects SEL software. At the time of this study, Ripple Effects teen version of computerized SEL training had 178 multimedia tutorials (390 as of 2008). It is designed to build protective factors, reduce risk factors, and solve problems in non-academic areas correlated with school success. The tutorials are reading-independent training modules, which each take about 15 minutes, on average, to complete. They are comprised of photos, illustrations, videos, audio, peer-narrated text, and interactive exercises, with a hip hop look and feel.

The intervention examined here was a "self-efficacy" configuration of the software. Self-efficacy is the context-specific belief in one's capacity to master what is needed to succeed (Bandura, 1997). Success in this case was defined by schools as academic achievement and reduction in behavioral problems, and by researchers as positive changes in attitudes toward alcohol, marijuana and locus of control. A scope and sequence was designed to promote cognitive, social and emotional capacity-building toward those intended ends.

Learning process. Independent of specific content, the *Whole Spectrum Self-Regulated Learning System* that powers Ripple Effects software contains elements that have been linked to successful development of self-efficacy: context-specific application, guided mastery, self-regulated learning, observational learning, systematic self-reflection, transfer training, and skill rehearsal (Bandura, 1997; Pajares & Urdan, 2006). Additional elements of the system include continuous assessment of content mastery through interactive games, reading independence through peer narration and illustrations, narrative/story as teaching tool, and positive reinforcement for completion

of the learning process.

Content base. Twenty-one of the tutorials addressed "core components" of self-efficacy. The strengths-based intervention began with the "learning styles" tutorial, which includes an interactive self-profile designed to promote students' sense of self-efficacy about the single most important capacity in a school environment, the capacity to learn. Other core content included a "strengths" tutorial and skill training to promote social-emotional competencies that are linked to the successful translation of *belief* in one's capacity for mastery, to *actual* mastery: goal setting; self-regulation (of thoughts, emotional reactions and physical response); expectations about the future; and, assertiveness, problem-solving, and resilience (which included two traits linked to self-efficacy, optimism and managing change). All of this was framed in the context of community (being connected). Two of the required tutorials promoted affective capacity: identifying with others and expressing solidarity. These were intended to balance the promotion of a stronger sense of self with a deeper-felt awareness of others and expression of that awareness in caring, respectful behavior. Core content also included two topics directly related to locus of control: fate and control/empowerment.

Staff selected 21 additional tutorials, weighted about two-to-one toward problems (disputes, teacher conflict etc.) over strengths (asking questions, study habits, etc.). Once students had completed the assigned tutorials, they could explore any of the 136 additional topics.

Implementer training. The school social worker received a three-hour training to become familiar with the software, create a site-specific scope and sequence for the "implementer's choice" tutorials, and learn how to monitor student electronic scorecards for completion. She was not trained in, did not deliver, and did not facilitate discussion of, any of the assigned content.

Outcome Measures

The analysis included multiple, quantitative and qualitative, process and outcome measures.

Quantitative process measures. Quantitative process measures included enrollment attrition, study attrition, intervention attrition (compliance), dosage and self-selection of optional tutorials.

We classified as "enrollment attrition" the percentage of students for whom there was no pre- or post- intervention data, because they had been removed from school. We classified as "study attrition" the percentage of students who were physically enrolled in school, but did not comply with study protocols, including completing the self-report surveys. We classified as "intervention attrition" the percentage of students who had consented to the study, and had access to the technology, but, for whatever reason, were non-compliant. That is, they did not have minimal exposure, defined as completion of interactive exercises from at least 12 tutorials (equivalent to roughly three contact hours, or 29% of the total assigned content). We included in efficacy and dosage analysis all students who had at least three hours exposure to the software program. Exposure to self-selected content was a yes or no event. We did not analyze that dosage.

Quantitative outcome measures. Quantitative outcome measures included no fewer than 12 measures of concept mastery, six objective school achievement measures, and two self-report measures.

Each tutorial included at least one measure of concept mastery: a set of six multiple choice questions, disguised as an interactive game. The tests are structured such that students cannot complete the game and earn points until every answer is correct. Students can experiment with answers until they arrive at the correct one.

The six quantitative school achievement measures were grade point average (GPA), days absent, tardies, suspensions and discipline referrals and school enrollment rates at one-year follow-up.

The two self-report measures were computer-based, pre- and post-intervention surveys on attitudes toward alcohol, marijuana,

and other drugs, and perceived locus of control. Both self-report surveys were adaptations of previously validated instruments. The Monitoring the Future (MTF) survey measures norms and perceptions of harm about alcohol and marijuana. The Multi-dimensional Health Locus of Control scales (MHLC) measure attribution of life events to internal (Self) or external (Fate/Other) factors. For both scales, Ripple Effects adapted the format to peer-narrated, computerized delivery, with a hip hop look and feel, a game-like structure of reinforcement for any answer, and automated data collection. For the locus of control scales, Ripple Effects adapted the "Other" subscale to include other social forces, such as racism, as well as other powerful people.

The reliability coefficient for the REMTF combined scale on norms and perceptions about alcohol was 0.74, while the coefficients for marijuana norms (0.88) and risks (0.85) were sufficiently high to enable them to be analyzed separately. The RELC scales for Self and Fate both had pre- and posttest alpha values of 0.70. The alpha values for the Other scale, which included the substantive content adaptations, were 0.59 for the pretest and 0.71 for the posttest. Since the pretest did not meet the 0.70 criterion, posttest data were analyzed alone with independent samples t-tests.

Qualitative measures. Qualitative measures included interview data on perception of program usage, barriers to use, and perceived value from implementer perspectives.

Data Collection

Compliance, dosage and concept mastery. Ripple Effects software automatically collected data on compliance and dosage. Dosage was directly tied to completion of the interactive games that measured concept mastery. If students were awarded points for a tutorial, it signified they had successfully provided all the correct answers to the quiz.

School data. School administrators provided pre-intervention demographic data, including free or reduced lunch status, limited English proficiency (LEP), gender, and ethnicity.

They also provided enrollment attrition data, and data on GPA, absenteeism, tardies, suspensions, and discipline referrals for the first semester of the year of the study. Two years after the intervention, the school district provided what prior year and one-year follow-up data they had available.

Self-report data. During the Fall of 2003, as part of their regular school activities, with a social worker monitoring but not mediating the process, students completed the two computer-based surveys described above, before and within two weeks after the seven-week intervention. At least 12 weeks elapsed from teacher training to final survey.

Qualitative data. At several points along the way, the study coordinator conducted and documented phone and in-person interviews with the school administrator, and the site program facilitator. Site visits by Ripple Effects technology support staff provided observational data on implementation conditions and school climate issues.

Method of Analysis

SPSS was used to run all of the analyses. Several methods of analysis were used, each appropriate to the kind of data being analyzed. For administrative data with pre and post values (GPA and absenteeism), repeated-measures of analysis of variance (ANOVA) were used to examine whether or not some of the differences between treatment and control remain after taking into account where students started. For absenteeism, which had a non-parametric distribution, the Games-Howell posthoc test for pair-wise comparisons was used.

Since there was no baseline data for discipline factors, and distribution was non-parametric, independent samples t-tests with the Games-Howell posthoc correction were employed. Games Howell is designed for use when sample sizes are small and the variances are unequal. The set of control variables included ethnicity, gender, LEP, and free or reduced lunch status, which we used as a measure of socio-economic status.

For the self-report data with pre and post values (the REMTF norms and risks scales, and

the Fate and Self RELC scales), we ran repeated-measures ANOVAs with a between-subjects factor (study group) correction.

To establish dosage, Ripple Effects software created a password-protected file for each student and tracked completion of interactive exercises for each tutorial, assigning 100 points per exercise. Dosage was calculated as the point count divided by an average completion rate of four per hour.

Bivariate Pearson product-moment correlations were employed to see if the number of hours of exposure to Ripple Effects was associated with differences in outcomes. In cases where there were pretest data, partial correlations were run on the posttest data to control for the pretest covariate. For each set of correlations, the Bonferroni method was used to minimize the chances of making a Type I error. For one year follow-up (categorical) data, independent samples t-tests were conducted. All means presented in the text and tables are the raw values unadjusted for the covariates.

RESULTS

Baseline Equivalence

Analysis of pretest surveys indicated no significant baseline differences between TG and CG students for any self-report variable. Prior year administrative date covered 94% of the total sample. The data showed no significant differences at baseline in absenteeism. Both groups were above 15%. The data showed differences between the groups in pretest scores for GPA, favoring the CG, with scores for both groups below the 2.0 minimum requirement for graduation (Table 1).

Process Outcomes

Technology-related implementation results. The 15 computers at this site were relatively old, refurbished desktop machines, and the school had no on-site technical support staff. Despite this, no technology-related barriers to use arose during the intervention or testing.

Enrollment attrition. Enrollment attrition during the intervention period, as measured by the availability of administrative post-intervention data, was 10%: 7% of the TG, 13% of the CG. One TG student was sent to juvenile hall near the beginning of the intervention. Two CG students were expelled midway through the semester.

Study attrition. Study attrition was 14%. All students were pretested, but posttest data were missing for 7% of the TG and 21% of the CG. The built-in electronic monitoring, coupled with reports by the facilitator, confirmed that no control group students had contact with the intervention.

Intervention attrition (non-compliance). There was no intervention attrition. Compliance among TG students who were enrolled in school and had administrative post-intervention data was 100%.

Dosage. Mean dosage was 98%. No student completed less than 85% of the assigned intervention.

Participation in self-selection option. One hundred percent of students who had any exposure to the software intervention, elected to also privately explore unassigned tutorials related to topics of personal interest.

Table 1.
Comparisons of Baseline Scores on GPA and Absenteeism for 2002-2003 School Year

	Treatment		Control		
Outcome	M	SD	M	SD	Difference
GPA	1.10	.36	1.78	.87	-0.68
Absenteeism	0.19	.13	.15	.15	.04

Note: The sample consists of 14 students in the treatment group and 12 students in the control group.

Quantitative Outcomes

Concept mastery. Analysis of points awarded for multiple choice games provided evidence that treatment group students demonstrated at least short term mastery of no fewer than 36 key concepts, and an average of 41.

School achievement outcomes. As can be seen in Table 2, the data indicate that TG students who had the Ripple Effects intervention instead of academic instruction for two hours a week had higher academic grades than CG students who received the two hours of instruction in Math or Language Arts. After adjusting for baseline unequivalence, the difference in gains for TG students was a full grade and a half (p<.01, Cohen's d = 1.01). There were no significant differences in absenteeism scores between TG and CG students. All students had dramatically lower absenteeism rates than in the previous year. Table 3 shows that TG students had significantly lower tardy rates (p<.05), compared to CG students.

Students in the sample had high discipline referral rates overall, with a few students accounting for a large percentage of the referred offenses. As can be seen in Table 4, the TG had substantively, but not significantly, lower scores in discipline referrals overall, and in two of the areas of greatest concern to staff: defiance and swearing.

Table 2.
Treatment Effects on School Outcomes

Outcome	Pre M (SD)	Post M (SD)	Change	Pre → Post Difference in Changes between Groups	Cohen's d
GPA				1.50**	1.01
Treatment	1.10 (0.36)	2.26 (0.62)	1.16		
Control	1.78 (0.87)	1.44 (1.04)	-0.34		
Absenteeism				-0.046	0.65
Treatment	0.19 (0.13)	0.004 (0.01)	-0.186		
Control	0.15 (0.15)	0.01 (0.01)	-0.140		

Notes: The sample consists of 14 students in the TG and 12 students in the CG.
** $p < .01$.

Table 3.
Differences in Tardies for Treatment and Control Students

Outcome	Treatment M	SD	Control M	SD	Difference	Cohen's d
Tardies	0.00	0.00	0.44	0.73	- 0.44*	0.85

Notes: The sample consists of 14 students in the TG and 16 students in the CG.
* $p < .05$

Table 4.

Differences in School Discipline Referral Rates for Treatment and Control Students

	Treatment		Control			
Referral	*M*	*SD*	*M*	*SD*	Difference	Cohen's *d*
Defiant or disruptive	2.14	8.02	6.94	0.01	-4.79	0.53
Fighting or starting a fight	0.07	0.27	0.06	-1.85	0.01	0.04
Name calling	0.71	1.54	2.56	-3.79	-1.85	0.57
Swearing	2.14	8.02	5.94	-1.21	-3.79	0.43
Talking	2.29	7.99	3.50	-0.13	-1.21	0.17
Threaten adult	0.00	0.00	0.13	-0.59	-0.13	0.54
Threaten student	0.71	2.67	0.13	-2.21	-0.59	0.33
Walk out	1.86	5.39	4.06	-13.38	-2.21	0.32
Total mean referrals	9.93	29.28	23.31	32.34	-13.38	0.45

Self-report surveys. There were no statistically significant differences on either self-report measure. As can be seen in Table 5, differences in the perception of norms and risk of alcohol and marijuana were in the opposite direction as hypothesized. Mean changes of students in the TG were toward lower perception of risk than the control group. None of these differences were significant.

As can be seen in Tables 6 and 7, there were very small, net negative differences in gains for all three measures of locus of control (internal, external-fate, external-other) by the TG, but none were statistically significant. Lower numbers indicate a stronger affiliation with that scale. Higher values indicate that a person or group disagrees with the attributions in the items (i.e., that consequences are attributable to self, fate, other structures or other people), so the negative score signifies a positive gain in internal locus of control.

Dosage effects. With uniformly high dosage rates, no dosage-related effects could be detected.

Qualitative Findings: Staff Reports

The report from interviews with the social worker, who implemented the program, was in alignment with the quantitative findings. Despite the fact that students were randomly

assigned, and that baseline data later indicated that TG students actually started with lower academic scores, at the midpoint of the intervention she reported, "All our best students are in the Ripple Effects group." She gave as an example the fact that two students from the CG had just been expelled, while two students from the TG had each been chosen as the school's "student of the week."

Twelve-month Follow-up on School Enrollment

Attempts to test whether positive effects persisted over time were partially successful. Follow-up administrative data for the 2004-05 school year, provided by the school district, allowed us to compare school enrollment rates, one year post-intervention. Of 14 TG students enrolled at the time of post-intervention data collection, 71% were enrolled at 12-month follow-up. Of 14 CG students enrolled at the time of post-intervention data collection, 36% were enrolled at 12-month follow-up, a substantial, significant difference, p=.026. The disproportionately higher number of TG students who made the transition from eighth to ninth grade created a meaningful size imbalance between treatment and control groups. This prevented conducting a valid analysis of long-term impacts on grades, behavior and absenteeism.

Table 5.
Differences in Changes in Norms and Perceptions about Alcohol and Marijuana, by Condition

REMTF Scale	Pre M (SD)	Post M (SD)	Change	Difference in Changes between Groups
Alcohol Norms & Risk				-1.69
Treatment	17.38 (3.58)	14.69 (2.81)	-2.69	
Control	15.00 (4.06)	14.00 (5.67)	-1.00	
Marijuana Norms				-2.25
Treatment	8.31 (0.85)	5.69 (1.93)	-2.62	
Control	6.73 (2.76)	6.36 (2.46)	-0.37	
Marijuana Risk				-3.76
Treatment	10.54 (1.76)	7.69 (3.45)	-2.85	
Control	7.36 (4.03)	8.27 (4.52)	0.91	

Notes: Sample consists of 13 students in the treatment group and 11 in the control group.
Higher numbers represent greater perception of risk or disapproval.

Table 6.
Pre- and Post Scores and Differences in Changes in Locus of Control by Condition

Scale	Pre M (SD)	Post M (SD)	Change	Difference in Changes between Groups
Internal-Self				-1.34
Treatment	25.46 (4.39)	24.85 (3.74)	-0.61	
Control	25.27 (4.90)	26.00 (4.75)	0.73	
External–Fate				-0.59
Treatment	37.15 (4.14)	36.38 (4.17)	-0.77	
Control	36.45 (5.07)	36.27 (4.65)	-0.18	

Notes: The sample consists of 13 students in the treatment group and 11 in the control group.
Higher numbers represent greater disagreement with the scale.

Table 7.
Differences in Locus of Control-Other for Treatment and Control Group

Scale	Treatment M (SD)	Control M (SD)	Difference
External–Other People & Structures	32.77 (6.42)	33.36 (2.58)	-0.59

Note: Sample consists of 12 students in the treatment group and 12 in the control group.

DISCUSSION

Significance of Findings

The very low attrition and high dosage rates confirm the hypothesis that Ripple Effects software-based, self-regulated training can be implemented with fidelity, even when implementers have only three hours of training. This suggests it may be a more scalable and sustainable intervention than one that requires extensive training to provide live instruction. Students at very high risk of school failure achieved striking, statistically significant academic gains through reducing the time spent on core academic subjects, by more than two hours per week, and instead pursuing self-regulated, computerized training to promote self-efficacy, and privately addressing whatever personal risk or protective factors they chose. This sharply challenges conventional theory that academic failure of students with multiple, non-school-related risks, can best be addressed by more academic training and practice.

The baseline-adjusted net difference in GPA gain of 1.5 on a 4.0 scale is the difference between failure and success among one of the highest risk groups for dropping out of school and early entrance into the criminal justice system: low-achieving African American students, with a history of poor school performance, from a poor, violence-prone neighborhood, where drugs are easily available.

Every student in the treatment group took advantage of the opportunity to privately address some topic of personal interest to them. As a group, their behavior changed for the better in the process. This suggests adolescents may be the best judges of their own needs. It challenges the notion that providing individualized guidance to students with multiple risks needs to be a lengthy, expensive process, or depend entirely on the expertise of mental health professionals.

The very high discipline referral rates for the CG (M = 23 incidents per student, over one semester) support the principal's perception that behavior problems had been interfering with instruction. Findings that TG students had 57% fewer discipline referral rates overall, with 69%

fewer referrals for defiant and disruptive behavior are important, even though not statistically significant, for these are important predictors of involvement in the criminal justice system.

The significant difference in tardiness (p<.05) may suggest greater engagement with the school community, a factor that is highly correlated with overall school success, and inversely correlated with involvement with the juvenile justice system. Absenteeism was extremely low for both treatment and control groups, when compared to baseline data from previous years. There are a number of factors that might impact those rates, including school climate and narrow definitions of "absenteeism." The latter may be related to the fact that school revenue is directly tied to reported average daily attendance rates.

Follow-up data showing a significant difference in enrollment rates, with TG students still enrolled in school at double the rate of CG students, suggests that greater school engagement continued over time. Among this population, the school district estimates that annual mobility rates are 30%. Hypothetically, that could account for all of the TG loss of enrollment, whereas the CG group would still have additional unexplained loss of enrollment of more than 40%. The suggestion that a short, relatively inexpensive, self-regulated, computerized intervention (Ripple Effects) could potentially have such a positive impact on dropout rates calls for immediate further study.

The lack of positive impact on norms and perception of harm about alcohol and marijuana raises some important questions. Conventional wisdom, backed by years of research, would have predicted that both norms and perception of harm were correlated with social behavior, academic outcomes and school engagement (Hawkins, Catalano, & Miller, 1992). In this study, if anything, they are inversely correlated with positive outcomes on all those other measures. There are interesting hypotheses, including: the development of critical thinking skills in the TG may have led to independent assessment of lesser harm; self-

directed exposure of some students to tutorials on methamphetamines may have led to the belief that, by comparison, marijuana is a less harmful drug (TG students did have higher scores on the assessment of harm from methamphetamines); empathy training may have reduced social disapproval in general; or, the four tutorials which directly addressed harm and norms about drug use (one contact hour) was simply not enough to make a difference. No conclusions can be drawn.

The lack of impact on locus of control raises interesting questions. All three of the school outcomes that were positively impacted are theoretically mediated at some level through self-efficacy, and the configuration of the Ripple Effects intervention used in this study was designed to promote school achievement through self-efficacy. Yet there is no significant change in locus of control. This suggests that confidence in one's capacity to master what is required to succeed in a context-specific situation, along with context-specific training in those required attributes, does not automatically translate into a generalized sense of control over life and/or may be more important to school success than that generalized sense of control.

Study Limitations

Sample size. Small sample size increased the possibility of both Type I and Type II errors. The Games Howell step-down process reduced that risk but did not eliminate it. Clearly, future research is needed to see if these differences hold up in a larger sample.

Causal mechanisms. The data indicated that the Ripple Effects intervention had positive impacts on objective, school-related outcomes but were not able to identify causal mechanism for those outcomes. The process of self-regulated learning, the research-based content of the self-efficacy configuration, the opportunity to privately address personal risk factors, or other features, including the technology itself, may all have played some role. Much further study is needed.

Implications

Findings on process outcomes may have promising implications to structured school or other youth-serving settings, where compliance is carefully monitored. This study's findings may not be generalizable to situations where use is solely a matter of student choice, nor where adult supervision is lacking. Again, future study is needed to assess this study's generalizability.

Findings on objective outcomes have greatest relevance for those schools and districts that have large minority populations; persistent, disproportionate representation of African American and Latino students in disciplinary actions; and/or persistent gaps in academic achievement between these students and their Caucasian and Asian American counterparts.

CONCLUSION

The data support the hypothesis that Ripple Effects is an effective academic achievement intervention, even when it is implemented in lieu of academic instruction. While there is support that this intervention works for school achievement, how that happens remains unclear; this serves as a reminder that we are at the beginning, not end, of an important research process. Much further work needs to be done before we will understand how this technology can best be leveraged to promote the social-emotional competence that is a student-level linchpin for academic and life success.

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