Impact of a Computer-Based, Social-Emotional Intervention on Outcomes Among Latino Students When Adult Monitors of the Student Training Are Non-professionals: A Randomized Controlled Trial

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ABSTRACT

Many schools rely on non-professionals for instructional services in non-academic areas. This may put some students at a disadvantage. This study examined the impact of a computerized, social-emotional intervention, implemented by non-professionals, with 120 low-income, gender-segregated, predominantly Latino sixth graders, in an urban public charter school. School staff randomly assigned students to treatment or control conditions. Treatment group (TG) students were assigned self-regulated completion of 42 multimedia tutorials, four times a week for seven weeks, monitored by non-professionals. Control group students had live instruction from teacher-advisors. Eighty percent of the TG complied with the intervention. T-tests indicated significantly higher grade point average (GPA) for personal and social responsibility for TG, and meaningfully higher scores for academic GPA, absenteeism, and discipline referrals, which were not significant. There was no significant impact on attitudes about marijuana or alcohol, or locus of control. The study confirmed that non-professionals could be effective implementers. In the absence of baseline data indicating otherwise, it is possible that the differences in outcomes can be attributable to starting differences between groups.

KEY WORDS: student behavior; Hispanic students; urban charter schools; social-emotional learning; computer-aided instruction

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BACKGROUND

Evidence links level of instructor proficiency to both academic and behavioral outcomes of students (Devaney, O'Brien, Resnik, Keister, & Weissberg, 2006; Fixsen, Naoom, Blase, Friedman, & Wallace, 2005). Instructor proficiency includes both content expertise and instructional methodologies. There is not a significant difference in student outcomes between faculty members with differing degrees, but there is such a difference between bachelor degree teachers and paraprofessionals or non-professionals. This is expected, since by definition even provisionally certified teachers are recognized as more proficient than non-professional school staff such as janitors, cafeteria aides and in many— but not all—cases, school volunteers. Nonetheless, due primarily to funding constraints, an increasing number of schools rely on non-professionals to deliver student training that can impact school success. These schools are especially likely to rely on non-teachers to deliver instruction in non-academic areas.

For more than two decades, outside volunteers have been used to address health and safety issues, from substance abuse, to gang violence, to molestation. Use of non-professionals for student advisory periods is an expansion of that trend. Advisory period is increasingly the context in which social-emotional issues and behavioral training are addressed. Student social-emotional competence is linked to overall school success (Zins, Weissberg, Wang, & Walberg, Eds., 2004), so use of non-professionals as advisors may have important ramifications. Evidence cited above would suggest that this practice might put those students who had non-professional advisors at both academic and behavioral disadvantage. However, implementation studies have also shown that, even among qualified teachers, fidelity to evidence-based practice in delivering social-emotional learning (SEL) training to students is moderate at best (Fixsen et al., 2005).

It is possible that computer-based SEL training, where content is standardized and instructional expertise is "in the box," may present a way to mitigate the disadvantage of using non-professionals, and also reduce the loss of fidelity by instructors who are inexpert in the subject area, but have academic degrees. Still, 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).

However, there is a growing body of evidence that technology-based training can be effective for some psychosocial interventions. The best evidence is for internet-delivered cognitive behavioral therapy for adults (Andersson, et al., 2005; Carlbring et al.; 2005; Christensen et al., 2004; Clark et al. 2005; Ybarra et al., 2005; Zabinski et al., 2003). Prior the beginning of this study, little formative evaluation and very few, real-world scientific studies of effectiveness of self-directed, social-emotional training for children had been conducted. One early study showed that a school-based health promotion/behavior change CD-ROM-based program (*BARN*) resulted in reductions in risk-taking behavior in adolescents (Bosworth, et al., 1994). An evaluation of a kiosk based HIV/AIDS prevention program using a game format, showed increased understanding of safety issues, and modest pre to post gains in self-efficacy scores, but the study lacked a comparison group to substantiate findings (Thomas et al., 1997).

Research that has been released during the course of the studies described here, shows that computerized delivery of science-based health information to children and adolescents can be effective in transferring accurate understanding related to substance abuse (Marsch, Bickel &

Badger, 2006; Schinke, Schwinn & Ozanian, 2005). Computerized delivery of social skill training has been shown to be effective in promoting self-reported assertiveness and decision-making skills, the former at a level equal to or higher than, a widely validated, instructor- delivered program (Marsch et al., 2006). Research has also demonstrated that adolescents and adults are both more comfortable seeking help from a computer than a live interviewer, and are more honest in answering questions on the computer, especially about matters that may carry perceived social stigma (Karabenick & Knapp, 1988; Turner et al., 1998; Weisband et al., 1996). There is not published research that shows the impact of computerized social-emotional learning interventions on children's school outcomes, where delivery of the training is not mediated by a trained professional. This study is an attempt to fill that gap.

Ripple Effects is a student-centered, self-regulated, evidence-based, computerized SEL intervention that addresses the non-academic factors in school and life success. It is in use in more than 500 school districts, including dozens of the largest urban ones, across the United States. Data from two prior studies indicated the program had promising but not proven positive effects on school outcomes, when used independently by students, without adult mediation of content (Ray, 1999; Stern & Repa, 2000). This report discusses one of a series of six concurrent, National Institute on Drug Abuse-funded studies, begun in 2003, to systematically examine the impacts of Ripple Effects on attitudes, behavior and academic performance among diverse groups of adolescents. It is the only one that examines impact of the intervention when implementation is monitored by non-professionals.

Purpose

The purpose of this study was to assess implementation fidelity, and to evaluate intervention efficacy of Ripple Effects software on internal and external student outcomes, when non-professional school staff implemented the intervention.

METHOD

Research Design

The school-level study was a longitudinal, repeated-measures, randomized control trial (RCT) conducted under real world conditions, without any direct involvement of program developers in delivery of the intervention. The study measured success 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.
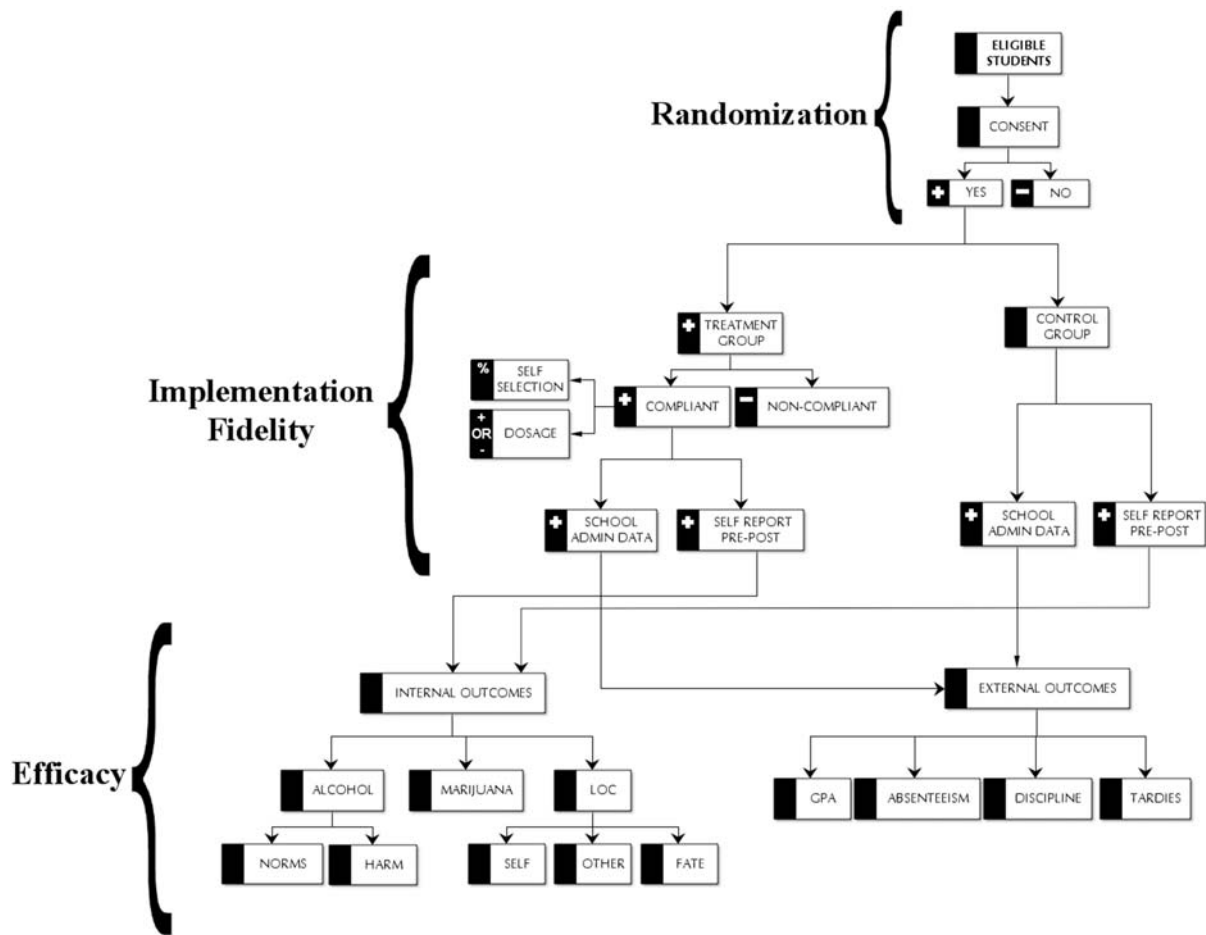
Figure 1: Flowchart of the Research Design

Method of Assignment to Condition

Students were first separated by gender and then randomly assigned by computer to one of four advisory periods for females, or one of four advisory periods for males. Half of the classrooms from each set were advised by highly qualified certified teachers; half by non-professionals (the school janitor, a cafeteria aide, a secretary, and a parent volunteer). Students in the four advisory periods overseen by non-professionals comprised the treatment group (N=62). Students in the four advisory periods led by certified teachers comprised the control group (N=58).

Condition of Use

Treatment condition. Four days a week during advisory period, over a ten-week period in the fall of 2003-2004, students in the intervention group went either to the computer lab (the two advisories with females), or to a study area with a mobile laptop cart (the two advisories with males), and used the software. Ratio of desktop computers to students was 1:1; ratio of laptops was .8 to 1 (12 laptops per 15 students.) Students were exposed to self-regulated use of a self-efficacy configuration of the Ripple Effects intervention. The configuration consisted of 42 of the 178 tutorials available in the software at the time of the study. Staff monitored electronic scorecards to verify compliance. After finishing their assigned tutorials, students were free to use the remaining time to explore any of the additional 136 tutorials to build personal strengths or address personal risk factors.

Control condition. Control group students stayed with their certified teachers, and participated in "business as usual" for their advisory periods. Business as usual for them was live instruction to promote social-emotional development, strengthen group skills, and build relationships between advisors and students. There was no set curriculum for any advisor to complete. Each could use the time for group problem solving, discussion, role plays, or skill training. They were provided access to the intervention after the study ended.

Setting

The setting was the second year of operation (2003-2004) for a public, charter middle and high school located in one of the poorest neighborhoods in a major West Coast city. It is a community where violence rates are high, illegal immigration is pervasive, and medical marijuana has been legalized by state referendum. In 2003-2004 the school served 389 students in grades 6-12. The school sets high academic expectations after admittance for all students, and formally acknowledges the role of social behavior in school performance, with grades for personal and social responsibility included on regular report cards.

Each school day begins with a gender-segregated advisory period: 45 minutes are set aside to address non-academic issues that contribute to school success. School leaders had identified their students' strong belief in fate and lack of sense of a viable future as factors impacting willingness to set goals and persevere in the face of difficulty, and thus ripe for addressing in advisory. However, those same personnel had expressed concern that the non-professional advisors' lack of training in instructional methods, social-emotional learning theory and classroom management techniques might put their students at a disadvantage in developing essential social-emotional competencies. If so, negative school outcomes could be the result.

Study Sample

The sample comprised all 120 sixth grade students at the school. These students shared multiple socioeconomic risk factors. Those did not include previous academic failure or special education status. Eighty-three percent were Latino, and the same percentage had limited English proficiency (LEP). Seventeen percent were African American. Forty-nine percent were male. Ninety-four percent were low socio-economic status (SES) and Title One eligible, a 100% overlapping group. Most of the students were children of undocumented immigrants.

Intervention

The intervention was a subset of tutorials from Ripple Effects software. At the time of this study, the Ripple Effects teen version of computerized SEL training included 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 interactive multimedia tutorials are reading-independent training modules, which each take about 15 minutes, on average, to complete. They are made up of photos, illustrations, videos, peer voices reading aloud the text, and interactive exercises, all with a hip hop look and feel.

The intervention examined here was a "self-efficacy" configuration of the Ripple Effects 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.

Twenty-one of the tutorials addressed "core components" of self-efficacy. Twenty-one additional tutorials were collaboratively chosen by staff during a three-hour, pre-intervention training, to address their students' needs. All 136 remaining tutorials were available for students to privately address individual interests or risks.

Learning process. Independent of specific content, the Whole Spectrum Learning System that powers Ripple Effects SEL software (Figure 2) contains elements that have been linked to successful development of self-efficacy: guided mastery, self-regulated learning, observational learning, systematic self-reflection, transfer training, and skill rehearsal (Bandura, 1997; Pajares & Urdan, Eds., 2006). All of these modes of learning are introduced with a case study scenario (context-specific application). 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,

including first person video true stories, and positive reinforcement for completion of the learning process.

Implementer training. A Ripple Effects trainer provided the non-professional implementers with one three-hour training session, during which they became familiar with how the software worked, created their site-specific scope and sequence, and learned how to monitor student electronic scorecards for completion of required tutorials. They were not trained in, did not deliver, and did not facilitate discussion of any of the assigned content.

Figure 2: Diagram of the Whole Spectrum Self-Regulated Learning System

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, dosage, and participation in the option to explore self-selected tutorials.

We classified as "enrollment attrition" the percentage of students for whom there was no pre-or post-intervention administrative data, because their family had moved or they had been removed from school. We classified as "study attrition" the percentage of students who were physically enrolled in school but failed to complete both pre and post tests. 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 three contact hours, or 31% of the total assigned content). For all compliant students, "dosage" measured the level of exposure to the required tutorials. We included in efficacy and dosage analysis all students who had at least three hours of exposure to the software program. Exposure to student self-selected content was a yes/no event; we did not analyze that dosage.

Quantitative outcome measures. Quantitative outcome measures included no fewer than 12 measures of concept mastery, seven 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 quantitative school achievement measures were: academic grade point average (GPA), personal responsibility GPA, social responsibility GPA, days absent, tardies, suspensions and discipline referrals.

Quantitative self-report measures included two computer-based, pre- and post-intervention surveys on (1) attitudes toward alcohol and marijuana, and (2) 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, marijuana and other drugs. 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 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 post-test alpha values of 0.70. The alpha values for the Other scale, which included the substantive content adaptations, were 0.59 for the pre-test and 0.71 for the post-test. Since the pre-test did not meet the 0.70 criterion, we analyzed the post-test data alone with independent-samples t-tests.

Qualitative measures. Qualitative process and outcome measures included direct observation and 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 rates. 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, LEP, gender, age 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.

Self-report data. During the Fall of 2003, as part of their regular school activities, students completed the two computer-based surveys described above, before and within two weeks after the eight-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, the site program facilitator, and technology staff. Site visits by Ripple Effects technology support person 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 post-intervention data with normal distribution (all three GPA measures), we ran independent-samples t-tests comparing the means of the treatment and control groups.

For administrative data factors with non-parametric distribution, such as absenteeism and discipline, we ran the same tests, but also the Games-Howell *posthoc* test for pair-wise comparisons. Severely unequal variances can lead to increased Type I or Type II error, and, with smaller sample sizes, this effect can be increased. Games-Howell corrections are used when variances and group sizes are unequal.

The set of control variables included ethnicity, gender, LEP, and Free or Reduced Lunch status, 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 (**s**tudy group) correction. For the Other RELC scale, since the pre-test did not meet the 0.70 criterion, we analyzed that post-test data alone with independent-samples t-tests.

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. These data were exported from each computer, with names decoupled from identifying numbers, and then data aggregated in centralized files. Dosage was calculated from the point count of each student's total number of completed interactive exercises, which, divided by an average completion rate of four per hour, resulted in per-student hours of exposure.

To see if the number of hours of exposure to Ripple Effects was associated with differences in outcomes, we ran bivariate Pearson product-moment correlations. In cases where there were pre-test data, we ran partial correlations on the post-test data that controlled for the effect of the pre-test covariate. For each set of correlations, we used the Bonferroni method to minimize the chances of making a Type I error. All means presented in the text and tables are the raw values unadjusted for the covariates.

RESULTS

Baseline Equivalence

Analysis of pre-test surveys indicated there was no unequivalence at baseline on any self-report variable (attitudes toward alcohol, marijuana, locus of control). Two years of effort to obtain baseline data on objective school outcomes ultimately failed for three reasons. The study began toward the beginning of the first year of operation for a charter school that started at 6th grade (the sample group), so there was no direct access to prior year school data. Many students were from families who were recent immigrants from Central America and Mexico for whom there was neither prior nor post documentation. The record keeping system for this new charter school could not be easily meshed with district level records, so students

who transferred from within the district could not be tracked.

Process Outcomes

Technology-related implementation issues. The laptop platform experienced multiple intermittent problems, and three laptops permanently failed, resulting in both delays, and reductions in access to the computers, for that group (the two advisories with male students). Due to these problems, we estimate males' access to the intervention being roughly 53% that of the females.[5]

Enrollment attrition. Two of the original 62 treatment group students moved, resulting in 3% enrollment attrition. Administrative post-intervention data were available for all 118 students who remained in the study.

Study attrition. Seven percent of treatment group and 10% of control group students did not complete pre-test surveys, while 17% of treatment and 10% of control group students did not complete post-test surveys. The electronic monitoring of program usage, coupled with reports by facilitators, enabled researchers to verify that no control group students had contact with the intervention.

Intervention attrition (non-compliance). Of the 60 students in the treatment group, 20% failed to comply with minimal requirements as described above. All 12 non-compliant students were in the boys' Advisories, where technology access was a problem.

Dosage. Among those who complied, the overall dosage rate for all treatment group students was 75%. Rates were bi-model, with the two computer lab groups (females) averaging 92%, or 40 tutorials (10 contact hours), and the laptop groups (males) averaging 57%, or 22 tutorials (5.5 contact hours). The standard deviation for dosage among males was five times that for females (SD = 10.3 tutorials for boys, 2 for girls). If dosage were

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[5] F = 6 weeks x 4 days x .75 hour/day = 18 hours possible access; vs. M = 4 weeks x 4 days x .75 hour/day = 12 hours possible, minus 20% for shared laptops (2.4 hours) = 9.6 hours total access, 53% that of F.

proportionate to estimated technology access for both genders, 53% of the mean dosage of females would result in 49% dosage for males, within the margin of error of their actual dosage.

Participation in self-selection option. One hundred percent of students who minimally complied with program requirements took advantage of the option to explore unassigned tutorials related to topics of personal interest to them.

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 22 key concepts, and an average of 32.

School achievement measures. As can be seen in Table 1, after controlling for race, gender, and SES, independent samples t-tests indicated significant positive differences in Social Responsibility (p<.01) and Personal Responsibility (p<.01) GPA in the treatment group, relative to the control group students. Treatment group students scored above a 3.0 benchmark, and control group students below. In Academic GPA, treatment group scores were higher, again with scores above 3.0, but the differences was not statistically significant. There were pronounced gender differences, with boys tending to have lower scores. Compared with control group students, Ripple Effects students had 32% fewer tardies, 40% lower absenteeism rates, and fewer suspensions, but none of these values were statistically significant. No statistically significant differences were seen between the two groups for discipline referrals; however, treatment group students had fewer discipline referrals in almost every category and 50% fewer referrals overall. Among treatment group students, referrals rates for fighting, threatening or swearing all were zero.

Table 1.
Differences in School Outcomes by Condition

Outcome	Treatment (N = 48)		Control (N = 58)		Difference	Cohen's *d*
	M	*SD*	*M*	*SD*		
GPA						
Academic	3.13	0.41	2.97	0.46	0.16	0.37
Personal Responsibility	3.13	0.44	2.72	0.49	0.40**	0.88
Social Responsibility	3.13	0.44	2.76	0.47	0.37**	0.82
Absenteeism	3%	5%	5%	6%	-2%	0.40
Tardies	1.08	1.82	1.59	1.86	-0.51	0.30
Suspensions	0.00	0.00	0.03	0.26	-0.03	0.20
Discipline Referrals	0.14	0.46	0.28	0.74	-0.14	0.20

Note: **$p < .01$

Table 2.
Pre- and Post-Scores and Differences in Changes in Perceptions of Risk and Norms about Alcohol and Marijuana, by Condition

REMTF Scale	Pre M (SD)	Post M (SD)	Change	Pre → Post Difference in Changes between Groups
Alcohol Norms & Risk				1.08
Treatment	15.50 (4.59)	16.92 (3.79)	1.42	
Control	15.43 (3.74)	15.77 (2.73)	0.34	
Marijuana Norms				-0.01
Treatment	7.82 (2.72)	8.18 (1.33)	0.36	
Control	7.40 (2.09)	7.77 (2.11)	0.37	
Marijuana Risk				-0.03
Treatment	9.39 (3.70)	9.71 (2.43)	0.32	
Control	9.28 (3.19)	9.63 (2.64)	0.35	

Notes: The sample consists of 38 students in the treatment group and 43 students in the control group.

Self-report outcomes. There were no statistically significant differences on either self-report measure.

There were only slight differences in norms and perception of harm about marijuana and alcohol. The treatment group had a greater gain in norms and perceptions of risk about alcohol than did the control group. Pre- and post-test norms and perceptions of risk for marijuana were similar for the treatment and control conditions, with a slight difference in score gains favoring the control group. None of these differences were significant. All values are reported in Table 2.

As can be seen in Table 3 on locus of control, (where higher numbers represent greater disagreement with the scale), treatment students were slightly more likely to attribute outcomes to Self than were the control students. They were also more likely to attribute outcomes to Fate than the control students. They were less likely than the control students to assume that outcomes were caused by Other people or structures (TG M = 34.85, SD = 5.90; CG M = 34.16, SD = 6.43). None of these results were significant.

Dosage effects. As reported in Table 4, there were no significant correlations between dosage and outcomes at the .002 level. Visual inspection of the data indicated a negative dosage-correlated trend for GPA. Those rates almost completely overlapped participation by gender, which in turn was highly correlated with access to the technology.

Qualitative Data: Staff Reports

The non-professional implementers (janitor, cafeteria aide, school secretary and volunteer) reported that they felt empowered to be able to deliver important content without personally having mastered it, and that they learned just by proximity to it. One said it was "like winning the lottery, but a lottery of wisdom." She described it as "very easy to monitor," and felt able to help her advisees solve problems by reminding them of what they had covered in the software, and by pointing them back to it as issues arose. Another implementer said that "If I had [it] when I was a teen, my life would be different."

They indicated their only implementation problems were technology ones, with the laptops being problematic at every step. The student groups using the laptops (males) had a month-long, technology-related delay at the beginning of the study, and both groups had a two-week interruption during the intervention period due to school testing. This meant that students in the laptop group (the boys) didn't use the program for weeks at a time. The boys also had to share laptops, creating competition for resources. Compliance and dosage data indicated the net effect of that situation was greatly unequal access to the intervention for different boys in the treatment groups, and between boys overall and girls overall.

Table 3.
Pre- and Post-Scores and Differences in Changes in Self and Fate Locus of Control by Condition

	Pre	Post	Pre → Post	
	M (SD)	M (SD)	Change	Difference in Changes between Groups
Internal-Self				-0.40
Treatment	25.17 (5.08)	25.49 (4.98)	0.32	
Control	26.24 (5.35)	26.96 (5.05)	0.72	
External–Fate				-3.15
Treatment	36.76 (7.70)	36.54 (7.58)	-0.22	
Control	34.33 (7.52)	37.26 (6.44)	2.93	

Note: The sample consists of 41 students in the treatment group and 46 students in the control group.

Table 4.
Correlations Between Dosage, GPA, Absences, Tardies, and Suspensions

	GPA		Absences		Tardies		Suspensions	
	N	r	N	r	N	r	N	r
RE Group	48	0.29	49	-0.04	49	0.08	49	a

a: Value could not be computed because at least one of the variables is missing or constant

Six-Month Follow-up

Despite two years of efforts, we were unable to obtain quantitative follow-up data for this school. We were able to obtain qualitative data, through six-month follow-up interviews with the principal, staff, and students. Students suggested they liked the software and had experienced positive and continuing benefits. Comments included: "It really showed me another person inside of me that I don't use much. Respectful." "It changed my learning disability." "I help other people. Before, I wouldn't care. I would just care about myself." "My attitude changed. I just feel more responsible." Several noted that seeing many different kids like themselves but slightly older, and seeing true story videos told by peers, were key to their identifying with the program. They also mentioned liking the games and the learning styles profile.

Several students interviewed by a local television station cited positive self-efficacy effects. One girl cited success in dealing with an issue of sexual harassment. One boy cited success in learning to manage his anger. The principal described the program as an empowering tool for these students, allowing them to "broach these subjects without having fear, or having to speak to an adult, and they can actually walk through some really positive steps and solutions."

DISCUSSION

Significance

This study is significant because it was a real world test of the impact of separating content expertise from service delivery in an area that has become increasingly important to educators and policy makers: the development of social-emotional abilities as a means to improve school climate, narrow the achievement gap, and reduce disproportionate discipline among Latino and African American youth.

In this context, a clinically important finding from this study is that non-professional implementers were able to ensure at least minimal exposure to an evidence-based intervention for 80% of all students. This is a much higher rate of implementation fidelity than has been shown with many analyses of live interventions (Fixsen et al., 2005). It is likely that it would have been even higher, if sufficient technology had been available for every boy to have equal access.

Because this study was part of a series of NIDA-funded studies undertaken concurrently on the impact of Ripple Effects software as a preventive intervention, we adopted null hypotheses that fit the more common school condition of implementation by educational professionals. Rather than simply mitigating the difference between professional and non-professional advisors, the intervention had to show significantly better comparative results to meet the test of effectiveness.

The intervention met that standard in two important areas: GPA for Personal Responsibility and GPA for Social Responsibility. The objective rates of lower discipline referrals confirm subjective appraisal by teachers of students' behavior. Treatment group students had fewer discipline referrals in almost every category and 50% fewer referrals overall. For several categories of discipline referrals, the rate of incidence fell to zero in the treatment group. Since rates of the control group were also low, the only way those differences could conceivably have been significant is with a much larger sample group. This markedly better conduct is not only a protective factor for these particular students, but for their peers and teachers as well. It contributes to a more positive school climate for all and more classroom time available for instruction for each student.

The trends toward overall higher academic GPA scores and lower absenteeism rates are consistent with other research on the correlation between social-emotional learning and GPA (Zins et al., 2004). The higher grade point correlated with use of this software program (3.13 vs. 2.97), although representing a small increase, has practical significance. It puts treatment group students over the 3.0 GPA threshold. In California, for example, students

who maintain a minimum 3.0 GPA are guaranteed a place in the California State College System. This has implications for the Latino and African American students studied here, most of whose parents have not completed high school, let alone college. Currently Latino students represent 60% of the dropout student population in California, where one-eighth of all U.S. students are educated.

There are several plausible hypotheses for the treatment group's slightly lower perception of harm of marijuana. Media analysis exercises, which were available in the intervention, may have caused students to pay more attention to the substantial, positive media attention during the intervention period about legalized medical use of marijuana. The development of critical thinking skills may have led to independent assessment of lesser harm by treatment group students. Empathy training may have reduced social disapproval in general. The four tutorials that directly addressed harm and norms about alcohol and marijuana (one contact hour) may simply not have been enough to make a difference. No conclusions can be drawn.

Evidence that the Ripple Effects training software had no significant effect on locus of control, and may have actually increased attribution to fate, while behavior and grades still improved, although not statistically significant, deserves further exploration. Staff at this school had identified fatalistic attitudes as contributing to lowered achievement among their population of Latino students. The configuration of Ripple Effects for this study was designed to promote self-efficacy. Fate was addressed in a specific tutorial. Students who were interviewed reported feeling like they had more control over their reactions to adverse events, from being taunted about academic achievement, to being sexually harassed. Yet they persisted in attributing life events to fate, even while control group students reduced their attribution to fate. It is possible that the fate tutorial sensitized these students, many of whom are classified as illegal immigrants, to how much their life circumstance is the "luck of the draw," *and* helped promote the understanding that they can control their

reactions to external events, even when they cannot control the events themselves. It may have increased a sense of self-efficacy specific to the school environment, without resulting in a greater generalized sense of control. Again, more study is needed.

We chose to allow non-professional staff similar latitude in choosing among evidence-based practices, as trained teachers had in their advisory periods. For these non-professional implementers, this consisted of assigning a subset of 21 tutorials of their choice, based on their understanding of their students' needs. This policy was consistent with best practices for community-based research and with social-marketing theory about what can create buy-in among implementers. The addition of the sexual harassment tutorial to the curriculum for one group of girls was an example of how they exercised that discretion (see Appendix A for options exercised). Based on student reports, it appears these implementers' instincts were good and those choices had positive effects. However, in combination with the small sample size, this flexibility with content choices prevented us from being able to conduct componential analysis of effects that may have been linked to those smaller-group content choices, or to personal choices students made, outside the core curriculum.

Study Limitations

Lack of baseline data. Without prior year school outcome data, it is impossible to confirm that the groups, though randomly assigned, were equivalent at baseline; it is possible that the differences in outcomes can be attributable to starting differences.

Attrition bias. Twenty percent of the male students did not have minimal exposure to the intervention, and so were excluded from analysis of efficacy. While this is considered a low attrition rate, it is markedly higher than the rate for girls, which was zero. It is possible that students who were not exposed were lower performing students overall and thus indirectly boosted the average performance for the treatment group. However, since the trend is toward an inverse relationship between male

students' exposure and GPA, it is at least equally likely that the opposite is the case. That is, that less aggressive, more compliant boys (who tend to do better in school) were denied access to a scarce resource by their more aggressive peers, and treatment group intervention effects were dragged down, not boosted, by their lack of participation.

Generalizability

This study indicates the effectiveness of a particular configuration of a computer-based intervention (Ripple Effects) with a particular, multi-award-winning learning system, and a library of content that had undergone three separate expert reviews and substantial adaptations based on them. Results cannot automatically be generalized to other computer-based programs, or to situations where use is unmonitored or entirely a matter of student choice.

The study was conducted at a *de facto* ethnically segregated school, among mostly Latino students with multiple risk factors. The implications of these findings cannot automatically be extended to all students. It has greatest relevance for those schools and districts that have large Spanish-speaking populations, persistent, disproportionate representation of Latino and African American students in disciplinary actions, or persistent gaps in academic achievement between these students and their Caucasian and Asian American counterparts.

CONCLUSION

The school in this study was most interested in the question, "Would use of Ripple Effects software as a group-level, targeted intervention be a cost-effective way to neutralize the presumed disadvantages of having untrained, non-professionals fill in for qualified teachers during advisory period?"

Evidence described here, where not one of seven objective measures of effectiveness indicated negative effects from that condition of use, indicates the answer to that question is "yes." The significantly higher grades for personal and social responsibility, and meaningfully higher academic grades and lower discipline referrals suggest that self-regulated, computer-based training not only mitigated potentially negative outcomes for students who had non-professional advisors, compared with their peers who had live SEL instruction, but may have actually conferred positive advantage.

The latter evidence is surprising on its face. Nonetheless, it is consistent with results from the first real world, randomized controlled pilot trial of the Ripple Effects intervention in New York City, where students who used the program on their own had twice the level of observed, positive behavioral effects as their peers who had the program with the addition of adult mediated discussion and role play sessions once a week (Stern & Repa, 2000).

These results suggest that the capacity to deliver an effective, scalable, sustainable SEL intervention with fidelity may be within the reach of resource-poor schools and community-based programs, which can afford neither to hire mental health professionals, nor to provide the extensive teacher training needed to implement social emotional learning interventions with full fidelity to science. A much larger group of people, with less training than previously had been believed, may be effective implementers of primary, secondary or tertiary preventive-intervention programs. This suggestion of great promise is not its proof, but contributes to a mosaic of understanding that is beginning to emerge about the potential—and limitations—of Ripple Effects software as an adaptable SEL intervention to promote school achievement.

APPENDIX A

Universe of 41 Tutorials Selected by School Staff

21 Strengths Tutorials	20 Challenge/Problem Tutorials
being courteous	angry
being happy	anti-depressants
choosing friends	change
experimenting	cigarettes
compliments	crack, cocaine
confronting behavior	dating abuse
getting help	defiant
giving help	disputes
joining a group	disrespectful
making apologies	drug dealing
making decisions	ecstasy
options	family background
people smarts	fighting
perspective taking	hate crimes
predicting consequences	racial conflict
showing care	sexual harassment
standing up for beliefs	stress
stopping reactions	success-phobia
understanding feelings	teacher conflict
values and beliefs	trauma
what you love	

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