

# Evidence of Effectiveness Implementation Fidelity

*Ripple Effects Whole Spectrum Intervention System*



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# Adaptation and Fidelity with a Computerized Social-Emotional Learning Intervention Across 50 Real-World Settings

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## ABSTRACT

Nine experimental studies (seven randomized controlled trials, two quasi-experimental), examined how real-world content adaptations of a computerized, self-regulated, social-emotional learning (SEL) intervention have been made at primary, secondary and tertiary levels, and how those adaptations correlate with student outcomes. Content adaptations were in the form of selection patterns, rather than changes to core messages or training strategies, which were set in the software intervention. Quantitative data included computer-generated reports of student usage, computerized self-report surveys, and school district administrative records. Qualitative data was compiled from interviews with a range of participants. For group level, primary intervention (n=154), two different sequences of the same group of tutorials, both resulted in increased resiliency assets for each treatment group, compared to control groups. At the secondary level of targeted prevention, in six simultaneous RCTs (n= 605), six different sets of tutorials, with 45% overlapping content, yielded significantly higher academic grades in four of the six ( $p < .01$ ), and for the six overall ( $p < .05$ ). The different configurations yielded at least one additional, significant positive effect for each study. At the tertiary level, in a quasi-experimental study (n=163), students with multiple risks for gang involvement, school failure, and trauma, covered lessons related to personal strengths, and risk factors. Rates of self-reported depression declined from pre to post ( $p < .01$ ). In a second quasi-experimental study, (n= 3,685) students privately addressed dozens of risk factors. Administrative data indicated that across all grades from first to fourth quarter, referrals to in-school suspension declined by 28%. These findings suggest that different sets of group-level configurations and idiosyncratic, personal content choices of the Ripple Effects intervention can all yield positive results. It does not allow the conclusion that exposure to *any* configurations will result in positive outcomes.

**KEYWORDS:** adaptation with fidelity, implementation fidelity; computer-based social-emotional learning

## BACKGROUND

Research has shown that adaptation with fidelity is a key element in both effectiveness and sustainability of prevention programs (Backer, 2001). However, there is not consensus among researchers and practitioners about the definition of fidelity (Brounstein, Gardner & Schinke, 2003; Dane & Schneider, 1998; Fixsen, et al., 2005, Mihalic & Irwin, 2003). Program developers, many in university

research environments, frequently equate fidelity with “integrity.” They mean that the intervention is implemented in full, in the way program developers intended. However, practitioners just as frequently argue that what gives real integrity to an intervention is adaptation to specific conditions, with specific populations, and unique individuals within those populations, rather than the imposition of cookie-cutter sameness.

Adaptation and fidelity apply both to content and processes. Advances in computer technology over the last fifteen years allow greater standardization of – and thus fidelity to – evidence-based content than ever before. A plethora of information-centric, computer-based, health-related programs are now available, most over the Internet (Andersson, et al., 2005; Bosworth, et al., 1994; Carlbring et al., 2005; Christensen et al., 2004; Clark et al., 2005; Ybarra et al., 2005; Zabinski et al., 2003). However, standardization of information often comes at the expense of capacity for adaptation. It is hard to find pre-configured computer programs that allow adaptation of informational content at both the level of the individual and the group. As importantly, information, by itself, has consistently been shown NOT to change behavior.

Adaptation of teaching and learning processes without loss of fidelity is a much more difficult challenge, especially with social-emotional learning (SEL). The range of teaching/learning methods that have been shown to be effective include cognitive-behavioral training (Botvin et al., 1990; Butler et al., 2006; Ellis et al., 1994; Kendall & Braswell, 1982), social skill training (Bandura, 1977, 1986, 1997; Wilson & Lipsey, 2007; Zins et al., 2004), mindfulness (attention focusing) training (Napoli et al., 2005; Singh et al., 2007; Zylowksa, et al., 2008), affective training and narrative (stories) (Coles, 1989; White & Epston, 1990; Barry & Elmes, 1997; Fogg, 2003); modeling (Bandura, 1977, 1986); rehearsal (Yablonskey, 1976; Bandura, 1986, 1997); transfer training (Yablonskey, 1976; Richey, 1992; Gambrill, 1997); journaling (Progoff, 1980); media analysis (Carr 1990; Weinstein, 1997); private counseling (Wilson & Lipsey, 2007), case study with discussion (Kolb, 1984; Benard, 1991; Rees & Porter, 2002) and interactive games. Most computerized interventions have proven more able to ensure informational integrity, than to ensure fidelity to this range of proven instructional processes. Few address individual learning differences. None enable personalized matching of the right strategies, since not all strategies work with all

students. The challenge is matching the right strategy, and the right teaching method, to each student's needs and abilities.

One computer-based intervention, Ripple Effects, claims to be adaptable, in terms of both content and process – without loss of fidelity either to evidence-based content, or to proven effective learning processes. Ripple Effects is a comprehensive, computerized, SEL and problem-solving intervention. Developed by the originator of a clinically validated, model, live (teacher delivered) intervention<sup>1</sup>, Ripple Effects was designed specifically to: (a) reduce instructor-related loss of fidelity in both content and process, regardless of cause; (b) increase adaptability to site-specific needs, constraints, resources and opportunities; (c) increase capacity to match targeted interventions to individuals with specific risk factors; (d) ensure greater cultural competence across diverse settings; and (e) enable currency with a constantly changing knowledge base about valid strategies and evidence-based practices.

The key to Ripple Effects adaptability lies in seven things: (a) a comprehensive library of more than 10,000 screens of evidence-based, instructor-independent, media-rich content; (b) “granular” modularity that allows the content components to be mixed and matched, with millions of possible combinations; (c) an expert system that prescribes and automatically dispenses the most relevant, evidence-based strategies to each user, based on their content choices; (d) A *Whole Spectrum Learning Platform*, that makes a whole spectrum of methods of learning available all of the time, to every student, regardless of topics chosen; (f) a data management system that allows administrators to block content to match local mandates, and track student usage; (g) built-in

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<sup>1</sup>Program author, Alice Ray, was also the originator of *Second Step*, a model live instruction program. Like other instructor-delivered programs that require significant time investment and a preset scope and sequence, *Second Step* is often not implemented according to standards. Up to 70% of the time, it may end up on the shelf within three years of first use, which itself may be at least a year after adoption (Ray, 2008).

cultural competence, through inclusion of diverse multicultural images, diverse peer voices for narration, and explicit lessons related to ethnicity, class, gender, sexual orientation, religious differences, disabilities and social justice; and (h) staff training software with the same information and navigation structure, but different Graphical User Interface (look and feel) as the student program<sup>2</sup>.

The Ripple Effects computer-based SEL program is being used in more than 500 school districts, juvenile justice and community-based organizations across the United States, and in Canada, and the Caribbean. During the period from 2003 through 2008, nine studies (seven randomized, controlled trials, and two quasi-experimental, longitudinal studies) involving a total of 4,700 students have examined the impact of this program on attitudes, mental states, core social-emotional competencies, and school outcomes, including grades, behavior and absenteeism. Taken together, these studies demonstrated effectiveness in producing positive outcomes under various specific conditions of use, at three levels of intervention: primary, secondary and tertiary.

## METHODS

### *Research Design*

The purpose of this paper is to examine how the process of adaptation through custom configuration has worked in the real world. In particular, we will examine (a) What real world content adaptations have been made at group and individual student levels, and (b) How those content adaptation have affected student outcomes.

We draw on both objective and subjective, qualitative and quantitative data and analyses to address these questions. Quantitative data includes computer-generated reports of student

usage, and pre- and post self-report survey results, as well as school district administrative records for absenteeism, discipline referrals, suspensions, In-School Suspensions (ISS), and GPA.

### *Settings*

Fifty-one diverse real-world school settings included: urban, rural, and suburban; east coast, west coast and deep south; traditional, charter, alternative, and continuation; elementary schools, middle schools and high schools; in academic, advisory, counseling, discipline and computer-lab settings; with teachers, counselors, social workers, college intern and non-professional school staff (facilities manager, secretary, cafeteria aide, volunteer) as implementers.

### *Intervention*

Ripple Effects was used as either a freestanding and/or a supplemental, student-regulated, computerized, SEL intervention in all nine of the studies discussed here. In no two of these studies was the configuration of Ripple Effects exactly the same. In every case, the program was adapted to fit specific site, program, group and individual needs, opportunities, and constraints. For purposes of clarity, description of adaptations of Ripple Effects are divided into primary, secondary and tertiary applications.

### *Measures and Data Collection*

Eight of the nine studies carefully documented recommended group-level scope and sequences and individual content choices<sup>3</sup>. They described: (a) The breadth of site-specific, group level adaptations of content scope and sequences; (b) The breadth of individual level content choices; and, (c) Compliance rates and dosage effects. Qualitative data was compiled from interviews with teachers, counselors, non-professional implementers, school and district level administrators, and a sample of students. It

<sup>2</sup>The staff training software was developed after completion of several of these studies, in response to findings about factors in non-compliance, and to meet training demands in response to interest in scaling up in some of the largest school districts in the United States.

<sup>3</sup>The ninth study documented group level choices, but not individual ones.

includes records of adopted scope and sequences in eight of the nine studies and records of individual content adaptations for more than 4,400 students across 50 of the 51 schools, in eight of nine studies.

#### *Methods of Analysis*

In six of the studies, for all data with post-Ripple Effects values only (e.g., GPA, absenteeism, discipline referrals), independent-samples t-tests compared the means of the treatment and control groups. For all data with pre and post values (e.g., norms and risk of alcohol and marijuana scales, locus of control scales, and school data in one study), repeated-measures ANOVAs with a between subjects factor (study group) were used. For six of those studies where sample sizes were small, and the variances were unequal, Games-Howell posthoc corrections were used.

## RESULTS

### *Adaptation as a Primary Intervention*

*Study overview.* In 2005-2006 school year, in a northern California suburb, 154 students from two middle schools participated in a study of the effectiveness of Ripple Effects as a tool to develop resilience. By mutual agreement with WestEd (the researchers), Ripple Effects, and school staff, the scope of content covered was just 42 of 390 available tutorials (about 12 contact hours). As can be seen in Table 1, selected tutorials specifically addressed factors that research has shown are components of resilience: autonomy, social competence (empathy and connectedness) and problem solving (Benard, 2004).

Table 1. *WestEd Study Tutorials*

A strong and healthy sense of self	Social Competence	Problem solving
<b><i>Autonomy</i></b>	<b><i>Empathy</i></b>	32 problem-solving
Self-awareness	20 empathy	33 resolving conflict
1. strengths	21 perspective taking	34 brainstorming
2. risk and protection	22 showing care	35 cause and effect
3. learning style	23 paraphrasing	36 teacher
4. feelings-names for		
5 physical sensations	<b><i>Connectedness</i></b>	<u>Suggested topics</u>
Self-management	24 joining a group	37 testing
6 controlling impulses	25 conversations	38 bullied
7 stopping reactions	26 appreciating diversity	39 sexually harassed
8 internal triggers	27 helping others	40 solidarity-showing
9 outside triggers	28 friends-choice of	41 change-normal
10. relaxing	29 respect - showing	42 resisting pressure
Self-efficacy	30 responsibility	
11 control-taking	31. getting help	
12 assertiveness		
<b><i>Sense of purpose</i></b>		
13 motivation		
14 future not there		
15 setting goals		
16 success-phobia		
17 luck		
18 effort		
19 resilience		



*Adaptations to sequence of topics.* The sequence (as opposed to scope) of the common tutorials was decided at each school level, and did not match between schools. At both schools, students were allowed to use whatever modes of learning they preferred, with the only requirement being that they complete the

interactive (core) components. This represented only three of the 12 possible modes of learning for each lesson. In addition, students were able to privately explore other topics as they chose, time permitting. The total number of topics for which interactive elements were completed was 42.

Table 2. *Sequence for WestEd Study Site #1*

Session	Lesson A	Lesson B	Lesson C
1	learning style	teacher	empathy
2	strengths	helping others	solidarity (bystander)
3	risk & protection	problem-solving	respect – showing
4	feelings-names	perspective taking	sexually harassed
5	motivation	future (not there)	setting goals
6	luck	success-phobia	effort
7	controlling impulses	stopping reactions	cause and effect
8	physical sensations	internal triggers (self talk)	outside triggers
9	showing care	brainstorming	resolving conflict
10	control-taking	assertiveness	assertiveness – cont.
11	resilience	getting help	change-normal
12	testing	relaxing	paraphrasing
13	resisting pressure	bullied	joining a group
14	conversations	appreciating diversity	friends-choice
15	responsibility	<i>student choice</i>	<i>student choice</i>

Table 3. *Sequence for WestEd Study Site #2*

Session	Topics	Session	Topics
1	a learning style b feelings-names for c teacher	2	a strengths b risk & protection c resilience
3	a motivation b future (not there) c setting goals	4	a success-phobia b luck c effort
5	a controlling impulses b cause and effect c stopping reactions	6	a internal triggers (self talk) b outside triggers c authority-dealing with
7a	a control-taking b assertiveness c assertive eyes	7b	assertive message assertive posture assertive reasons assertive voice
8	a empathy b perspective taking c solidarity	9	a showing care b paraphrasing c conversations
10	a appreciating diversity b respect – showing c friends-choice of	11	a problem-solving b brainstorming c bullied
12	a responsibility b resolving conflict c resisting pressure	13	a helping others b getting help c sexually harassed
14	a change-normal b joining a group c <i>student choice</i>	15	a physical sensations b relaxing c testing

*Impact of adaptations on outcomes.* Across both schools, the treatment group showed significantly higher mean scores than the control group from pre- to post-test on two resiliency assets: empathy and problem-solving. From pre-test to post-test, treatment students showed gains in mean scores on 67% of the items, as opposed to control students who showed gains on 33% of the items. Control students had lower mean post-test scores on 67% of the items, whereas treatment students showed lower mean post-test scores on 33%. The control group had significantly higher mean scores than the treatment group on one resiliency asset – connectedness. There were no significant gains or losses in mean scores for resiliency assets from post-test to follow-up, possibly indicating that students maintained their post-test gains.

The unexpected finding that control students had significantly higher mean scores on connectedness was initially surprising. It is possible that this finding can be explained as the result of the treatment groups' increase in empathy, which could improve relationships with control students, resulting in their feeling more connected. However, further study would be necessary to fully understand this interesting finding.

Grade point averages were collected at the beginning and end of the study. Although mean grade point averages increased for treatment students and remained virtually the same for control students, the differences were not statistically significant. Analysis of data on absences, tardiness, suspensions and discipline referrals revealed no significant differences between treatment and control groups in mean numbers of incidents of absences, tardies, suspensions, or referrals. Treatment group students had higher rates of excused absences than control group students at follow-up.

Teachers reported during interviews that behavior and attitudes of students in the treatment group seemed to be improving, and one principal reported that behavior for the 6<sup>th</sup> grade class as whole was better than at any time in her memory. Prior year administrative data

could have confirmed or corrected teachers' and principal perceptions, but it was not available.

#### *Adaptations as Secondary Prevention*

*Six randomized controlled trials.* From 2003- 2008, a series of six, concurrent studies examined the impact of Ripple Effects on internal and external outcomes, among groups of students who all had multiple risk factors for school failure. In each case, use of the intervention was aimed toward the same objective outcomes: higher grades, and reduced discipline problems, absenteeism, tardies, and suspensions. Implementers in all six studies agreed that distal outcomes of increased norms and perceived risk of alcohol and marijuana, as well as stronger locus of control, might be mediator of those outcomes<sup>4</sup>, and agreed to address those mediators in a scope and sequence.

*Adaptations in both scope and sequence of lessons.* At orientation sessions in spring of the school year prior to implementation, staff at each study site expressed different perceptions of the "mediators of the mediators." These perceptions were partly dependent on whether their students were rural or urban, African American, Latino or Caucasian, middle schoolers or high schoolers, and/or whether those students had already experienced serious school failure, or were simply at high risk of such failure. Some of the factors which they felt were important, such as fear of success, unworthiness, and a foreshortened sense of future, had not initially been in the program. Along with the addition of many individual risk factors, which had been recommended by an expert panel of reviewers, content suggested by these staff members, was added, before the implementation test began.<sup>5</sup>

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<sup>4</sup> Consistent with research on self-efficacy (Bandura, 1997), and risks associated with substance abuse (Hawkins, et al., 1998; Wilson, Lipsey & Noser, 2007).

<sup>5</sup> Ideally, adaptation is a three way process. The wisdom at the base of the community, as well as scientific evidence from the top of the ivory towers,

Staff from each school agreed to a core curriculum of 21 tutorials recommended by Ripple Effects, which could be completed in slightly more than five hours over eight weeks. In addition, each school also added 21 more recommended tutorials (their site-specific adaptation) out of 158 that were available, for a total of 10.5 to 14 contact hours, depending on student pacing. Ripple Effects provided a suggested list of fifteen tutorials for schools to pick from.

Since students across these schools shared many risk factors, a reasonable hypothesis would have been that separate groups of educators at separate study sites, would independently arrive at similar conclusions about which tutorials would best serve the needs of their students. Especially given that they were provided with a list of fifteen to draw from in selecting their own topics. In fact the opposite was true. Of 158 possible content choices, **none was chosen by staff at every school**. One was chosen by staff at five of the six schools: disputes. Four were chosen by staff at four schools: showing care, teacher conflict, disrespectful, and peer pressure. Eleven topics were chosen by three schools, 20 tutorials by two schools, and a full 44 by only one school of the six. The six schools chose a total 80 different topics beyond the core required ones. This degree of difference in adaptation was one of two reasons that what we had originally envisioned as a single multi-site study, had to be broken into six smaller ones.<sup>6</sup>

*Impact of group-level content adaptations on outcomes.* Every school, regardless of content adaptations, had positive outcomes. Most had more effect on distal outcomes that schools had identified as important, than proximal outcomes that the funder (National Institute on Drug Abuse) was most interested in.

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inform continuous adaptation of content by developers. The revised (developer adapted) content increases capacity for more refined, further adaptations by users.

<sup>6</sup> The other reason was irreconcilable differences in methods of data collection.

Overall, treatment group students in these studies had significant increases in GPA,  $p < .01$  (Perry et al., 2008). Schools that kept suspension records had significant reductions in suspension,  $p < .05$  (Perry et al., 2008). Across schools, there were meaningfully lower, but not statistically significant scores for total discipline referrals. Which discipline categories had decreased instances, differed by school and were related to content choices. For example, the school that had identified cursing as a problem and adapted content to include that tutorial saw reduction in cursing (Bass et al, 2008). Schools that had identified defiance as the problem, saw meaningful differences in defiance scores (Bass et al, 2008). Where alcohol use was the biggest issue, norms against alcohol went up  $p < .05$  (Bass et al, 2008). Where deportment was a school value, grades for personal and social responsibility went up significantly (Perry et al., 2008).

#### *Adaptations for Tertiary Intervention*

In four studies, Ripple Effects computerized SEL training was used as a supplemental, tertiary intervention with students who had already experienced school failure and/or been referred for disciplinary problems.

#### *Group-level tertiary intervention*

In a quasi-experimental study of group-level, tertiary intervention (Koffman et al., 2008), Ripple Effects, facilitated by college interns, was used as a psycho-social component of a comprehensive gang prevention program (Juvenile Intervention and Prevention Program, JIPP), that also included bio-behavioral, parent training, and academic components. Participants were youth with at high risk of gang involvement and school failure. Unlike other configurations examined here, the JIPP staff supplemented the computer-based intervention with brief adult-facilitated discussions. JIPP staff selected and configured topics to address two major themes: empowerment (weeks 1-6) and leadership (weeks 7-12) (Table 4).

Table 4. 12-Week *Scope and Sequence for LAUSD/JIPP Intervention*

Week	Main Tutorials	Supplemental Tutorial
1	Learning Styles, Strengths	Temperament
2	Beliefs, Smarts, and Feelings	knowing yourself
3	Understanding feelings, Motives-understanding, and Stereotypes-resisting	
4	Assertive message, Communicating feelings	Peer pressure
5	Problem-naming, Problem-solving	Options-weighing
6	Authority-dealing with, Institutional injustice,	Intolerance
7	Responsibility, Respect	Making an Apology
8	Resolving conflict, Justice	Confronting injustice
9	Prejudice, Discrimination	Racial conflict
10	Making things right, Reconnecting with others	Finding power
11	Ethnic pride, Cultural differences	Identifying with others
12	Respecting authority, Citizenship	Community resources

Table 5. *Mean Score Differences from Entry to Exit on the Beck Depression Inventory*

Cohort	Entry			Exit			Difference	t-statistic
	n	M	SD	n	M	SD		
Cohort 3	37	18.59	11.09	19	10.47	9.77	-8.12*	-2.81*
Cohort 4	32	14.19	10.29	20	10.05	10.22	-4.14	-1.42
Cohort 5	73	14.52	9.25	43	11.12	11.26	-3.40	-1.68
Cohort 6	21	14.52	9.00	15	11.40	10.38	-3.12	-0.94
Cohorts 3-6	163	15.38	9.93	97	10.81	10.48	-4.57*	-3.46*

Note: \*  $p < 0.01$ .

Scores on the Beck Depression Inventory indicate the following: 1-10: "Normal," 11-16: "Mild Mood Disturbance," 17-20: "Borderline Clinical Depression," 21-30: "Moderate Depression," 31-39: "Severe Depression," 40: "Extreme Depression."

#### *Impact of JIPP adaptation on outcomes.*

Effects on one psychological measure, depression, were positive (Koffman et al., 2008). There was a decline in average Beck Depression Inventory scores between students who were tested at entry and students who were tested upon exit of the program. Average scores declined for each individual cohort; however, only cohort three exhibited a difference that is statistically significantly different from zero (Table 5). The intervention also resulted in statistically significant score decreases for all cohorts combined. Prior to the

intervention, the average cohort three student was evaluated as experiencing "borderline clinical depression." After completing the program, the average cohort three student was assessed as having a "mild mood disturbance." The decline in scores for the other three cohorts ranged between 22 and 29 percent. The overall effect on all cohorts was a decline of approximately 30 percent. Academic and disciplinary outcomes were also positive, however they could not be attributed exclusively to Ripple Effects, and were not analyzed for significance.

*Individualized Tertiary Intervention*

In one study, involving 3,685 students at 40 schools, Ripple Effects was used as an individualized disciplinary intervention. This intervention occurred in the counselors office, or in in-school suspension (ISS) settings. For first time disciplinary offenses, students were required to complete a single 45 minute training intervention matched to one of 36 disciplinary offenses. Separate tutorials addressed all 29 offenses that accounted for 99.5% of discipline referrals. Students who had been referred to In-school suspension (ISS) for more serious or repeat offenses, were instructed to both complete the offense-related tutorials *and to* privately explore tutorials related to underlying reasons for that behavior.

The breadth of issues that students privately addressed covered 64 different topics, and

included more than 20 risk factors (Table 6). Of the top 25 topics that were explored, for each group, about one third had to do with their specific offense, one third were personal risk factors in any of six domains, and about one third were tutorials to build strengths in core social-emotional competencies that could help prevent further misbehavior and/or develop resilience in the face of adversity. In general, younger children pursued internal emotions, such as fear or anger, and very individual risk factors, such as bedwetting, and child abuse. Middle and high school students also pursued topics related to emotions of fear and anger, but were more interested in the context of relationships. For adolescents, dating abuse was a more common selection than physical abuse by a parent, though students in both groups pursued the topic “beaten.”

Table 6. *Top Topics Addressed Over Three Years of Individualized, Tertiary Intervention, by School Level*

#	Lesson	Elementary	Middle	High
1	<b>Abstinence</b>		✓	✓
2	<b>Abuse-Boyfriend/Girlfriend</b>		✓	✓
3	Acne		✓	✓
4	<b>Addicted</b>		✓	✓
5	<b>Addicted/alcoholic Parent</b>	✓	✓	✓
6	<b>Afraid</b>	✓	✓	✓
7	Aggression		✓	✓
8	<b>AIDS</b>		✓	✓
9	Alcohol	✓	✓	✓
10	<b>Angry</b>	✓	✓	✓
11	<b>Anti-depressants</b>		✓	
12	Making apologies	✓		✓
13	<b>Ashamed</b>	✓	✓	✓
14	Asking questions		✓	
15	Assertiveness	✓		
16	Attendance	✓	✓	✓
17	Attention problems	✓		
18	<b>Background</b>	✓		
19	<b>Beaten</b>	✓	✓	✓
20	<b>Bed Wetting</b>	✓		
21	Being Courteous			✓
22	Being Funny		✓	✓
23	Blurting Out		✓	✓
24	<b>Body Image</b>		✓	✓
25	Brainstorming Options	✓		
26	Breaking Rules	✓	✓	✓

#	Lesson	Elementary	Middle	High
27	<b>Bullied</b>	✓		
28	Bullying		✓	
29	Character	✓		
30	Controlling Impulses	✓		✓
31	Cursing	✓	✓	
32	Dealing With Authority			✓
33	<b>Death</b>	✓		
34	Disrespectful		✓	✓
35	Drugs	✓		
36	Fighting	✓	✓	✓
37	<b>Future Not There</b>		✓	✓
38	Getting Help		✓	✓
39	Getting Respect		✓	
40	Grades	✓		
41	Hitting	✓		
42	Honesty	✓		
43	Ignoring Things		✓	✓
44	Learning style	✓	✓	
45	Making Decisions		✓	✓
46	Managing Feelings	✓	✓	
47	Marijuana	✓	✓	✓
48	<b>Parenting-Teen</b>		✓	
49	People Smarts		✓	✓
50	Predicting Consequences		✓	✓
51	Problem-Solving	✓		
52	Relaxing	✓		
53	Resisting Pressure		✓	
54	Respect-Showing	✓	✓	
55	Self-Esteem		✓	✓
56	Setting Goals		✓	✓
57	<b>Sex-Safe</b>		✓	✓
58	Sexual Harassment		✓	✓
59	<b>Sexual Orientation</b>		✓	
60	<b>Sexually Abused</b>		✓	
61	Stealing	✓		
62	Stopping Reactions		✓	✓
63	Talking Back	✓	✓	
64	Teacher Problems	✓	✓	✓

**NOTE: Risk factors** are in bold.

*Impact on outcomes with tertiary, individualized configurations.* Regardless of which personal risk factors were addressed, group-level impact was positive. This self-regulated, personalized use of Ripple Effects resulted in the following effects among students who had been subject to disciplinary sanctions: (a) 28% decrease in discipline referrals from fall

to spring (normally a time when discipline referrals increase dramatically) in Year 1, and a 5% increase in year 2; (b) a reduction in repeat referrals to ISS, from fall to spring, normally a time when trends are in the opposite direction (30% year 1, 26% year 2); and (c) An increase in out of school suspension rates from fall to spring. Because there was no prior year

baseline for comparison, there was no way to know whether this represented negative, neutral, or positive findings. It followed the normal fall to spring trend, but may represent either a higher or lower rate of increase.

#### *Unplanned Adaptation by Students*

Two of the studies described above, where the intervention was configured for group-level, secondary intervention, also had high levels of unplanned, individual adaptations by students.

In one study (Bass et al., 2008), among 177 students who had previously dropped out or been expelled from school, or were under court jurisdiction, unplanned adaptation occurred at the level of the individual. Some of the high school students in the treatment group neglected to complete the required tutorials for the protocol, but instead, pursued whatever interested them. Regardless of content choices, as long as there was minimal exposure of three contact hours over seven weeks, outcomes were the same as for those students who more closely adhered to the preconfigured scope and sequence, that is: significantly higher grades, higher retention at 1-year follow-up, and meaningful, lower suspension rates. While not statistically significant, the treatment group suspension rate of zero compared to 11% for the control group is clinically important for this population.

A second study in the same series involved 117 students who had experienced previous school failure. Many of them had been "retained" and were in what had been labeled an academic "dumping ground," an unsafe, chaotic, ungraded alternative middle school with a regular police presence. Students who did not complete the minimum requirements, did explore other tutorials of interest to them. Among students who were minimally compliant with the Ripple Effects intervention, defined as at least three contact hours,<sup>7</sup> there was 68% fidelity to the assigned content, or roughly nine

contact hours on average. The mean completion scores showed students who had minimal exposure to the intervention completed an average of 70% *more* tutorials than they were assigned (as much as six additional contact hours) with some *completing more than a hundred* of the available tutorials. The result: grades that were approximately 3/4 of a letter grade higher (M= 2.41, SD 1.03) than the control students (M = 1.68, SD .094),  $p < .05$ .

## DISCUSSION

The analysis of nine studies suggests that this computerized intervention can be adapted, with fidelity, in a variety of configurations. It specifically suggests that topic selection, topic ordering, delivery settings, and methods of delivery can all be adapted, down to the individual level, and result in positive outcomes.

#### *Implications for Practice*

The positive outcomes correlated with individualized, self-regulated use of this program for tertiary intervention in discipline settings suggests the greatest value of this program may be its capacity-building function, especially for school counselors, and other staff implementing individualized interventions and practices, including Response to Intervention and Positive Behavioral Supports and Interventions.

The finding that diverse SEL adaptations all produced improved academic outcomes, is a reminder that there are many "best practices" in SEL that can work to reduce barriers to school success. Whichever ones the implementers *want* to try, are the ones most likely to generate their buy-in, and thus also become better for the students under their care.

The breadth of tutorials students privately explored provides some evidence that the expert system built into the program (which allows students to enter by way of their risk or disciplinary offense) can and does lead them to evidence-based strategies, not only to address personal risk factors and remediate specific

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<sup>7</sup> Only 37% of those assigned to the treatment group were actually exposed to the intervention. This and other compliance issues are addressed in a separate article (Ray & Berg, 2008).

behavior problems, but to build social-emotional strengths that can be protective on many levels. Thus it potentially can address all three levels of intervention in a single session. This expert system function merits further research, to better understand how such technology can efficiently deliver personalized training to students.

Although the findings about adaptation and use for primary and secondary intervention were positive, even with very little exposure, they depended somewhat on the expertise of Ripple Effects and/or school staff to make a logical, evidence-based match between site or district goals, and the strategies that have been shown to be most effective in meeting those goals. There's no evidence that exposure to just *any* set of proven effective practices, will result in positive outcomes. Rather there is evidence that sets of different, logically reasonable configurations could all yield positive results. For example, cultivation of empathy is not the solution to impulsivity or defiance, but is a big part of one for intolerance.

Not all potential implementers of this program have the expertise (or time) necessary to customize a scope and sequence. To increase the chance that real world adaptations will be within the universe of reasonably logical configurations, and still allow the staff-led adaptations which increase buy in, Ripple Effects has developed four supplemental offerings: (a) a set of guides for tiered intervention that provide the rationale for, and delineation of, more than 61 scopes and sequences divided into universal promotion (primary), targeted prevention (secondary) and individualized intensive (tertiary) interventions. Each is oriented toward achieving particular outcomes, with particular students; (b) A "fill-in-the-blanks" site implementation planning guide enables implementers to complete the site-adaptation process in less than one hour; (c) A parallel software program of staff training for implementers; and (d) Free implementation support via the web, email, and telephone. All implementation support materials are available in print or electronic versions.

### *Limitations*

Because of the level of variance possible in configuring this computer-based intervention, it is not possible to do a topic-by-topic, or learning mode- by-learning mode componential analysis, even with groups as large as the 3,685 students who participated in the tertiary intervention. Although we have been able to correlate the *process* of content customization (adaptation) with a wide range of positive outcomes, both when Ripple Effects has been used as a stand-alone program, and when it has been used as a supplemental component in primary, secondary and tertiary interventions, we cannot take the further step of attributing causality. Compliance and dosage issues also still need to be addressed, and have been in another article (Ray & Berg, 2008).

While Ripple Effects computerized, modular, comprehensive approach solves a number of issues related to both content and process with fidelity and adaptation, it introduces a new set of issues related to the technology itself. These are likely to be ongoing challenges as hardware and software installations, security and permissions protocols constantly change.

### CONCLUSION

All of these findings together indicate that Ripple Effects can be adapted at the level of the individual and/or the level of the group, to align it with site, group, or individual needs and goals. Because the expertise is "in the box," there is no danger of loss of fidelity to evidence-based content and practices.

Perhaps the most striking implication for practice of these results in an implicit one. They suggest developers and researchers may be able to more greatly trust the wisdom of real-world implementers as those implementers make necessary – or just preferred – adaptations to evidence-based programs. As importantly, it suggests that those implementers, in turn, can trust the ability of even young children, to know what is underlying some of their problems and to take advantage of resources to begin to address those underlying issues privately.



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# Compliance Factors With Self-Regulated Use of a Computerized, Social-Emotional Learning Intervention

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## ABSTRACT

For real-world tests of self-regulated, computerized interventions, the most basic measure of fidelity is student compliance. In this study we used quantitative and qualitative analysis of compliance data across seven experimental studies of the impact of Ripple Effects computerized social-emotional learning intervention to answer the questions: To what degree did participants comply with the protocol? What factors most contributed to compliance rates? Compliance was defined as completion of interactive parts of a minimum of 12 tutorials (3 contact hours) seven weeks, and was automatically logged by the computer. Of 309 students (after enrollment and study attrition) assigned to treatment groups, 70% of students had scores which showed at least minimal compliance. Compliance rates varied by study site. Different schools represented different age groups, academic or behavioral histories, school climate and levels of adult monitoring. Analysis of data from matched sets of schools indicate compliance rates did not differ by student ethnicity or SES, but did vary student behavioral or academic history. Since these were setting level variables in these studies, we could not determine their influence on individual students, independent of the setting. Level of professional expertise of the trained implementer was not a factor in student compliance. Analysis of qualitative data across sites has yielded meaningful correlations between the following setting-level factors and compliance rates: technology capacity, physical setting, school climate, level of adult monitoring, implementer training, and "acts of God."

**KEYWORDS:** Implementation fidelity; computer-aided prevention; compliance; social-emotional learning

## BACKGROUND

The purpose of this paper is to examine an important element of implementation fidelity with self-regulated use of a computer-based, social-emotional learning program: student compliance with the intervention. Regardless of how studies are designed, efficacy of a self-directed intervention cannot be measured if students do not use it. Over the last five years, seven randomized controlled trials (RCTs) and two quasi-experimental studies have examined

the impact of a computer-delivered intervention called Ripple Effects on both internal and external outcomes, with students from elementary through high school. Results of those studies are reported elsewhere, and include statistically significant positive effects on grades, absenteeism, discipline referrals, suspensions, tardies, norms about alcohol, resiliency assets and depression (Bass, Perry, Ray, and Berg, 2008; De Long-Cotty, 2008; Koffman, Ray, Albarran, & Vasquez, 2008; Ray, Patterson, & Berg, 2008). Here we focus on

cross-study observation and analysis of compliance rates under various conditions of use for the seven randomized trials where specific content was required and compliance monitored.

Implementation fidelity refers to the degree to which a program is implemented as intended. Over the past two decades, a body of research has demonstrated the positive impact of social emotional learning on academic and life outcomes (Benard, 2004; Elias & Arnold, 2006; Wilson & Lipsey, 2007; Zins, Weissberg, Wang, & Walberg, 2004), while more recent research has focused on the important role of implementation fidelity in achieving these results (Dane & Schneider, 1998; Devaney, O'Brien, Resnik, Keister, & Weissberg, 2006; Fixsen, Naoom, Blase, Friedman, & Wallace, 2005).

Ripple Effects is a computer-delivered comprehensive social-emotional learning (SEL) intervention that addresses a wide range of non-academic factors in academic and life success. It was developed by the originator of another clinically validated live intervention, *Second Step*, and was specifically designed to reduce barriers to implementation integrity faced by live instruction programs. Ripple Effects was designed to: 1) reduce instructor-related loss of fidelity in both content and process, regardless of cause; 2) accommodate a wide range of differences in learning styles, abilities and disabilities; 3) increase adaptability to site-specific needs, constraints, resources and opportunities; and 4) increase capacity to match targeted interventions to individuals with specific risk factors. It is designed to be used directly by students, and includes built-in electronic progress monitoring of core components.

Compliance and dosage are two common measures of fidelity with an intervention. For SEL programs they are frequently conflated. They are both understood to answer the question: "How much of the prescribed content and process for a particular intervention does the implementer adhere to?" However, as is also the case with medical trials, with SEL evaluations, compliance and dosage can mean

different things. One is an implementation process measure; the other is a more calibrated measure of an individual subject's exposure to an intervention within the parameters of participation in the implementation process. That more calibrated analysis of dosage effects on internal measures and objective school outcomes among students who are at least minimally compliant with the intervention are reported elsewhere (Bass et al, 2008). Here we focus on basic compliance factors.

To use a medical analogy, if the test is of a drug to be taken daily, subjects who take the drug once in a month are considered not compliant, and dropped from analysis, whether the reason is conscious choice, forgetfulness, or restricted access to their medicine. Those who occasionally miss a dose are still included, and their dosage levels analyzed for correlations with outcomes.

For this analysis, we distinguish between students who are dropped from the trial, because they moved out of the treatment groups parameters or withdrew their consent (study attrition), and those who were not included in the efficacy measurement because they missed so many doses of the "medicine," that their outcomes would not be a valid test of the intervention: non-compliance, also called program attrition. These latter students and their adult monitors are included in implementation process measures of effectiveness, and provide important information about the factors that may predict base-level compliance. When the intervention is a self-regulated computer program, with dosage and outcomes measured at the level of the individual student, as is the case with Ripple Effects computer-based training, an argument can be made that compliance and dosage really are the same thing. However, in considering fidelity to dosage requirements, there are both formative and summative issues.

While it is clear that measuring outcomes among students with no exposure, is not a valid test of the efficacy of the intervention, it was not clear at the beginning of these studies, what amount of exposure should be considered "compliant." The answer to the question of

“how much is enough?” in various settings had not been pre-determined by the developers. Rather, Ripple Effects’ position had been (and is) that program goals and conditions of use for primary, secondary and tertiary intervention, which vary widely, all affect what should be considered “standard” or “best practice” in a given setting. Nonetheless, for purposes of comparative study, some standardization was required.

Research had consistently shown that that the skill acquisition targeted in primary and secondary interventions could not be achieved with a one-shot session (Greenberg, Domitrovich, Graczyk, & Zins, 2001). Research has also shown that several primary and secondary interventions, such as Botvin’s “Life Skills Training” curriculum to prevent substance abuse, could be effective with as few as eight, forty-five minute lessons, or six contact hours (Botvin, G., Baker, Dusenbury, Botvin, E., & Diaz, 1995). Other programs have shown effects in 10-15 contact hours.

Thus, Ripple Effects developers set a level of exposure to 24 tutorials, (approximately six contact hours) as the *minimum required* dosage for use of Ripple Effects as a targeted, group-level intervention for students who had multiple risks for substance abuse and school failure, and/or as a group level, primary intervention to promote core social-emotional competence. It set a *recommended* dosage of 42 tutorials (10.5 hours). Once the minimum required dosage was established, using SAMHSA standards for minimal to moderate fidelity, Ripple Effects defined 50% of the minimum requirement (three contact hours; 12 tutorials) as comprising compliance fidelity with the condition, which would allow a valid test of effects.

Findings from the six RTCs where there was a sufficient range of dosage levels to allow dosage analysis, indicated two things: there were significant, positive results on GPA, attendance, tardies, and suspension, when students completed three or more contact hours (50% of the proposed minimum dosage); and, available data showed significant, small correlations between dosage and GPA and

attendance (Perry, Bass, Ray & Berg, 2008). Given the positive finding after three hours of exposure, we used that figure as the basis for the analysis of compliance factors discussed here.

### *Purpose*

The primary compliance-related questions for the Ripple Effects intervention are: Did participants comply with the minimum required dosage? If not, why not? And can those factors be controlled?

## METHODS

### *Research Design*

Six concurrent studies of Ripple Effects as a preventive intervention took place during the 2003-2004 school year, one study of Ripple Effects as a universal SEL intervention occurred during the 2005-2006 and 2006-2007 school years. All seven studies were randomized controlled trials, conducted at individual schools, with students as the unit of analysis. Studies were conducted in real-world conditions, with no involvement of the developer in delivery of the intervention. Evaluation of interventions is often conducted with significant additional implementation support well beyond that provided to regular implementers of an intervention. That was not the case here. Conditions of use approximated those typically found in schools. We use both quantitative and qualitative methods to address the research questions. All studies received IRB approval, and all participants provided consent using IRB-approved methods.

### *Settings*

The settings for the seven studies were rural, urban and suburban, traditional, alternative, charter and continuation, elementary, middle and high schools, with widely diverse policies, structures, school climate, and available conditions of use for the intervention.

Table 1. *Demographic Characteristics of Participants by Study and Overall*

Demographic Factor	All studies (n=338)	Study 1 (n=61)	Study 2 (n=52)	Study 3 (n=26)	Study 4 (n=51)	Study 5 (n=15)	Study 6 (n=62)	Study 7 (n=71)
Urbanicity	Mixed	Urban	Urban	Rural	Rural	Urban	Urban	Sub-urban
Grade(s)	6 - 12	8	9 - 12	7	8 - 9	8	6	7
Average age	13.5	13.7	16.6	11.9	13.4	14.3	10.8	a
Gender								
Female	43%	27%	41%	42%	54%	46%	51%	49%
Ethnicity								
African American	31%	67%	72%	2%	2%	78%	17%	4%
Asian/Pacific Islander	7%	2%	10%	2%	1%	4%	0%	19%
Hispanic	31%	29%	17%	0%	3%	18%	83%	26%
Native American	1%	0%	0%	9%	2%	0%	0%	0%
White	30%	2%	1%	87%	91%	0%	0%	51%
English language learner								
Yes	30%	27%	24%	0%	0%	19%	83%	17%
Free/reduced lunch								
Yes	60%	80%	61%	36%	31%	100%	94%	31%

a = Data not available

### Participants

This paper focuses on 338 ethnically diverse adolescents and their 12 adult implementers, who participated in the seven randomized controlled trials of group-level participation in the Ripple Effects intervention,<sup>1</sup> and for whom compliance of implementers as well as students, and individual student dosage data, were well documented. As can be seen from Table 1, student ethnicity, socioeconomic levels, average age, and English language proficiency differed among studies. These students' academic and behavioral histories also varied by study.

The twelve adult implementers differed by level and area of expertise, teaching experience, and professional versus non-professional status in the school. They included a school janitor, a school secretary, a math teacher, a social worker, a special education teacher, an English teacher, and a parent volunteer.

<sup>1</sup> A separate paper deals with dosage issues when Ripple Effects is used as an individualized intervention with 3,685 students (Ray, Patterson & Berg, 2008).

### Intervention

Ripple Effects is a comprehensive, computerized, social-emotional learning (SEL) and problem-solving intervention. The computerized intervention includes: 1) A comprehensive library of more than 10,000 screens of evidence-based, instructor-independent content delivered via multiple media (sound, video, animation, illustrations, photographs, interactive assessments); 2) An expert system that prescribes and automatically dispenses the most relevant, evidence-based strategies to each user, based on their content choices; 3) A *Whole Spectrum Learning Platform*, that makes a whole spectrum of methods of learning available all of the time, to every student, regardless of topics chosen; and 4) A database structure and tracking system that allows administrators to monitor student progress and dosage levels.

In all of these studies, students were directed to independently and privately complete roughly 42 tutorials from the Ripple Effects software, working directly on the computer, over a single semester. The role of the adult implementer was to introduce the program at the first session, assign the tutorials,

and check “electronic scorecards” to monitor dosage and ensure compliance, but not otherwise be involved in the delivery of the intervention.

Other conditions of use, including technology capacity, curricular context, level of expertise of implementers, and use for primary or secondary prevention, varied by study and are addressed below.

Implementers received a single, three hour training to orient them to the software, help them customize the scope and sequence for their site-specific context, and prepare them to introduce the software to students, and use the built-in data management system to monitor compliance and track student progress. Implementers received no content-related training and were specifically instructed not to put themselves between students and their use of the computer program.

### *Measures*

Measures for the six studies evaluating Ripple Effects as a secondary intervention were the same. Quantitative process measures included enrollment attrition, study attrition, intervention attrition (compliance), dosage, and choice to explore optional tutorials. Quantitative outcome measures included six objective school achievement measures, and two self-report measures. The school achievement measures were grade point average (GPA), days absent, tardies, suspensions, discipline referrals, and, where available, one-year follow-up enrollment data. The self-report measures were two computer-based, pre- and post-surveys on attitudes toward alcohol and marijuana, and perceived locus of control. Both self-report surveys were adaptations of previously validated instruments. The Monitoring the Future (MTF) survey measured norms and perceptions of harm about alcohol, marijuana and other drugs. The Multi-dimensional Health Locus of Control scales (MHLC) measured attribution of life events to internal (Self) or external (Fate/Other) factors.

The primary outcome measure for the single study of use of Ripple Effects as a primary intervention was a set of scales from the

Resilience and Youth Development Module (RYDM) of the previously validated California Healthy Kids Survey (WestEd, 2004). It was a 42-item, pre/post/follow-up survey that measured several resiliency assets: Social Competence (with items covering empathy and connectedness); Problem-Solving; and Autonomy (with items covering self-management, self-efficacy, and sense of purpose). GPA, absenteeism, and discipline referrals measures were also used. All self-report up surveys had been adapted for peer-narrated, computer delivery.

*Compliance.* Group level compliance was defined as exposure to a minimum dosage level of 12 tutorials (about three contact hours, depending on individuals’ pace). Dosage levels were computed as a percent of the minimum requirement. The measure of dosage and, by proxy, student compliance was the number of tutorials for which students completed the interactive elements (journal, self-profiles, games to assess content mastery). The measures of implementer compliance were whether implementers confirmed that the student was in front of the computer using the software, and whether they actively monitored completion of required tutorials.

### *Data Collection*

Study attrition was measured using school administrative data. School administrators provided data on GPA, absenteeism, tardies and discipline referrals for each study. They did not make prior year’s data available. Self-report surveys were adapted for computerized delivery and automated data collection.

The process for tracking student dosage, and by proxy, compliance rates, was automated. The software program created a password-protected file for each student and tracked completion of interactive exercises, the core components of each tutorial. This data was exported from each computer with names decoupled from identifying numbers, and then data aggregated in centralized files. The same process was used for collecting self-report survey data.

Qualitative data on implementation factors and conditions came from direct observation during site visits (four studies) and documented implementer, student, technologist, and administrator interviews at a other sites.

#### *Methods of Analysis*

*Quantitative.* For all data with post-Ripple Effects values only (e.g., GPA, absenteeism, discipline referrals), researchers ran independent-samples t-tests comparing the means of the treatment and control groups. For all data with pre and post values (e.g., the norms and risks scales, the RESD scales), they ran repeated-measures ANOVAs with a between-subjects factor (study group). In six studies that were conducted concurrently, with smaller sample sizes and unequal variances on some variables, researchers also ran Games-Howell posthoc corrections. Across those six studies, to examine dosage correlations in multi-factor analyses, they ran bivariate Pearson product-moment correlations, and used the Bonferroni method to minimize the chances of making a Type I error.

For the study of Ripple Effects as a primary intervention, data analysis was conducted using statistical program STATA/SE 9.2. Descriptive statistics including mean scores on the measures at baseline, post-, and follow-up tests are reported. Baseline comparisons of scores within/between groups for treatment vs. control were conducted using t-test. Researchers examined changes between pre-post, post-follow-up, and pre-follow-up using Analysis of Covariance controlling for baseline or posttest scores, gender, and ethnicity.

*Qualitative analysis.* Qualitative data from the seven studies were combined and analyzed to identify key factors and conditions across studies. Study coordinators, researchers, and a cross-disciplinary forum of thought leaders convened by Ripple Effects also contributed to qualitative analysis of compliance issues.<sup>2</sup>

## RESULTS

### *Compliance Rates*

As can be seen in Table 2, these real-world studies had a range of compliance levels. Across seven studies, at eight schools, out of 309 students remaining in the treatment group after enrollment and study attrition, 70% had minimal compliance (three contact hours over seven weeks). These rates were somewhat bimodal. Four schools had very high rates ( $M = 89\%$ ), while three schools had low to moderate rates ( $M = 53\%$ ).

### *Student Demographics*

As can be seen in Table 3, compliance rates did not differ by ethnicity of the student population, or other key demographic factors. In the six studies that were conducted concurrently, there were two sets of demographically matched schools in each set, one school had very high compliance rates, the other had moderate to low rates. In the seventh study, there was one set of two demographically matched schools. For all of these studies, assignment to condition was at the level of the student, not the school, but *de facto* segregation resulted in our being able to easily match schools by common demographic traits. This enabled some setting level comparisons.

Compliance rates differed by gender at one school (School 6, mean male compliance = 60%, female = 100%). This gender difference could be attributed to uneven access to technology. Boys had laptops; girls went to a computer lab. A shortage of laptops led to some boys to comply, and other not. There was insufficient data to identify whether boys who obtained use of the laptops were genuinely more compliant with the intervention, or simply more successful in gaining access to a scarce resource.

<sup>2</sup> As part of a three day meeting held March 14-16, 2006, practitioners and researchers addressed the question: "Why do good programs end up on the shelf?"



Table 2. *Attrition and Compliance*

	Overall		School 1	School 2	School 3	School 4	School 5	School 6	School 7
	#	%							
Starting Treatment Group (TG)	338	100	61	52	26	51	15	62	71
Enrollment attrition	14	4%	7%	12%	0%	2%	7%	3%	0%
Study Attrition	15	5%	0%	0%	0%	30%	0%	0%	0%
Remaining TG	309	91%	93%	88%	100%	69%	93%	97%	100%
Intervention Attrition	92	30%	63%	41%	12%	37%	0%	20%	13%
Compliance	217	70%	37%	59%	88%	63%	100%	80%	87%

Table 3. *Compliance Rates for Demographically Matched Participants*

Compliance & Demographic Factors	Matched Set 1		Matched Set 2		Matched Set 3	
	Study 1	Study 5	Study 4	Study 3	Study 7, Site A	Study 7, Site B
Starting TX Group	61	15	51	26	44	27
Attrition	7%	7%	32%	0%	0	0%
Compliance	37%	100%	63%	88%	80%	100%
Grade(s)	8	8	8-9	7	6	6
Female	27%	46%	46%	42%	50%	47%
Ethnicity						
African American	67%	78%	2%	2%	1%	6%
Asian/ Pacific Islander	2%	4%	1%	2%	21%	16%
Hispanic	29%	18%	0%	0%	27%	25%
Native American	0%	0%	2%	9%	51%	53%
White	2%	0%	91%	87%		
English language learner	27%	19%	0%	0%	15%	15%
Free/Reduced Lunch	80%	100%	31%	36%	31%	32%

### *Student Motivation*

Analysis of students' choices to pursue self-selected tutorials beyond those assigned, suggests that individual student motivation to explore the program was not correlated with higher compliance. Students at the lowest compliance site (School 1,  $M=37%$ ), had the highest rate of completion of self-selected tutorials, nine self-selected topics for every 10

required ones. When presented with a learning option that was relevant to them and allowed them to learn through whatever method they preferred, about issues of personal concern to them, these students who had previously been labeled as unmotivated and unresponsive were neither—even if they failed to complete the tutorials their teachers had assigned.

*Setting-level Factors and Compliance Rates*

Compliance rates did vary by school setting. Analysis of qualitative data across sites has yielded meaningful correlations between the following seven factors and compliance rates: technology capacity, contextual setting, school climate, adult monitoring, implementer training, student risk factors and prior school performance, and “Acts of God.” Table 4 summarizes the rankings for each study by factor. In no case did success or failure on a single factor determine compliance rates, rather the presence of and interaction between multiple factors had the most significant impact.

*Technology.* Technology infrastructure capacity (hardware, networks), reliability, physical accessibility, and support staff were all implementation factors that correlated with compliance rates. Generally, it was stability of the system, rather than speed or power, that impacted implementers. One school (School 5) had a cobbled-together set of older computers

with a simple network, and no dedicated on-site technical support. Nonetheless, they had no technology-related implementation problems. Conversely, Schools 1 and 2 had more computers, and more sophisticated networks, but both proved to be unstable, which resulted in initial delays. They had low compliance rates. For School 4, it was the location of the computers in the library, as well as the small number of computers, that negatively impacted compliance. School 6 had fewer working personal laptops, than they had students assigned to use them, which reduced compliance significantly. At several sites, varying school or district policies about permissions created installation problems, which delayed and then compressed the implementation time available. In two instances of seven, the technologists upon whom program people relied, defined their role in terms of control, rather than empowerment of users. This resulted in delays and barriers to technical support.

Table 4. *Ratings by Study on Seven Key Factors in Compliance Levels*

Factor	Study 1	Study 2	Study 3	Study 4	Study 5	Study 6	Study 7
<i>Compliance Rate</i>	37%	59%	88%	61%	100%	82%	87%
Technology capacity	–	– / +	+	–	+	– / +	+
Contextual setting	+	–	+	–	+	+	+
School climate	–	– / +	+	+	– / +	+	+
Adult monitoring	–	–	+	–	+	– / +	– / +
Implementer training	+	+	+	–	+	+	+
Student risk factors, history	–	–	+	+	–	–	+
“Acts of God”	– / +	–	–	–	– / +	– / +	– / +

Note: “–” indicates negative conditions, “+” indicates positive conditions, and “– / +” indicates neutral or mixed conditions. Studies are listed from lowest to highest compliance rate.

*Contextual setting.* Two aspects of setting were correlated with lower compliance: students needing to go unsupervised from one location to another to access the intervention; and, students completing the intervention in an unsupervised setting. Other than that, there is little clear correlation between contextual settings and student compliance rates, or outcomes. As with demographics, almost every context that had high compliance in one study, could be matched with a similar context at another school where compliance rates were much lower. This includes academic classroom contexts, (within, or instead of Math or Language Arts), advisory periods, life skills class, and computer class. Study schools 1, 3, 5, 6, and 7 took students to a computer lab as a group to complete the intervention. At School 2, students were free to complete required tutorials throughout the school day. At School 4, students worked unsupervised in the library. Schools 2 and 4 and low compliance.

*School climate.* For the schools in these studies, there were not reliable, quantitative measures of school climate, but there was qualitative data. For five of the studies, site visits by researchers enabled direct observation of school climate. All sites had direct reports from site coordinators. Four study sites were in the same city and served students with similar demographics and many of the same risk factors. They were poor, African American and Latino adolescents from violence-ridden neighborhoods. Two of those sites, School 5 and School 6, had elements of positive school climate: an orderly, disciplined atmosphere, clear understanding of school rules, high expectations of students, an explicit shared purpose, strong principal leadership and committed and energetic teachers—and exceptionally high compliance rates (Table 4). One of the two remaining schools (Study 2) was a continuation school, with most students either attending by court order, or returning to school after dropping out. It had both positive and negative climate indicators. The other “alternative” school (Study 1), not only failed to communicate high expectations of its students,

it appeared to have given up hope on them altogether. Staff referred to their own school as a student “dumping ground.” The climate was undisciplined and unsafe. Police had been called to campus for four of the five site visits. Compliance rates were low not only for this intervention, but for all other expectations of these students. The two schools in this city with better climate (Schools 5 and 6) had more than twice the level of student compliance as these two schools. Nonetheless a positive school climate, by itself, does not guarantee successful implementation and exposure to the program.

Schools 3 and 4 both drew from a similar population, this time rural, mostly white youth in a marijuana-growing region of California. Both schools had elements of positive school climate. School 3 had much higher compliance rates. Other factors, such as technology access and adult monitoring, seem to have been factors at this site. The two suburban schools sites included in Study 7 both had several indicators of positive school climate, but a 20% difference in compliance, in this case attributable to adult monitoring.

*Student age, risk factors, prior performance.* It appears that older students were somewhat less compliant than younger students. High school students and continuation students (Schools 2 and 4) had mean compliance rates of 60%, compared to 80% for 6,7<sup>th</sup> and 8<sup>th</sup> graders. Compliance levels for students based on individual student risk factors and prior performance were mixed. Schools 1 and 5 both enrolled youth with multiple risk factors with a history of school failure. School 1 had the lowest compliance rate, while School 5 had the highest. At these study sites, school climate and adult monitoring, not student factors, appeared to make the difference.

*Adult monitoring.* There were substantial differences in the level of adult monitoring of student compliance. Surprisingly, professional training and expertise of implementers was *not* a factor. Non-professional facilitators at School 6 (school janitor, cafeteria aide, volunteer, and secretary) had higher compliance rates for students under their supervision than certified

teachers in other schools. A math teacher at School 3 had higher rates than a Behavioral specialist at School 4. Authority of the facilitator, logistics, and time all contributed to compliance levels.

The adult monitor's role as an active enforcer of compliance, rather than simply "expecting" students to use the program, was the aspect of adult monitoring that most impacted compliance. Study 7 took place in a California suburb with lower crime rates than the city, but higher poverty and ELL rates than the national average. It included two schools with similar student bodies, and similar school climates, but had a 20% difference in compliance rates among those students. The explanation for the noticeably different compliance rates: one staff member simply failed to administer the program in full – and did not communicate this to the researchers until the end of the study.

The capacity to easily monitor was also a component. Adult monitoring was very low at Study site 4, a rural high school, because the teachers charged with implementing had competing responsibilities in the classroom at the same time that they were expected to monitor the intervention in the library. Site 1 teachers lacked the capacity to maintain basic order, while Study site 2 had students completing the program on their own time, making consistent monitoring of electronic scorecards cumbersome.

Lack of monitoring was associated with students choosing their preferred topics over those assigned. It was beyond the scope of the studies included here to determine the impact of the self-selected topics on outcomes.

*Implementer training.* For all of these studies, the protocol called for a minimum of three hours of implementer training. Eleven of the twelve implementers were trained. Some implementers were certified teachers; others were non-professional staff. Not every teacher who was trained, implemented. All trained non-professionals implemented. The implementer who missed all but thirty minutes of the training, but failed to monitor compliance, was a certified teacher.

*"Acts of God."* In several cases a dramatic event outside of the control of the study site, impacted implementation compliance. Though outside of personal control, the events are common enough to merit inclusion here as a typical factor impacting compliance in real-world settings. School 2 had a blackout and energy interruption. A major forest fire in rural northern California disrupted schedules at Schools 3 and 4. More than a week of implementation time was lost. At School 4, this was in addition to time lost earlier due to delays in getting the technology set up, and on-going limitations in technology access. Because of school calendar constraints, the duration of the study could not simply be extended, so available treatment time was cut short. This second school had low compliance rates.

*Interactions between factors.* These compliance factors did not operate independently. In fact, our qualitative data from these studies shows that at least four implementation challenges were in place simultaneously at schools where compliance was very low. For example, at school 1, unsafe and chaotic school climate, students' behavioral history of non-compliance, adult monitor's lack of enforcement, and technology challenges, combined to large effect. Technology barriers, monitoring challenges, reduced training, and an "Act of God" resulted in School 4's lower compliance rate, despite positive school climate and lower risk students.

## DISCUSSION

Self-regulated, computer-delivered student exposure to an intervention brings greater visibility to the issue of non-compliance. With live, teacher-delivered instruction, there are students who sit in the room, but refuse to participate. Rarely is their exposure measured in terms of active learning. With dosage data built into the computer, and students completing the intervention individually, this changes. We can identify which children are indeed being left behind and have initial indications of why.

*Findings About Key Factors In Compliance*

By examining the difference in compliance rates among different students in different settings, with different conditions of use, we have come to preliminary conclusions about what can help ensure students compliance with usage requirements, and adult compliance with monitoring requirements.

Students are more likely to comply if: Their participation is explicitly required, not just expected, or invited;<sup>3</sup> their compliance is monitored; they respect the authority of the adult implementer; school climate is moderately safe and orderly; technology is accessible and easy to use. Students must receive at least a ten-minute orientation on how to use the software program, so that they understand: that they can followed their preferred style, order, and pacing; that they must do the interactive parts of the program; how their privacy is protected; and, how to access the scoring system, which enables them to track their own progress.

Implementers more like to effectively play their part if: Their moral authority is strong; structure is clear; climate is moderately safe and orderly; technology capacity is sufficient; they do not have competing responsibilities at the same time; they have received minimal initial training of at least three hours;<sup>4</sup> and, technology and implementation support are easily available.<sup>5</sup>

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<sup>3</sup> Exceptions to this rule, not covered by studies here, are counseling, nurse, or health clinic settings, where increased disclosure of serious problems has resulted from inviting students to search the program for something they think could be of use to them.

<sup>4</sup> Since completion of these studies, we now have preliminary data that 90 minutes of software-based implementer training may be sufficient. Further study is needed.

<sup>5</sup> The implementer training software provides embedded, on-going coaching, as well as initial training in implementation issues. In addition, it provides training in personal leadership, behavior management and cultural competency, to increase moral authority and capacity of implementers to motivate and ensure student compliance.

*Limitations*

Our analysis was limited by the small sample sizes of the secondary intervention study. Larger studies would enable the use of more quantitative methods to assess factors in compliance.

## CONCLUSION

The software-delivered intervention studied here was explicitly designed to overcome many of the barriers to successful implementation compliance faced by clinically validated instructor-delivered SEL interventions. With increasing focus on scaling and sustaining model programs, the question of what conditions are required to achieve compliance with an intervention need to be answered.

These studies individually and collectively provide new evidence of the persistence of some traditional barriers to successful implementation, including school climate, and competition for instructional time. Most of these barriers cannot be answered by more technology, though technology capacity is certainly an important factor.

Findings from these studies suggest that one important factor, level of facilitator training and expertise, can be mediated by a software-delivered intervention. Compliance at sites where facilitators had no prior expertise were as high or higher than site with trained, certified professional teachers. In addition, high compliance rates were achieved with as little as three hours of training to prepare facilitators to oversee the intervention.

These studies also provide evidence that demographic risk factors, separate from setting level conditions, do not predict compliance rates for self-regulated learning. Contrary to stereotype, students of color with multiple risk factors do not disproportionately refuse to comply with the computerized intervention, as long as minimal monitoring is in place.

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