

Final Report

Stamp in Safety I: Preventing Injuries on Preschool Playgrounds

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A. Background

About 5 million children under age 5 spend weekdays in US preschools ⁽⁶⁾. [“Preschool” refers here to a range of childcare centers, daycares, Head Start centers, and other institutions that include adults supervising and caring for groups of children ages 2-5]. Supervision at preschools is often inadequate due to the number of children present and the relative expense of hiring sufficient supervisors ⁽⁷⁾. Inadequate supervision is of particular concern on preschool playgrounds, large physical environments with many potential hazards ⁽⁸⁻¹⁶⁾. Playground equipment is overwhelmingly the leading cause of injury in childcare settings ^(8, 10). From 2001 to 2008, an average of more than 223,000 US emergency room visits annually were attributable to playground injuries ⁽¹⁾. Fractures alone accounted for more than one-third of these injuries, followed by contusions/abrasions (20%), lacerations (17%), and strains/sprains (12%) ⁽¹⁾. Forty American children died on playgrounds between 2001 and 2008 ⁽¹⁾.

Injury scholars argue that supervision may be the most promising behavioral target to prevent injuries among young children ⁽¹⁸⁻²⁰⁾. Parents who display higher quantity and quality of supervision experience reduced child injury rates ⁽²¹⁻²³⁾, even when the children have individual traits (e.g., impulsivity) that place them at increased injury risk ⁽²⁴⁾. Adult supervision appears to reduce children’s risk through at least two mechanisms. First, because adults have better developed cognitive and impulse control skills, they verbally or physically intervene when children engage in behaviors they deem safe but adults recognize as dangerous ^(23, 25). Second, and somewhat less intuitively, the mere presence of adults appears to cause children to better utilize self-correcting strategies and make non-risky decisions ^(23, 26).

B. Objectives

Phase I aims included:

Aim 1: Gather Information Concerning Needs and Desires of the Target Audience.

Aim 2: Develop the Core Components of an Interactive, User-Friendly Product to Deliver the *Stamp-in-Safety* Program via the Internet.

Aim 3: Evaluate Feasibility and Usability of the *Stamp-in-Safety* Program.

The central aim of the Stamp In Safety (SIS) Phase I project is to create an accessible, low-cost injury prevention training program for preschool playground supervisors that increases the quantity and quality of adult playground supervision. Delivered easily and widely to preschool playground supervisors via an exceptionally sophisticated and rich web-based learning platform Stamp-in-Safety actively engages playground supervisors through the use of the program’s reward or “stamping” system and decreases

children's' risky playground behaviors (4,5). Stamp in Safety Phase I employs user-friendly, digital media technology (e.g., web, DVD, personal digital assistant) to train adult supervisors on how to improve child safety on preschool playgrounds by offering an appealing ink-stamp to children who demonstrate safe behaviors on the playground. This basic behavior modification approach seeks to improve the focus and attention of playground supervisors by involving them in "catching" and rewarding children's positive behaviors such as proper use of equipment, sharing materials and equipment, avoiding aggressive behaviors, being friendly to peers, and being polite and considerate. As well as rewarding children for desired behaviors, the program accomplishes a second, equally important objective: it encourages adult supervisors to develop the habits of watching children carefully, engaging with children on the playground, and ultimately noticing and intervening to prevent risky or dangerous behaviors.

C. Project Development

Ironically, playgrounds are the preschool environment where adult supervision is most urgently needed, yet it is the location where staff are least likely to supervise children. Typically, supervisors are young women who are poorly paid for their demanding work. When "playground time" arrives, they have just completed a busy morning interacting with young children, and often use this time to take a break from the children, socialize with co-workers, or check phone messages - scenarios that safety experts dread. The playground is the most dangerous environment in a preschool, with about 75% of injuries occurring there (7,10). Behavioral interventions are needed to improve supervision.

The few previously published attempts to improve playground supervision have relied primarily on education programs. In one study at an elementary school, for example, a classroom safety lecture yielded a slight decrease in dangerous behavior over the subsequent weeks (27). In another, both students and playground monitors were trained through teacher education (28). There was a slight post-intervention decrease in problem behavior by the children, but no significant change was noted in playground monitors. Child-oriented behavioral strategies have also been tried with elementary school students (29).

Initial Development

Development of the Stamp in Safety Phase I program started with the creation of a content matrix that mapped intervention content across the various formats (e.g., video, print, audio, interactive web) to be used. In order to be included in the matrix, content had to be evidence-based and show strong evidence for efficacy among diverse populations. Once the content was determined our goal was to produce program materials that would deliver that content in engaging, accessible, acceptable, and effective ways.

We employed an iterative process in developing these materials. The *Stamp In* video script was developed in consultation with Dr. David Schwebel. Having previously implemented the intervention in a variety of test sites, Dr Schwebel was able to provide detailed and practical information about modeling its implementation as well as valuable insight into the range of preschool and day care environments found across the country and their most common playground safety hazards. At various stages of development drafts of treatments and scripts underwent review and generated corrective feedback from scientists, clinicians, media specialists, and content experts.

Focus Groups

In November 2011, one focus group with child care/child development center staff was held at IRIS Educational Media's office in Eugene. The PIs and instructional designer facilitated the discussion, which lasted 90 minutes. The purpose of the focus group was to find out about playground safety instruction,

numbers of injuries occurring on preschool playgrounds, and the current strengths and weaknesses of playground supervisors.

The group consisted of eight women between the ages of 24 and 46. All participants were non-Hispanic, seven of whom were Caucasian and one of mixed race. All participants had at least some college education, with that majority holding a Bachelor's degree. Six of the participants were teachers or teaching assistants and two were directors. Five of the participants had been working in the field five years or less, one less than 10 years and two more than 10 years. The age range of the children that the participants supervised varied from between 18 months and 12 years and all but one participant worked in a center that served families who received some type of payment assistance.

Participants were asked what recess time looks like on their playgrounds, what goes well, what doesn't go well and about staff strengths and weaknesses. All centers had at least 30 minutes of playground time a day and if the child was in care all day, they were outside for at least an hour each day. Staff to child ratio requirements were always met with the norm being that there were more staff on the playground than required. Staff members were strong in the following areas: positively stating behavior expectations, adult follow through, and recognition of appropriate behavior. However, staff did have the following weaknesses: over/under assistance for children, non-specific praise, inconsistent and stringent consequences, telling a child what NOT to do rather than what to do, and that there was a level of physical intervention that was not appropriate for the level of child problem behaviors.

Participants thought that in a playground safety program, it would be important to address the fact that some staff are resistant to accept new training. They were mixed on whether the children needed to view a video about playground safety and the Stamp In program in addition to the staff watching a video. Participants suggested that we provide handouts or other supplemental materials that would help extend the intervention, for example, a handout with "50 Ways to Say Good Job", would be appreciated. And, finally, participants would like to see material that addresses the needs of children with special needs.

Focus groups provided us with important information on playground supervisors' attitudes about their work. For example, we learned that supervisors believe they play an important role in children's development and consider their work challenging. This was an attitude that we sought to reinforce in the videos. However, many supervisors also said that they believed in giving children 'independence' and 'freedom' on the playground and that their job was to respond to problems when they came up. While many felt their job was to keep children safe, they did not consider 'safety' to be a major concern. In fact, the two day care center Directors present at the focus group said that they would be reluctant to use a program on safety because it might lead to the perception that the center had a safety problem. Meanwhile, pro-social behavior was another topic that supervisors and directors alike seemed particularly interested in promoting at their centers. Understanding these attitudes led us to shift the video's focus to highlight the effects of active supervision on children's pro-social behavior and on safety as a secondary benefit. The program's title also changed from *Stamp-In-Safety* to *Stamp In*. These shifts in 'marketing' did not in any way change how the intervention was modeled in the video, but rather served as an additional rationale for implementing the program.

In order to show realistic models, we hired playground supervisors as actors. Also, to show a range of settings and playground equipment, we filmed at one large and one small day care center. The use of animation for certain sequences allowed us to illustrate common problems, dangers and 'wrong-way' examples without having to stage these negative scenarios using real actors and children.

Production

The first step in the process was the creation of “shooting scripts” for the videos. Content and curriculum, designed by the development team at IRIS Ed, was turned into a screenplay. Actors, locations, on screen action and dialogue were described in detail to facilitate the production.

Once we were assured that scripts and other drafts of materials were satisfactory, we began the production of video, text, audio, and interactive web assets. The IRIS Ed approach strives to make video presentations engaging and realistic, aiming for authenticity in language, setting, and situation. In the pre-production stage, we carefully cast actors, selected appropriate locations, and identified realistic theatrical props. To produce the video, we employed a professional crew (director, camera operator, lighting technician, audio recordist, production grip, makeup specialist, and production assistant), and used high-definition video, digital audio, and a full-complement of lighting and grip equipment. The video footage was filmed in real settings in order to provide a natural context. As much as possible, we attempted to cast actors who had relevant experience, paying attention to the need to represent the racial, ethnic, and gender diversity of our target audience. Through attention to quality and detail, realism, effective writing, and creative presentation, IRIS productions have been recognized for excellence in non-broadcast media with 12 Telly Awards and numerous awards from other professional organizations.

Once program footage was shot, it was edited in IRIS’ post-production studio, which employs the most current digital editing, graphics, and audio equipment available. After rough drafts of video sequences were developed, they were reviewed by project staff and refined accordingly. Nearfinal versions of video components, with graphics and animation added, also underwent review by staff and consultants. After revisions were completed, the videos were audio edited and audio processed (e.g., voice equalization, mixing, “sweetening” of sound). The final step was uploading the videos to IRIS web platform, *irisedonline*, for testing and eventual delivery to participants of the feasibility study. Video materials were authored and mastered to DVD as well. Other online intervention materials (text, audio, web interactive) were prepared and uploaded as well. These materials are presented in as simple, clear, and concise manner as possible in keeping with the goal of IRIS Ed media materials to elicit behavior change.

Once online assets were finalized, a variety of application development tools were used to create an online environment where program materials could be accessed by remote users regardless of users’ computer operating systems. To create these platform-independent assets, *irised.com* uses a Cold Fusion-driven interactive learning environment and a Content Management System (CMS) whose Graphical User Interface (GUI) allows media developers to easily upload, configure and modify diverse program assets (see Facilities and Other Resources). The program was formatted for DVD delivery as well, linking video assets on the disk with interactive applications on the Internet. The DVD version was intended for users who do not have a high speed connection.

After completion of program assets, IRIS staff assembled components and uploaded them to the Internet site. The graphical interface on the web site was designed for simple operation and maximum user control in which navigation icons and menu panels meet standard user requirements and expectations. The program underwent an initial test conducted by two IRIS employees not associated with the project for content and spelling errors, menu hyperlink functionality, and system compatibility. Once corrections were made and the quality and stability of the product was ensured, the web site was ready for a further external usability evaluation along with other components of the program.

Description of the Stamp In program

The *Stamp-in-Safety* program is implemented in three steps.

During Step I, preschool staff learn basic child behavior management strategies. Positive reinforcement, redirection to safer activities, cognitive development capacity, and relevant educational/psychological theory are reviewed. This first step is critical for two reasons. First, effective staff development requires that educators understand the research and theory behind recommendations⁽³⁰⁾. Second, cognitive development research indicates young children have a limited capacity to learn, understand, and follow safety rules; 4- to 6-year-olds, for example, spontaneously recall only about half their parent's rules about safety in the home⁽²¹⁾. This second point illustrates why preschool safety interventions must focus not only on children, but also on the adults who supervise them⁽²⁸⁾.

In Step II, practices designed specifically to improve playground supervision are introduced. The goal of this step is to provide playground supervisors ample opportunity to practice lessons they have learned from the online training they have received⁽³⁰⁾. For a week, staff implements daily "stamping days" on the playground. Guided by the Internet-based training they received in the *Stamp-in-Safety* intervention, staff carry small ink-stamps on the playground and place a stamp on deserving children's nametags to reward them for behaving safely. Supervisors determine safe behavior based on written and/or unwritten playground safety rules. By the end of the playground session, all children receive ink-stamps.

"Stamping days" form the unique core of the *Stamp-in-Safety* program, and they are effective for two reasons. First, children are rewarded for safe behavior. Scholars dating to BF Skinner⁽³¹⁾ have recognized positive reinforcement as an effective behavior modification strategy. Equally important, stamping days allow adult supervisors to practice and develop new habits of watching children, engaging with them, and recognizing safe as well as dangerous behavior. In other words, the *Stamp-in-Safety* program goes beyond modifying child behavior. It also encourages adult supervisors to interact with and carefully watch children on the playground, so that teachers reward safe behavior as well as intervene when necessary to stop risky behavior. Unlike other supervision training programs, it does not criticize old habits, coerce supervisors into behavior they dislike, or mandate that they stand in particular locations on the playground. It accomplishes what is necessary to protect young children's safety – improved adult supervision, surveillance, and safety-related intervention on the playground – through repeated practice and in a positive manner. In fact, pilot research revealed that supervisors become engaged and excited about the *Stamp-in-Safety* program and develop the habit of more interactive, higher-quality playground supervision. The program is designed to provide behavioral rewards to children, but it also rewards teachers, who enjoy interacting with children and seeing children's pleasure upon receiving a stamp. The program modifies child behavior through a basic behavioral change model, but it also modifies resistant-to-change adult habits of inadequate playground supervision by rewarding adult supervisors with happy children and by offering supervisors ample opportunity to practice learned supervisory skills.

In Step III, "stamping days" are phased into an irregular but consistent event via a tapered behavioral reinforcement schedule. To ensure longevity of effects realized by behavior modification, theorists recommend tapering from continuous reinforcement delivery to intermittent reinforcement schedules⁽³²⁾. Thus, *Stamp-in-Safety* reinforces behavior continuously at the start to allow initiation of behavior change, but then tapers slowly over time, ending with a long-term schedule of occasional "booster" reinforcements. "Stamping day" schedules will be delivered to supervisors via automated message (phone, text message, or email, as preferred). The program will also permit adjustment to unusual/unique circumstances (e.g., multiple playground sessions per day, playground cancellation for inclement weather).

D. Pilot Study

To evaluate the feasibility and usability of the *Stamp-in Safety* (SIS) program we completed a two-panel, pre- and post-training study design. While the design does not control for potential threats to internal validity, it does allow for the evaluation of changes in playground supervisor self-efficacy, behavioral intentions, perceptions of playground safety, and knowledge. Additionally, posttest evaluation of consumer satisfaction and were collected from participating playground supervisors and the childcare directors. Threats to internal validity will be addressed during the Phase II evaluation by conducting a large-scale randomized control trial comparing childcare centers assigned to the SIS Program and a wait-list control group.

Method

Participants. 24 childcare centers were recruited to take part in the Phase 1 study and completed the SIS training program. Interested childcare directors were screened for eligibility. To be eligible childcare centers had to be open 5 days a week, have a playground that is used daily (or visit one), have internet access, be willing and able to show all playground supervisors the training (either as a group or individually), and be willing to implement the intervention for at least four consecutive weeks. Eligible directors provided names and contact emails and phone numbers of playground supervisors at their facility who were interested in completing the assessments. Research staff then randomly selected one of the interested playground supervisors and sent pretest assessments (see Measures below).

Once the playground supervisor completed the assessment the childcare directors were sent the SIS program materials and provided the training to all playground supervisors at their facility. The SIS program was then implemented for four weeks, with stamping activities occurring daily for the first week and gradually decreasing over the next four weeks (with two stamping days in the last week). At the end of the 4 week stamping schedule the participating playground supervisor completed the posttest assessment. Additionally, the childcare directors were sent a brief survey at posttest.

Measures. The following assessments were collected, either at pretest (T₁), posttest (T₂), or both (T₁ & T₂):

Demographics (T₁): Demographic information (gender, age, racial and ethnic identity, employment, and income) were collected at pretest.

Self-Efficacy (T₁ & T₂): Measures of the playground supervisors' perceived self-efficacy on managing and supervising playground activities was measured using a 10-item 10-point Likert scale designed using guidelines on developing domain specific self-efficacy measures (Bandura, 2006). The scale demonstrated good internal reliability at both pretest (alpha = .89) and posttest (alpha = .94)

Behavioral Intentions (T₁ & T₂): We developed a 7-item scale to measure the frequency with which playground supervisors engaged in behaviors to encourage and support safe behaviors on the playground. This scale had questionable internal reliability (alpha = .6 at pretest and .69 at posttest), therefore we analyzed each item separately.

Perceptions of Playground Safety (T₁ & T₂): Six items assessed the playground supervisors' perceptions of safety on the playground and likelihood of injury occurring. Four of the items used a 4-point frequency measure ranging from "None" to "A Lot." One item assessed overall perceptions of safety on a 4-point scale ranging from "Very Safe" to "Very Unsafe." Finally, one item assessed the perceived likelihood of injury on the playground with a 5-point scale ranging from "Very Low" to "Very High." This scale had acceptable internal reliability at both pretest (alpha = .73) and posttest (alpha = .75); we analyzed the overall scale change

as well as change on individual items.

Knowledge (T₁ & T₂): Six multiple-choice questions were used to assess the playground supervisors' knowledge of the proper use of the *Stamp In* method.

Consumer Satisfaction (T₂): At posttest playground supervisors completed an 11-item Likert scale assessing their satisfaction, sense of usability, and agreement with the SIS program. Additional open-ended questions were also collected to gauge what they liked best about the program, additions or changes they would like to see added to the program, and any other comments they had about using the program.

Implementation Fidelity (T₂): During the four week intervention period the participating playground supervisors kept a daily checklist of their activities on the playground. They reported any injuries, children's risk-taking and overall behaviors, likelihood of future injuries, number of children and other supervisors present on the playground, time spent on the playground, movement of supervisors on the playground. Additionally, on assigned stamping days they also reported on the number of stamps given and whether or not each child had received a stamp.

Director Survey (T₂): At posttest the directors were also sent a questionnaire assessing their perceptions of how SIS influenced safety on the playground as well as their satisfaction, sense of usability, and agreement with the SIS program. Additionally, we asked if they would continue to use the SIS program at their center.

Participant Tracking. Our online screening and survey questionnaires were hosted by Qualtrics.com. Twice a week, if not more often, qualifying participant information was gathered from this secured site: 1. Qualifying participant information would be entered into a secured database. Each participant would be given an anonymous identification number, and sent an individual link to the first questionnaire, 2. Upon completion of the initial questionnaire the participating childcare centers, would receive a mailed copy of the SIS program and supplemental materials. The participant would be given two weeks time in which to complete the training. If participating directors did not show the training in the two week period they would be dropped from the study, 3. Once participating directors showed their entire playground supervisory staff the training they began the four week stamping activities, which were tracked by the participating playground supervisor using the daily checklist. 4. After completing the 4 week stamping activities the participating playground supervisor completed the posttest assessments.

Hypotheses and Findings

Our first objective was to establish feasibility and usability of the internet-based Stamp-in-Safety program. As shown in Table 1, ratings of usability were very high, with 10 of the 11 items having scores exceeding 5 (agree) on the 6-point scale. The only item that was lower, "Much of the information was new to me", reflects the fact that some of the basic playground supervision material in the program was known already to some of the playground supervisors. Taken together, these data provide strong evidence the internet-based delivery system of the SIS program is feasible; the supervisors found it readily usable and were satisfied with the product.

Table 1: Usability Descriptive data

	<i>M</i>	<i>SD</i>
Overall, I was satisfied with the quality of this training.	5.6	0.9
I was satisfied with the quality of the information.	5.5	0.9
The training met my expectations.	5.6	0.7
I would recommend the training to other teachers.	5.4	1.2
The training content was well organized.	5.7	0.5
It was easy to understand the ideas presented in the program.	5.8	0.4
Much of the information was new to me.	3.5	1.5
I agree with the ideas presented in the training.	5.4	1.0
I am likely to use many of the strategies described in the training.	5.3	1.1
The training was engaging.	5.5	0.8
It will be easy for me to implement this approach.	5.4	1.3
TOTAL scale	5.3	0.7

Our second objective was to demonstrate that the program accomplished four goals: improved supervisors' self-efficacy to keep children safe, improved supervisory behavior, perceived safer playground environment, and knowledge about the SIS program and playground supervision. We tested these hypothesized changes using paired-sample *t*-tests (See Table 2). As expected, we found marginal increases for supervisor self-efficacy after the training (pre-intervention *M* = 7.1, *SD* = 1.1; post-intervention *M* = 7.7, *SD* = 1.0; $t(23) = 1.73, p < .10$).

Table 2. *Stamp In Method* Paired Sample *t* tests (N =24)

	Pre Intervention		Post Intervention		<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
<u>Self-Efficacy (10-point scale)</u>	7.1	1.1	7.7	1.0	1.73†
<u>Supervisory Behaviors (6-point scale)</u>	4.1	0.6	4.4	0.5	2.63*
Reward Positive Behavior	4.6	1.0	5.0	1.0	1.45
Tell Children Why Being Rewarded	4.6	1.2	5.3	0.8	2.28*
Warn About Unsafe Behavior	5.5	0.8	5.0	0.9	2.72*
Move Around While Supervising	5.5	0.6	5.5	0.7	0.24
<u>Perceptions of Playground Risks</u>					
Risk Taking (4-point scale)	2.8	0.7	2.5	0.6	1.45
Conflict Between Children (4-point scale)	2.7	0.6	2.4	0.5	2.02†
Risk of Injury (5-point scale)	2.3	0.8	1.9	0.8	2.39*
How Safe Are the Children (4-point scale)	1.5	0.5	1.3	0.5	1.70†
<u>Knowledge (correct of 14 items)</u>	3.2	1.2	4.4	1.2	4.49***

*** $p < .001$; ** $p < .01$; * $p < .05$; † $p < .10$

We found the predicted overall improvement in supervisory behaviors (pre-intervention $M = 4.1$, $SD = 0.6$; post-intervention $M = 4.4$, $SD = 0.5$; $t(23) = 2.63$, $p < .05$). Two of the four individual self-reported supervisory behaviors also increased as hypothesized; supervisors reported lower levels of warning children about risky behaviors following the intervention (pre-intervention $M = 5.5$, $SD = 0.8$; post-intervention $M = 5.0$, $SD = 0.9$; $t(23) = 2.72$, $p < .05$) and higher levels of telling children why they were rewarded for positive behaviors (pre-intervention $M = 4.6$, $SD = 1.2$; post-intervention $M = 5.3$, $SD = 0.8$; $t(23) = 2.28$, $p < .05$). The other two measures of behavior, rewarding positive behavior and moving while supervising, did not change in a statistically significant manner post-intervention.

There were trends for the hypothesized change in supervisors' perception of the playground's risk post-intervention. They reported less conflict between children (pre-intervention $M = 2.7$, $SD = 0.6$; post-intervention $M = 2.4$, $SD = 0.5$; $t(23) = 2.05$, $p < .10$), less risk for injury (pre-intervention $M = 2.3$, $SD = 0.8$; post-intervention $M = 1.9$, $SD = 0.8$; $t(23) = 2.39$, $p < .05$), and reduced overall risk on the playground (pre-intervention $M = 1.5$, $SD = 0.5$; post-intervention $M = 1.3$, $SD = 0.5$; $t(23) = 1.70$, $p < .10$). The fourth measure of perceived playground risk, on children's risk-taking, did not have a statistically-significant change post-intervention.

Last, we examined change in knowledge about the SIS program and playground supervision. Supervisors had greater levels of knowledge following the intervention, with a pre-intervention mean of 3.2 items correct ($SD = 1.2$) and a post-intervention mean of 4.4 items correct ($SD = 1.2$), $t(23) = 4.49$, $p < .01$.

E. Discussion

Child playground safety is multifaceted. To keep children safe, the playground environment must be age-appropriate, monitored and maintained (Thompson et al., 2007). But a safe environment is not sufficient for safety. Proper adult supervision is also essential (Thompson et al., 2007). Prior to this investigation, empirical evidence suggested Stamp in Safety was an effective strategy to improve adult supervision and reduce child risk-taking on playgrounds (Chelvakumar et al., 2010; Schwebel et al., 2006). The present investigation suggests SIS can be delivered via an internet platform, and is rated as usable and satisfactory by playground supervisors using it in that manner, thus enabling dissemination of this intervention in a cost-efficient manner. Present results also provide self-report data from playground supervisors that support previous findings, that institution of the SIS program yields improved child safety and reduced child risk-taking on the playground.

A challenge to injury scientists is the translation of effective public health interventions to broad dissemination and use (Sogolow, Sleet, & Saul, 2007). Too often, interventions are developed, tested with a small sample, and then relegated to the pages of academic journals without being adopted and used broadly to improve public health. Dissemination of SIS via an internet platform offers the opportunity for the program to be adopted and used broadly to improve children's playground safety, and the present data suggest it can be delivered effectively in this manner.

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