

# COMMUNITY-BASED PREVENTION USING SIMPLE, LOW-COST, EVIDENCE-BASED KERNELS AND BEHAVIOR VACCINES

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*A paradox exists in community prevention of violence and drugs. Good research now exists on evidence-based programs, yet extensive expenditures on prevention have not produced community-level results. Various multiproblems are quite prevalent in the United States, such as violence, Attention Deficit Hyperactivity Disorder (ADHD), conduct problems, learning disabilities, depression, and other mood problems. Various studies have observed that intuitively appealing community-based coalitions and best practice requirements have not produced prevention gains as hoped for by many. Calls for more money, fidelity, or dose seem unlikely to succeed. Other alternatives may be possible. Most of the best practices aimed at preventing these community problems are composed of evidence-based kernels, which act on core principles of prevention (risk and protective factors). What is not widely known is that the evidence-based kernels are powerful in their own right. Evidence-based kernels are irreducible units of behavior-change technology, and they can be put together into behavioral vaccines (daily practices) with powerful longitudinal prevention results. Kernels and behavioral vaccines are simple, and they are not programs or curriculum in the conventional sense. This article presents examples of evidence-based kernels and behavioral vaccines that can be promoted easily across whole communities or states using social marketing principles. Widespread propagation of evidence-based kernels and behavioral vaccines could have a significant impact on communities and their prevention norms, providing low-cost alternatives and practical models for community psychology, public health, and policy makers. Behavioral kernels and vaccines can add needed precision to prevention science and community psychology. © 2004 Wiley Periodicals, Inc.*

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Persistent efforts to apply weak or inefficient prevention programs in the United States result in annual expenditures of about 800 million dollars for safe and drug-free schools. However, these expenditures have produced little or no appreciable effect on either substance abuse or violence prevention based on previous national evaluations (e.g., Silva & Thorne, 1997). These negative findings led to a demand for compliance with principles of effectiveness: mandating needs assessments and adoption of evidence-based practices based on those needs. In their analysis of compliance, Hallfors and Godette (2002) reported that few schools truly follow those principles of effectiveness. Furthermore, it is not clear from their analysis that such compliance can produce community-level changes in violence or substance abuse. They found many districts (from a sample of 104 school districts in 12 states) appear to select research-based curricula, but the quality of implementation is low. Only 19% of the responding district coordinators indicated that schools were implementing a research-based curriculum with fidelity. Common problems included lack of teacher training, lack of requisite materials, partial use of required lessons and teaching strategies, and failure to deliver lessons to age-appropriate student groups. Hallfors and Godette concluded that low levels of funding, inadequate infrastructure, decentralized decision-making, and lack of program guidance have contributed to the slow progress in improving school-based prevention. All of these problems are becoming worse because of local and state cutbacks from economic crises in state and local governments. More money and resources to fix these issues simply will not happen for some time—especially with prevailing ethos on academic accountability. Finally, schools and the whole context of prevention have changed dramatically, with such things as No Child Left Behind, proclaim the federal leadership of safe and drug-free schools (Modzeleski, 2003).

Other evidence challenges current political dogma of community-based approaches: a Cochrane Review of community programs aimed at adult use of tobacco and a study of the Fighting Back Initiatives.

Secker-Walker, Gnich, Platt, and Lancaster (2002) reported frustrating disappointment about community-based programs to reduce tobacco use among adults. After reviewing 32 studies, they reported that the largest and best-conducted studies to detect an effect on prevalence of smoking were a disappointing failure.

Federal and foundation initiatives continue to provide strong support for community anti-drug, delinquency, and violence coalitions. The Fighting Back initiative from the Robert Wood Johnson Foundation provides an excellent venue to test the full measure of a coordinated community approach, which was done in a report by Hallfors, Hyunsan, Livert, and Kadushin (2002). All stakeholders (political, business, and community leaders) were invited to address substance-abuse issues and develop a comprehensive, coordinated response. The communities developed their own ideas for effective practice. The model of community-driven selection differs from efforts like the Minnesota Heart Health effort, which is fairly prescriptive across multiple communities to implement core and common practices. The Fighting Back initiative—the Cadillac of community-coalition model efforts—included public awareness, prevention, early intervention, relapse prevention, and some environmental strategies. As Hallfors and her colleagues noted, the Fighting Back study tested the community-empowerment model, not specific interventions.

The Fighting Back evaluation sounds alarm bells for current, common community-empowerment approaches, and readers of this article are urged to read the full study. The research found:

1. no effect of strategies on child and youth outcomes,
2. a significant negative effect on adult substance-abuse outcomes, and
3. no effect of community strategies on outcomes.

Perversely, the more high-dose strategies the communities did, the worse the substance abuse outcomes—that is, substance abuse increased. These findings soundly refuted the community-empowerment model.

An exception to the litany of failure in community approaches is Project Freedom, a broad-based community effort to reduce alcohol and drug use in Wichita, Kansas. A unique partnership between the program and the evaluation ultimately helped develop something called the “Kansas Community Toolbox”—a data dashboard of community actions accessible online (e.g., Fawcett et al., 1997; Paine-Andrews et al., 1996). One of the first outcome efforts of Project Freedom was reported in 1996 by Lewis and others; it involved an adaptation of a previously validated procedure called “reward and reminder” by Biglan and others in 1995, which showed major reductions in illegal sales of tobacco to minors from about 50% to 20% of the attempts.

In Wichita, Project Freedom members—consisting of adults and minors—issued citations to clerks in supermarkets, convenience stores, and liquor stores who were willing to sell alcohol and tobacco products to minors and issued commendations to clerks who refused to sell. For those liquor stores receiving the citizen’s surveillance, there was a marked decrease from 83% of stores selling alcohol to minors to 33%. In liquor stores not experiencing the intervention, there was a smaller decrease in alcohol sales, from 45% to 36%.

In Wyoming and Wisconsin, my colleagues and I have implemented the same basic reward and reminder (citation and commendation) protocols using coalitions. The effort contains extensive documentation of exactly what to do and how to do it, along with technical assistance support provided by the state and nested inside a social marketing campaign. In both cases, the results have been quite powerful (Table 1). Both states are home rule, meaning no state enforcement of tobacco access laws. Both states have high rates of smoking among adults and adolescents. Wyoming results have been stable for three years, and the Wisconsin implementation had only two months of planning, coalition contracting, and training before the official tobacco inspections were conducted by a third party. Wisconsin’s population is ten times greater than Wyoming.

The implementation of the Reward and Reminder protocol has been consistently effective in eight communities of Oregon (Biglan et al., 1995), in Wichita (Lewis et al., 1996), and in the whole states of Wyoming, as well as Wisconsin (using officially reported state Synar inspection rates as required by law). These iterations of community-

**Table 1. Official Percentage of Successful Illegal Sales of Tobacco to Minors**

	1996	1997	1998	1999	2000	2001	2002
Wyoming	43%	28.2%	44.3%	55.1%	8.9%	9.4%	8.65
Wisconsin	46.8%	22.6%	27.8%	22.4%	24.6%	33.7%	20.4%

■ = Baseline  
 □ = Reward and Reminder

based efforts are different from traditional efforts. First, the basic intervention is simple, and community members can be trained to implement reward and reminder in a few hours. This creates “team spirit” and mutual reinforcement. Second, the results it produces are larger and faster than traditional policies and procedures. Thus, feedback happens quickly and the successes are fed to the media and community, creating a perceived norm. Third, the effects derive from concentrated implementation of a simple evidence-based strategy with focused intensity. Then a community “tipping point” can happen. People are not flailing about on scores of different things. In many ways, these are the core principles that have been used successfully for years—from barn raising to fund raising for United Way. The example is useful as a metaphor of what might be done with kernels of evidence-based practices for prevention and will be explained later.

The unfortunate failure of the “empowerment model” or the mandated menu selection of best practices versus a more-defined or constrained community replication model has many implications for prevention. A fundamentally different approach reflecting the simplicity of the reward and reminder programs may be needed for communities if such issues as violence or substance abuse are to be prevented.

### **EVIDENCE-BASED KERNELS AND BEHAVIORAL VACCINES FOR PREVENTION**

Lists of presumptive best practices, published by the U.S. Department of Education, the Substance Abuse and Mental Health Administration, the Centers for Disease Control and Prevention, the Office of Juvenile Justice and Prevention, Drug Strategies, and others, typically contain considerable overlap. The publication of these lists has created confusion about the trade name (trademark) with the active ingredients of proven interventions. Many people falsely assume that the program is the active ingredient. For example, the Reward and Reminder (Citation and Commendation) campaign for tobacco-access control described herein is not the active ingredient; it is a marketing name for something that contains a list of active ingredients supported by significant research.

#### *Searching for Active Ingredients in Prevention: Evidence-Based Kernels*

In pharmacy, an active ingredient is a chemical that produces some reliable effect. This article proposes a similar idea, but suggests a novel phrase, evidence-based behavioral kernels. What precisely is a kernel? In behavioral science, an evidence-based behavioral kernel is an irreducible unit of behavior-change technology that produces an observable, reliable result (cause and effect, if you will). Kernels can work individually and can be combined (compounded, in pharmacy) in ways to produce positive results. By coming to understand the active ingredients—evidence-based behavioral kernels—in prevention programs, one can begin to create a community-based culture of effective practices that might be more sustainable, especially when state and local government resources are stretched to the limit.

How did the idea for behavioral kernels emerge? A number of leading prevention scientists was invited to meet at Stanford University to produce a consensus statement about prevention of child-rearing problems, particularly for children with serious multiproblems. Both Dr. Richard “Rico” Catalano and I were in attendance

and have created evidence-based “best practices” for prevention. We fell into a dialogue about what was really “inside the box” of those best practices, which then revealed what might be described as behavioral kernels. Both of us first taught a universal, school-wide signal for quiet and transition. Both of us taught the teachers and staff to engage in frequent ritualized greetings on a daily basis with the students, such as shaking their hands as they enter or leave classes. In both cases, teachers, students, and peers are taught to praise and reinforce positive behaviors. Thus, Dr. Catalano’s work (Seattle Social Development Project or SSDP, as it was originally called and now called SOAR) and my own earlier PeaceBuilders work (Embry et al., 1996) actually used very similar protocols, packaged somewhat differently. Both produce measurably positive benefits in well-controlled studies (Flannery et al., 2003; O’Donnell, et al., 1995).

This coincidence was not singular: During another special meeting involving leading scientists of violence prevention, Dr. Denise Gottfredson and I had a chance to review our respective work. While Dr. Gottfredson called her approach “an organizational development model” (Gottfredson, 1986; Gottfredson, Gottfredson, & Hybl, 1993) and I called mine “a social–emotional–cognitive competence” model (e.g., Embry et al., 1996), both of us used nearly identical reinforcement procedures of student behavior (e.g., having recognitions read on the public address system), which are embedded in a number of other evidence-based prevention programs such as Positive Behavior Support (e.g., Sugai et al., 2000) and Constructive Discipline (Mayer, Butterworth, Nafpaktitis, & Sulzer-Azaroff, 1983). The connections among the evidence-based prevention programs become even more apparent, tracing the intellectual and scientific roots via bibliographies. For example, all of the above-named major programs cited the earlier work on the use of school-wide behavioral reinforcement protocols (e.g., Mayer, & Butterworth, 1979). Mayer, in turn, made use of other pioneering work from behavior analysis in time-series studies of single classrooms or teachers (e.g., Jones, Fremouw, & Carples, 1977; Madsen, Becker, & Thomas, 1968). In a word, best practice programs are composed of evidence-based *kernels* that work on their own and can be formulated into combinations.

Like life, which is encoded by genes to make proteins or structures, behavioral kernels are encoded by elemental behavioral equivalents of genes, discovered behavioral laws. A few examples include Matching Law, Extinction, Discriminative Stimuli, Variable Interval, Ratio Schedules, and many others that are derived from the basic research of psychology, sociology, anthropology, and even medical findings related to mood, traits, or behavior. These elemental units or laws, though, are not “alive” unless expressed as a behavioral kernel. The elemental units that create behavioral kernels are typically difficult to see under the naked eye, just like the genes or DNA, but are readily discernible in laboratory settings.

Generally, almost anyone can use a behavioral kernel with very brief explanation or modeling, such as shaking hands, using a transition cues or writing a praise note—even without understanding the elemental units or “laws” making up the kernel. Interestingly, real people rather than scientists have invented most behavioral kernels, which then have been spread by imitation and verbal behavior through the principle of selection by consequences. Formal scientists, however, have studied many behavioral kernels quite extensively and improved them using theoretical knowledge of the underlying behavioral elements. Behavioral kernels ultimately have their roots in real people acting on the world—as everyday scientists who are acting on their social universe. Humans, unlike other primates, invent, adapt, and select many behavioral

kernels to construct their social environment. Kernels can become a bit like verbal memes, self-replicating by imitation

### *Criteria for Potential Behavioral Vaccines and Kernels for Changing Cultural Practices*

Kernels can be assembled to create behavioral vaccines, which are substantially different from prevention programs. A program is typically a curriculum or lessons that uses syllabi over days or weeks. Typically, the assumption is that after the completion of the program sequence, some change in behavior or knowledge happens. Thus, programs like *Second Step* or DARE have a curriculum plan and are completed over several weeks or months. But what is a behavioral vaccine?

In a previous study (Embry, 2002), I detailed the characteristics of a behavioral vaccine:

- a) any intervention that inoculates recipients against morbidity or mortality, in this case, problematic, aggressive, or potentially dangerous or lethal behavior, hospitalization, incarceration, suicide, or murder;
- b) low cost, as exemplified by hand washing to prevent infections, diet and exercise to prevent high blood pressure and diabetes;
- c) ease of administration that would insure minimum costs and maximum benefits with daily routines, assuring every-day practice with a minimum of training; and
- d) mass administration.

Behavioral vaccines make it possible to directly reach as many people as is humanly possible with a minimum of costs, with no need for trained, technical, or professional personnel present.

Behavioral vaccines are not the same as conventional “universal” prevention programs, as is commonly articulated by federal or state agencies. The difference in logic has important public health, safety, or economic consequences. Behavioral vaccines aim at total population-level changes in mortality and morbidity. A typical prevention program aims at increasing protective factors or decreasing risk factors for a group (all children say at a particular school, which may be called “universal,” but is not all children in the total community, state, or nation) or aims at a smaller subset of people in a school or social unit (targeted or selected approach in current jargon). Most prevention programs, even if well grounded in exemplary research, do not meet the definitions of behavioral vaccines—generally because of cost, complexity, and/or poor potential for comprehensive reach. A behavioral vaccine is, above all else, simple. In everyday language, most people call a behavioral vaccine a cultural practice.

Prevention programs have grave difficulties becoming cultural practices. Even the most research-based prevention programs, like Botvin’s LifeSkills, have not become cultural practices. Why is this so? One significant reason is that programs “swim against the current” of selections by consequences and related adaptive principles. Most cultural practices are adopted because of an interlocking series of self-sustaining consequences and antecedent conditions.

A cultural practice is almost immediately discernable and can be imitated quickly, even if not perfectly. Furthermore, the cultural practice typically produces immediate results—typically positive reinforcement from others, escape from social approbation,

and/or some other kind of advantage. For example, using good manners—a cultural practice that social scientists might call “social skills”—typically evokes many layers of reinforcement or advantage in many settings. Alternatively, being a really skilled “bad boy” in a rough-and-tumble chaotic neighborhood likewise produces many layers of immediate reinforcement or advantage. Both of these examples are cultural practices with different topographies selected by the consequences in their settings. Expecting any “prevention programs” to become a cultural practice is doomed for some obvious yet very profound reasons:

1. Most prevention programs fail to produce immediately discernable advantage, benefit, or results, and, therefore, immediate intrinsic or extrinsic reinforcement will be very weak. Without such feedback, behavior will soon decay. Other behaviors that do get more immediate feedback or reinforcement will be selected for in the environment, weakening the prevention program efforts.
2. Proprietary issues (e.g., trademarks, copyrights, understandable business concerns) can work against a widespread diffusion of a cultural practice (although can expand diffusion, too). Effective prevention programs take a great deal of capital to develop, test, and diffuse. If people could spontaneously adopt the prevention program and use it, then the results would be catastrophic for most developers. Thus, under current consequences of prevention funding, extreme disincentives exist for disclosing evidence-based kernels inside “best practice” programs. These behaviors are not bad; they are rational in an economic sense.
3. Basic social marketing issues also impinge on issues of prevention programs versus cultural practices. Social marketing uses what are called the 4 Ps, which are: the conception of a Product, Price, distribution (Place), and Promotion. The price of prevention best practice products presently is too high for schools—typically between \$10,000 to \$50,000 per year, which means the buyer can only be at a school-wide or district level—never “purchased” by a teacher or individual staff member. The place of distribution of best practices is not convenient. One can only obtain best practices from specialty suppliers, which requires bids or other complicated processes. One cannot buy effective prevention at convenient retail outlets. Promotion of evidence-based prevention products that can be adopted easily is virtually nonexistent. When was the last time the reader saw or heard a slick TV, radio, or newsprint ad for a prevention program in local media?

For potential behavioral vaccines or behavioral kernels to become cultural practices that might help prevent serious social problems, such behavioral vaccines or behavioral kernels would have to meet some rather stringent criteria. They would have to be:

1. low or no cost,
2. produce immediate benefit,
3. easy to explain, imitate, and generalize,
4. meet or solve other competing demands,
5. easily socially marketed, and
6. change key prevention principles—behavior- and/or antecedent-related risk and protective factors (e.g., Hawkins, Catalano, & Miller, 1992).

Is it possible that the six criteria for behavioral vaccines and behavioral kernels can be met for powerful prevention? Yes. In some cases, strong or better evidence exists for some behavioral vaccines or behavioral kernels than “best practice” programs on various government department lists. Often, many candidate behavioral vaccines or behavioral kernels actually are embedded as active ingredients in named prevention programs.

### *Behavioral Kernels or Vaccines for Classrooms and Families*

From the 1960s to the present, substantial research has been conducted on effective teaching and schools. Investigators have used a variety of research methods to capture differences in effective classrooms and schools—from direct observation, to archival records, to surveys. Some studies have been cross-sectional, some have been longitudinal, and some have been true experiments. Examples of some of those studies were cited earlier (e.g., Abbott, O’Donnell, Hawkins, Hill, Kosterman, & Catalano, 1998; Embry et al., 1996; Flannery et al., 2003; Gottfredson, 1986; Mayer et al., 1983). What is extraordinary is that many of these efforts contain similar components, which may have different names for the same thing (e.g., fuzzy grams versus praise notes; quiet signal versus the peace sign). In general, these procedures increase the density of positive reinforcement from peers and adults, reduce negative attention, change the environment to reduce negative behaviors, etc. Is there an experimental literature of the active ingredients? Yes, although it is not well known outside program developers or not understood as evidence based by consumers. What also is useful to know is that many of those same active ingredients exist in effective parenting programs. A number of potential evidence-based kernels and behavioral vaccines are presented in the Tables 2 and 3 that have usefulness for classrooms and/or homes, as well as community contexts such as after-school programs and day-care centers.

### *Evidence-Based Behavioral Kernels or Vaccines for Community Settings*

Negative or positive parent–child behavior related to prediction of life-time adverse child-development outcomes can be observed easily and countered easily in public places such as restaurants, grocery stores, waiting rooms, etc. (Langer, Rieckhof, Steinbach, & Tausch, 1973) or outside while monitoring and managing children’s play (e.g., Embry & Malfetti, 1980). Harsh handling, scolding, or hitting of infants and toddlers who are fearful can be commonly observed and coded by observers in shopping centers, malls, grocery stores, and other public places (e.g., Honig, 1994). The probability of when and where parents and children will have difficulties during shopping trips in types of interactions that predict life problems can be observed and predicted (e.g., Sanders, & Hunter, 1984). Parent–teen and teen–peer interactions can be coded reliably in stores and shopping malls and show differences by the children’s ages (Montemayor & Flannery, 1989).

Many of the evidence-based kernels and behavioral vaccines for school and home can be used in community settings. For example, response cost and class-wide peer tutoring can be applied to after-school programs. The Good Behavior Game can be used for various team sports or after-school activities, and Beat the Timer can be used in virtually every community group activity for children.

Table 2. Example Evidence-Based Behavior Kernels

<i>Kernel Title</i>	<i>Description</i>	<i>Evidence Citation Examples</i>
Beat the timer (k)	Use small timers to reduce allocated time for task. Powerful effects for reducing negative behaviors. Available at most discount stores.	Adams & Drabman, 1995 Drabman & Creedon, 1979 Wolfe, Kelly, & Drabman, 1981
Response cost (k)	Removal of token, money, or privilege for misbehavior w/o emotional displays. Works as well as stimulant medication for children with Attention Deficit Hyperactivity Disorder. Easily adapted at home.	Forman, 1980 Kendall & Finch, 1976 Little & Kelley, 1989 Reynolds & Kelley, 1997
Mystery motivators (k)	Random rewards using a simple, lottery-like system for behaviors. Very powerful in changing child behaviors at home & school, parent behavior, and work-related behaviors.	Brown & Redmon, 1989 Foxy & Schaeffer, 1981 Moore et al., 1994
Nonverbal transition cues (k)	Nonverbal (visual, kinesthetic, and auditory) cues for transitions (stopping one task & starting another), changing voice registers, getting quiet to hear instruction that are used school wide.	Abbott et al., 1998 Embry et al., 1996 Krantz & Risley, 1977 Rosenkoetter & Fowler, 1986
Meaningful roles (jobs) (k)	Providing responsible roles to all children in the classroom, school, or home increases prosocial behaviors, instructional time, and achievement, and provides positive adult and peer reinforcement & recognition.	Kahne & Bailey, 1999 Rutter, 1983
Response cards/slates (k)	True or false, multiple choice, open response, etc. cards/slates substantially improve participation, reduce disruptions, raise weekly tests scores, improve standardized achievement and allow for more feedback, praise, and recognition. Can be used at home.	Armendariz & Umbreit, 1999 Gardner, Howard, & Grossi, 1994 Skinner, Fletcher, & Henington, 1996
“Tootle”/compliment/praise note (k)	Tootles (opposite of tattles) are written compliment notes that are publicly posted. Effective in improving social competence, school adjustment, and reducing problem behaviors.	Abbott et al., 1998 Embry et al., 1996 Gottfredson, 1986 Skinner et al., 2002
Positive school-to-home notes (k)	Positive notes from school staff to home and from home to school help bridge behavior and contingencies, unite adults, foster positive family attention to child, and reduce negative/harsh interactions.	Blechman, Taylor, & Schrader, 1981 Kelley & McCain, 1995

Some procedures are unique to community settings. Recall that parent-child behavior typically degrades in restaurants. Traditional place mats for family restaurants typically feature a sampling of games (e.g., riddles, matching tasks, tic-tac-toe), while table-talk place mats provide conversational topics and illustrated games in

**Table 3. Example Evidence-Based Behavioral Vaccines**

<i>Vaccine Title</i>	<i>Description</i>	<i>Evidence Citation Examples</i>
Structured/Organized recess (v)	Structured recess games that emphasize turn taking, helpfulness, rule following, and emotion control dramatically improve cooperative behavior, decrease bullying & aggression, improve social norms, better character, improve academic learning during the day, and reduces Attention Deficit Hyperactivity Disorder and other disturbances. Reduces obesity or BMI.	Jarrett et al., 1998 Lewis, Powers, Kelk, & Newcomer, 2002 Murphy, Hutchison, & Bailey, 1984 Pellegrini & Davis, 1993
Good behavior game (v)	A team-based, response-cost protocol for groups of children that rewards inhibition of inattentive, disruptive, and aggressive/bullying. Documented in approximately 30 studies to reduce short-term and long-term behavior problems as well as DSM-IV Attention Deficit Hyperactivity Disorder, and conduct problems, special-education placement plus substance abuse/initiation. Can be implemented from simple presentations or manuals.	Embry, 2002
Class wide peer tutoring (v)	A team-based classroom procedure involving rapid-paced learning for spelling/vocabulary, math, & reading that improves behavior, increases standardized achievement, and reduces special-education placement. CWPT uses all of the kernels listed in this chart. Class is split into teams. Teams are split into pairs who work together 3–4 times a week on rapid-fire practice. Points are calculated, announced, and posted, followed by some recognition and occasional team reward. CWPT can be implemented from simple presentations or manuals, producing observable gains in a week.	Greenwood, 1991 Greenwood et al., 1993
Special play (v)	Utilizes 15 minutes of special play with simple things (blocks, buttons, pipe cleaners, blocks, scraps, junk) by the child in which an adult follows the lead of the child. Improves warmth and compliance while reducing aggression and agitation.	McDonald & Sayger, 1998 Webster-Straaton, 1998

which the entire family can participate. In controlled studies (e.g., Green, Hardison, & Greene, 1984), table-talk place mats resulted in more social and educational dialog among family members than either traditional place mat or no-material conditions. Table-talk place mats also reduced parental coercive comments and children's distraction comments. Table-talk place mats could be printed in bulk and changed each

week or month as a community-based kernel intervention. Behavior change could even be measured.

Grocery stores are places where parent-child behavior deteriorates. It turns out that simple advice packages, distributed to parents, observably changed parent-child interactions for the better while shopping (e.g., Clark, Greene, Macrae, McNees, Davis, & Risley, 1977; Ergon-Rowe, Ichinose, & Clark, 1991). In studies of preschoolers, my co-workers and I have been able to change parent-child behavior while shopping using specially designed shopping bags, distributed in the store, that have sticker charts for the child. Based on marketing research (e.g., Rust, 1993), positive behaviors can be cued by signs in the aisles or on the floors of the store. Community distribution of evidence-based practices on child rearing could happen in the places where problematic behavior occurs, such as grocery stores, video rental stores, toy stores, discount stores, and shopping malls. Parenting behavior can be improved in those settings using kernels of evidence-based practices.

With the exception of safety research and environmental issues (e.g., DePasquale & Geller, 1999; Geller, 1973), there is very little extant research on the diffusion of behavioral vaccines and evidence-based kernels. This lack is probably driven by the metaphor of therapy and school that has driven much of prevention science, each of which have an implicit culture that demands lessons or sessions. Kernels and behavioral vaccines are fundamentally daily habits or routines, not curriculum or therapy models, and thereby have tended to be ignored or overlooked. Behavioral vaccines and kernels also can be metaphorically like a product, which marketed as easily as something in a grocery store, discount store, via mail-order, or instead through in-service training or a continuing-education model.

## **SOCIAL MARKETING OF BEHAVIORAL KERNELS AND VACCINES**

Evidence-based behavioral kernels and vaccines lend themselves to powerful models of social marketing in ways that traditional approaches to prevention, intervention, and treatment cannot be. For example, “Tootle notes” or “Beat the Timer” can be positively and quite easily promoted in a community:

- “Does someone you know feel under appreciated? Pick up a package of ‘Tootle Notes’ today at any participating grocery store.”
- “Do you know a child who dawdles, delays, and gets distracted? Pick up a ‘Beat the Timer’ kit at the child’s school, most pediatricians offices, or local drug stores.”

Social Marketing makes use of the “Five Ps of Marketing.” The modern approach to marketing revolves around five Ps: product, performance, price, place, and promotion.<sup>1</sup>

*Product:* Commercial marketers make sure that their product is appealing to consumers and has a catchy name that is easy to remember. “Tootle Notes” or “Beat the Timer” are examples of catchy names.

*Performance:* Commercial marketers make clear what the customer must do to achieve the advertised result and what the benefits are from the product.

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<sup>1</sup>Traditional papers on social marketing list only four, and this paper adds another based on prior experience in the field.

“Awareness” is not performance, which must be measurable and reportable. Kernels and vaccines make performance promises of benefit such as “learn more,” “have less stress,” “saves time,” or “feel better.” The actions to achieve performance can be quite simple in the case of kernels or vaccines, such as “use response slates 20 minutes per day” or “use class-wide peer tutoring for 20–25 minutes per day, 3 or 4 times per week.”

*Place:* Kernels and behavioral vaccines can be easily accessible to virtually all potential consumers, unlike most prevention programs that are only available through specialty catalogues, training, certification, etc. All you have to do to get “Tootle Notes” or “Beat the Timer” and other kernels or behavioral vaccines is visit a local school, merchant, ask your doctor, or perhaps call a toll-free number.

*Price:* Indicated or selected prevention programs or treatment protocols may cost thousands of dollars to start up or use. Some evidence-based kernels, however, can be given away as sponsored premiums, such as “Tootle Notes sponsored by XYZ Realty.” Others cost a few dollars at most. Behavioral vaccines may be somewhat more expensive, perhaps a \$50 to \$500 for a group of children. Price also can be in time or effort, such as “takes only a few minutes a day.”

*Promotion:* Commercial marketers use promotion and advertising to familiarize consumers with the product and persuade them to buy it or try it. This enables the full power of advertising and marketing to operate for community-based prevention. The current crop of widely listed best practices do not lend themselves to this type of promotion, largely because the “buyers” are highly institutionalized—school districts, state government, etc. Evidence-based prevention kernels or behavioral vaccines can be adopted or purchased by a single user—a child, a teacher, a parent, etc. Kernels and vaccines can be sold in normal commercial settings like grocery stores and discount stores. Unfortunately, one cannot even order an evidence-based prevention program (“everything you need, just add water”) from Amazon.com.

There are some other issues to consider about the social marketing of evidence-based kernels and behavioral vaccines that may not be transparent. First, they invite huge possibilities for sponsorships from the private sector using marketing and advertising revenue rather than charitable gift giving. From my own personal experience in this country and overseas, I have been able to recruit major sponsorships from multinational corporations to do this kind of focused, positive, and population-based prevention. Second, the entire nature of evidence-based kernels and vaccines invites partnerships. Many people can play at the same thing, which moves prevention much closer to a culture and norms change. Third, the impact of evidence-based kernels and behavioral vaccines are observable and measurable using very simple procedures. Most of the kernels and behavioral vaccines come from a robust history of applied behavior analysis that insisted upon very high standards of measurement. In the case of kernels like response slates, nonverbal cues, cooperative games during recess, or behavioral vaccines like the Good Behavior Game or Class-wide Peer Tutoring, the impact on behavior is evident and measurable immediately, or within days. These observable effects greatly help in community self-efficacy and coalition building. Fourth, kernels and vaccines can be used as real examples for “cause marketing” for complicated

concepts like early childhood education, educational reform, or community violence prevention.

Social norms commonly are described as determining much of multiproblem behavior in youth. Norms are about daily behaviors, routines, and rituals rather than attitudes. When confronted with prevention in the past, most “social marketing” efforts have focused on the general issue or the “don’t” behaviors (e.g., don’t do domestic violence or child abuse). Offering a menu of 30 prevention programs for schools or stakeholders to choose from, like the prevention fair, cannot alter the community norms because there are no common daily behaviors, routines, rituals, or language that share any stimulus properties that would cue rule-governed behaviors that make up the core of “community norms.” Community norms require some kind of identity or unifying concept. Good social marketing campaigns promote a product or products and a brand identity because the brand identity “leads” people to other products based on the performance and benefits from the first success. In the case of evidence-based behavioral kernels and vaccines, my colleagues and I have started using the phrase, “The Simple Gifts Initiative” or “Simple Gifts for Our Children” because the benefits and ease of use need to be conveyed as distinct from standard prevention programs or campaigns. The use of evidence-based kernels and behavioral vaccines with a brand identity used in social marketing can create a shift in community norm—in actual behavior.

### **LIMITATIONS OF THIS STUDY AND CONCEPT**

Increasingly, various entities such as the National Institute of Health and the Society for Prevention Research have called for some alternative to evidence-based programs, suggesting, perhaps, the use of principles of effective prevention. Schools and community groups have voiced some dissatisfaction for the “canned program” approach. Evidence-based behavioral kernels and vaccines that measurably effect risk and protective factors add greater precision to issues of adoption, dose, and fidelity than very broad principles such as “refusal skills” or “interactive instruction.” The behavioral kernels and vaccines described herein are quite discrete. They can be precisely operationalized, which is part of their charm. Their short-term effects are easily measured, and their long-term effects have been established.

Notwithstanding these advantages, this article does not address other issues required for full-fledged community- or state-level approach—mostly for reasons of space and focus. Remaining issues that must be addressed include, but are not limited to:

1. how to calculate an optimum mix of behavioral kernels and vaccines for cost-effective results;
2. how to create a data dashboard for monitoring both implementation and outcomes;
3. how to construct evaluation protocols for such strategies; and
4. how this approach would integrate or augment existing investments in more complex evidence-based programs.

This article does not address an important next step in the overall construct of the theory of behavioral kernels and vaccines. The theory lends itself to the construction of a very precise formal language of prevention, just as genetic researchers have a

precise language of the polymorphism or alleles of genes. For example, each kernel can be given a unique classification code (e.g., BT = beat the timer); its allele or variation can be coded such as BTR+ (Beat the timer with reward) or BTRC (Beat the timer with response cost for failure). Dose, intensity, frequency, or other factors can be precisely coded by abbreviation, such as BTRC(2×pd) to indicate two times per day. This formal language of prevention would allow for far greater precision in understanding what works and what does not, as well as for replication. Amusingly, there is a precise, formal language for tying fishing flies, understood by any serious fly-fisher who can copy the instruction—yet no formal recipe language for prevention research or practice.

For the developers of prevention programs who always have potential economic interests, the downside would be full disclosure of active ingredients—which is required anyway in the course of therapeutic medical research. Some organization such as the Society for Prevention Research could substantially further the science of prevention by developing a common set of notations for behavioral kernels and vaccines, so that principle-driven prevention versus trademarked program prevention could be better developed and studied.

## SUMMARY

The use of best practice prevention programs and intuitively appealing community coalition processes have generally failed, so far, to yield population-level effects despite the funds allocated and regulations to promote them. This article introduces a rational alternative: promotion of evidence-based behavioral kernels and vaccines that have a chance of becoming cultural practices—with community-level effects on various multiproblems like substance abuse, delinquency, violence, or school failure. Evidence-based kernels are irreducible units of behavior-change technology that produce an observable, reliable result. Evidence-based kernels are what compose most of the named best practices for prevention. What is not widely known is that the evidence-based kernels are powerful in their own right. Behavioral vaccines are essentially several kernels put together for daily use with powerful longitudinal results. Substantial evidence exists showing that behavioral kernels and vaccines can affect major risk or protective factors or prevention principles. Because of the simplicity of kernels and behavioral vaccines, they can be promoted easily across whole communities or states, producing measurable changes that can be documented via time-series designs, in real world circumstances. Widespread propagation of evidence-based kernels and behavioral vaccines could have significant impact on communities, providing a low-cost alternative and practical model for community psychology, public health, and policy makers. Evidence-based kernels and behavioral vaccines represent simple gifts for the future of our children that can change community norms about prevention of serious problems like substance abuse and violence.

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