We have reviewed studies demonstrating that effective early intervention could reduce either the actual incidence of later criminal behavior or at least the risk factors (such as child abuse or behavioral problems in school) that are closely associated with future criminality. In this chapter, we estimate the direct costs and crime-reduction benefits of implementing such programs in California to address the needs of children at risk of future criminality. We consider four generic types of intervention: early-childhood home visits and day care; parent training and social-skills development for youths; programs aimed at improving the educational attainment of disadvantaged youths; and correctional interventions for young juvenile delinquents. We first discuss each of these, its costs, and potential. We then estimate the costs and benefits of providing these interventions to at-risk youths in California on a per-participant basis and compare programs based on the expected number of crimes prevented per million dollars spent.

A brief reflection on the nature of the prevention-versus-incarceration comparison may afford a better understanding of the parameters we take into account in estimating the cost-effectiveness of early-intervention strategies. It costs approximately $21,000 to keep someone in prison for a year (variable costs only, construction costs neglected).\(^1\) That amount is likely to exceed the amount required to induce someone to stay in school, for example. But that

\(^1\)Welch, Richard S., Chief, California Offender Information Services Branch, memorandum, March 14, 1994.
does not mean graduation incentives are more cost-effective than incarceration. Several other factors must be taken into account:

- **Targeting.** Someone who is incarcerated has been identified as a criminal, but it is not possible to identify with confidence who among a population of potential dropouts will turn to a life of crime. The number of youths who receive graduation incentives must thus be larger than the number of criminals who are imprisoned to realize the same reduction in crime.

- **Efficacy.** As should be clear from the previous chapter, preventing crime through one of the early interventions described here is not like preventing disease with a vaccine. Some large fraction of “treated” individuals may still go on to a life of crime. But it is all but certain that someone in a prison cell will not be able to commit more crimes.

- **Decay.** Even where prevention is effective, its influence may wear off after a while. Again, the effect of imprisonment is in full force for the entire span of incarceration.

- **Delays.** Locking someone up averts crimes immediately. A prevention program does not reduce the crime rate until its participants reach the age when they would otherwise have begun offending.

**TYPES OF EARLY INTERVENTION: COSTS AND POTENTIAL**

To calculate costs and potential benefits for each type of intervention, we use what we know from the literature and elsewhere to determine the values of program parameters. Explicitly, we must answer the following questions:

- What percentage of the population is to be treated, and how much crime do they commit?
- What is the cost per treatment?
- How effective is each program at preventing crime?
- How will effectiveness change if the program is expanded?
- How long do effects persist after treatment has ceased?
Working from the answers to these questions, we calculate the impact of each program on crime and criminal-justice spending. To do so, we rely on a mathematical model of criminal populations in prison and on the street, as affected by criminal career initiation, arrest and sentencing, release, and desistance from criminal activity. This model was developed for RAND’s analysis of California’s three-strikes law (Greenwood et al., 1994), and at the end of this chapter we compare the effects of the prevention strategies with those of the three-strikes law. Details of the calculations are in Appendix B.

**Population Treated and Crime Committed**

Nationally, about one out of four children lives in a household whose income is below the poverty line (Carnegie Corporation, 1994). We know that nationwide, there is no father present or willing to provide any kind of economic support for about 30 percent of all births. This fraction is probably somewhat higher in California as a whole, and certainly much higher in California’s inner cities. Finally, about 12 percent of births in California are to teenage mothers. We thus conservatively estimate that about one-quarter of California’s children come from families having one or more of the characteristics identified above that place them “at risk” for eventual involvement in violent behavior. This amounts to 150,000 of the 600,000 children born in California every year (according to 1990 data).

We assume that early-home-visit/day-care and parent-training interventions would be appropriate for the entire population of at-risk youths. Indeed, most home-visit/day-care interventions target children from “disadvantaged backgrounds” (see Schweinhart, Barnes, and Weikart, 1993; Lally, Mangione, and Honig, 1988), which may be characterized quite similarly to what we consider as at risk. It would be ideal to treat only those individuals who will eventually become offenders, but this is unknowable at the age when the intervention is undertaken. However, both graduation incentives and delinquent supervision target youths who are already in trouble: those with poor school performance, arrests, drug use, etc. Eligibility for these programs could thus be based on criteria more specific to the likelihood of future violence than earlier interventions, so the former could be targeted to fewer youths. We thus assume that home-visit/day-care and parent-training programs would be applicable to
25 percent of the population, while graduation incentives and delinquent supervision apply to only 10 percent and 5 percent of youths, respectively.

A narrower definition for treatment eligibility should also be associated with a treated population that commits a large number of crimes relative to the general population. To this end, we developed the concept of a “targeting ratio,” which is the number of crimes per person in the population targeted by the program (assuming no treatment) versus that per person in the general population. A targeting ratio of 1.0 indicates a participant group that commits crimes at the same rate as persons in the rest of the population. Targeting ratios greater than 1.0 indicate groups with greater criminal activity than the remainder of the population.

Programs that begin at earlier ages are expected to have a lower targeting ratio since it is difficult to predict at that age who will become a high-rate offender. However, among the interventions considered here, information on preintervention criminality for treatment and control groups is available only for graduation incentives, where the ratio was 3 (i.e., persons in the targeted population, if untreated, commit 3 times as many crimes as those in the population as a whole).² We use this as a benchmark. We chose a targeting ratio of 2 for home-visit/day-care and parent-training programs, to reflect the fact that younger children cannot be targeted as effectively. We chose a ratio of 4.5 for delinquent supervision since those youths are already heavily involved with the juvenile-justice system at the time of treatment.

Program Cost

According to the studies reviewed in the previous chapter, a generic early-home-visit/day-care program designed to reduce the incidence of child abuse, neglect, and delinquent behavior would include two primary core elements: weekly home visits beginning by the third trimester of pregnancy and running through the child’s second year, and full-time day care and education from ages two through five. We assume a cost of $2,700 per child for each year of home visitation, ²Derivation of this is in Table B.2.
which is the annual cost in 1995 dollars of prenatal and nurse home visits in the upstate New York study by Olds et al. (1993). We use a figure of $6,000 per year for average annual day care and early-childhood education, based on the average of costs for the Perry Preschool program (Schweinhart, Barnes, and Weikart, 1993) and the National Head Start initiative (Head Start Bureau, 1995).  

The typical parent-training program involves between 10 and 20 sessions of instruction and one-on-one counseling and coaching (Patterson, Reid, and Dishion, 1992). We use a figure of $500 per family from the Oregon Divorce Study for instruction and supplies. We add to that $2,500 per family to cover program management and administration (borrowed from the detailed cost data on the Perry Preschool program, which we assume would have similar administrative costs), for a total of $3,000 per family.

Data on the costs of graduation incentives are readily available. The cost of this program is $3,130 per youth, for each of four years of high school. This includes the cost of program staff, student materials and incentives, and space and equipment rental.

There is little information available on the costs of programs for young delinquents. Very few programs exist, and most are built into other systems and cannot be costed out. The Orange County Probation Community Action Association's "8%" program mentioned above costs about $5,000 per youth. It obtains many supplies and services, however, through donation and transfers. We were told that donated and in-kind receipts are about equal to those paid for with program-specific funds (Gwen Kurz, Orange County Probation Dept., personal communication, December 1, 1995). We thus use a figure of $10,000 per youth for participation in a fully funded delin-
quent-supervision program. Table 1 summarizes the costs for all of these programs.

**Effectiveness at Reducing Crime**

For this exploratory report, we did not endeavor to conduct an exhaustive review of the existing literature on early interventions. We compiled the results of a number of existing studies and attempted to learn what we could from this limited sample. Thus, our best guess for program effectiveness is based only on the research we considered. Furthermore, the studies we surveyed report results in a variety of terms—arrests, rearrests, referrals to probation, self-reported activity, and teacher and parent evaluations. We assume a roughly linear relationship between the outcome variables measured and future serious crimes committed. Even in the studies we relied on most heavily—those reporting arrests and rearrests—links of these variables to rates of serious crime are not self-evident and may indeed be quite complex. But because we aimed for suggestive rather than definitive results, we believed the assumption of a linear relationship would be satisfactory.\(^5\) Table 2 shows our assumed values for pilot-program effectiveness. (See Appendix A for the literature survey.)

<table>
<thead>
<tr>
<th></th>
<th>Home Visit/Day Care</th>
<th>Parent Training</th>
<th>Graduation Incentives</th>
<th>Delinquent Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year 1</strong></td>
<td>$2,700</td>
<td>$3,000</td>
<td>$3,130</td>
<td>$10,000</td>
</tr>
<tr>
<td><strong>Year 2</strong></td>
<td>$2,700</td>
<td></td>
<td>$3,130</td>
<td></td>
</tr>
<tr>
<td><strong>Year 3</strong></td>
<td>$6,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Year 4</strong></td>
<td>$6,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Year 5</strong></td>
<td>$6,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Year 6</strong></td>
<td>$6,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$29,400</td>
<td>$3,000</td>
<td>$12,520</td>
<td>$10,000</td>
</tr>
</tbody>
</table>

\(^5\)As with costs, the sensitivity analysis at the end of this chapter indicates that our assumed prevention rates can in some cases be varied substantially without reversing the outcome.
We also considered that most evaluations for which prevention rates were available were small, intensive pilot programs, which are likely to be more effective than large-scale, expanded programs. We thus include a modifying parameter to account for the effect of scale-up on program efficacy. The values chosen for this parameter reflect the relative size of each program, i.e., the larger the percentage of a cohort treatable by a program, the larger the expected penalty due to scale-up. We chose a scale-up penalty of 40 percent for early-home-visit/day-care and parent-training programs, and 20 percent and 15 percent for graduation incentives and delinquent supervision, respectively.

Most evaluations also have follow-up periods that are too brief to assess long-term program benefits. Indeed, some studies have shown that positive program effects decay rapidly after program completion (Ellickson and Bell, 1990; Currie and Thomas, 1995). We thus incorporated another parameter to account for decay in effectiveness due to time. We allowed time-decay to affect juvenile and adult crimes differently since different programs are administered at different
ages. We assumed that graduation incentives and delinquent supervision do not decay in their effectiveness on juvenile crimes, since they are administered during adolescence. At the other extreme, we attached large decay rates to prevention of adult crimes by home-visit/day-care and parent-training programs since they are administered at a very early age (in some cases, beginning before birth). The values chosen for this parameter are also presented in Table 1. (Later in the analysis, we also discuss how sensitive cost-effectiveness is to changes in pilot-program efficacy and the various decay rates.)

To estimate the eventual effectiveness of a scaled-up program, then, we multiply the pilot prevention rate by 100 percent minus the scale-up penalty and by 100 percent minus the decay rate for either juvenile or adult crime. Thus, the effective prevention rate of a scaled-up home-visit/day-care program against juvenile crime is estimated as

\[
50\% \times (100\% - 40\%) \times (100\% - 20\%) = 50\% \times 60\% \times 80\% = 24\%.
\]

The effective prevention rates against juvenile and adult crime are given in Table 2.

**COMPARING COSTS, BENEFITS, AND COST-EFFECTIVENESS**

We calculate cost-effectiveness for the treated cohort. That is, we consider the costs of delivering a set of services to at-risk youth or their families beginning in the current year and the eventual benefits in terms of crimes prevented over time for that group of youths. We take this cohort approach instead of considering the drop in the overall crime rate over some period of time because that rate includes crimes committed by criminals too old to be eligible for the interventions.

As shown in Table 1, two of the programs last only a year. For the others, program costs accumulate beginning in the first year and accrue for the duration of the intervention. We discount future costs at an annual rate of 4 percent to reflect the lower present value of future
dollars. Discounted costs are then summed over all program years to determine the net present value of total program cost per participant.

We estimate program effectiveness, i.e., benefits, in terms of the number of serious crimes prevented per program participant. To derive this, we apply the percentages in the above section to the number of serious crimes that an average program participant would be expected to commit in a lifetime. That is derived from the number of crimes expected in the whole cohort’s “lifetime” and the percentage of the cohort’s crime that the treated group is responsible for. In steady state, the number of serious crimes for one cohort across all calendar years would equal the number of serious crimes committed in a given year across all cohorts. From FBI data and national surveys, we know the latter number, including crimes not reported to the police, approached 1,200,000 in California for 1994 (extrapolated from U.S. Department of Justice, 1992). The treated group’s percentage of cohort crime is derived from the targeting ratio specific to the intervention. Appendix B contains detailed tables showing this series of calculations.

Since these interventions are conducted at young ages, benefits may greatly lag costs, as in the case of early home visits and day care, so we consider benefits accumulated over a 30-year period from the on-

---

6A $5,000 cost incurred now is a bigger cost than $5,000 incurred next year because the latter will be partially offset by the interest it earns in the meantime. Discounting is a standard practice in the economic analysis of social programs.

7Serious crimes recognized by California Penal Code Section 1192.7 include homicide, rape, arson, robbery, aggravated assault, and residential burglary. It should be kept in mind that the last three categories account for some 80 percent of serious crimes.

8We do not mean to imply that all program participants would have committed crimes in the absence of the program or that the program works by reducing by the same amount the number of crimes each participant would have committed. For ease of accounting, we speak of an average participant. The manner in which crimes are actually distributed across participants does not bear on the results we obtain.

9We make the steady-state assumption to simplify the analysis. In fact, California’s population is not in steady state and will not be at any time in the foreseeable future. The population is increasing. The current cohort is thus larger than the average-sized cohort contributing to California’s current crime rate, so the current cohort should commit more than 1,200,000 serious crimes. As a result, all our benefit estimates are conservative (since more crimes will be prevented by a given intervention) and our calculated costs per crime prevented are generous.
set of the intervention.\textsuperscript{10} We distribute the anticipated lifetime number of crimes prevented over a period running from age 14 through year 30 following intervention onset.\textsuperscript{11} We assume the number of crimes prevented in any year to be 10 percent smaller than that in the previous year. This “tilts” crimes toward the earlier years, reflecting an estimated 10 percent per year desistance rate among criminals (that is, every year, 10 percent of criminals cease being criminals; see Greenwood et al., 1994, p. 55). We then apply a 4 percent cumulative discount rate to calculate the net present value of crime-prevention benefits.\textsuperscript{12}

The benefits, costs, and cost-benefit and benefit-cost ratios for each of the alternatives are presented in Table 3. Detailed, year-by-year results are given in Appendix A, which also details the mechanics of calculating cost-effectiveness.

The net present values of costs per participant follow fairly closely the undiscounted values from Table 1. None of the interventions lasts very far into the future, so discounting does not greatly reduce any of the costs.

The differences among program benefits—serious crimes prevented—depend on the differences among program effectiveness values and targeting ratios from Table 2. Our high estimates of benefits for graduation incentives are based principally on an ultimate projected effectiveness rate several times those of the other interventions. This higher rate is largely due to modest anticipated penalties for scaling up the program and for decay of effectiveness with the passage of time. The projected benefits of the other three

\textsuperscript{10}This is essentially equivalent to a lifetime of crime prevention, as criminal careers typically end within 30 years of the ages at which childhood interventions begin.

\textsuperscript{11}For the two adolescent interventions, this is a 30-year period. For interventions beginning before age 14, it is less than 30 years: 25 in the case of parent training and 17 for home visits and day care.

\textsuperscript{12}Discounting is applied to both costs and effects to ensure consistent time preference among plans. The necessity of this is discussed in detail in Keeler and Cretin (1983) and is used similarly in Rydell and Everingham (1994). Intuitively, one would presumably pay more now to avert a crime to be committed now than to avert one to be committed several years from now. Note that condensing criminal careers for the two earlier interventions (see preceding footnote) has the effect of slightly overestimating the net present value of the crimes those interventions avert.
Table 3
Cost-Effectiveness of Early Interventions After 30 Years

<table>
<thead>
<tr>
<th></th>
<th>Home Visit/Day Care</th>
<th>Parent Training</th>
<th>Graduation Incentives</th>
<th>Delinquent Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost per participant</td>
<td>$29,400</td>
<td>$3,000</td>
<td>$12,520</td>
<td>$10,000</td>
</tr>
<tr>
<td>Net present value of cost per participant</td>
<td>$26,238</td>
<td>$3,000</td>
<td>$11,816</td>
<td>$10,000</td>
</tr>
<tr>
<td>Serious crimes prevented per participant</td>
<td>0.59</td>
<td>0.71</td>
<td>4.16</td>
<td>0.99</td>
</tr>
<tr>
<td>Net present value of serious crimes prevented per participant</td>
<td>0.30</td>
<td>0.47</td>
<td>3.05</td>
<td>0.72</td>
</tr>
<tr>
<td>Dollars per serious crime prevented</td>
<td>$89,035</td>
<td>$6,351</td>
<td>$3,881</td>
<td>$13,899</td>
</tr>
<tr>
<td>Serious crimes prevented per million dollars spent</td>
<td>11</td>
<td>157</td>
<td>258</td>
<td>72</td>
</tr>
</tbody>
</table>

programs are not so far apart from each other. Delinquent supervision is the strongest of those three because it is administered late enough to target a relatively high-risk set of youths; early home visits and day care are the weakest because of the delay in realizing their effects.

Since graduation incentives are by far the most effective of the interventions and are not terribly costly, they turn out to be the most cost-effective. Parent training comes in second, largely because it is so inexpensive. Early home visits and day care are the least effective and most costly of the interventions and thus have the least favorable cost-benefit and benefit-cost ratios.

Comparison of Early Intervention with Incarceration

We have now reviewed evidence bearing on the effectiveness of early-intervention strategies in reducing later criminality and used that information to estimate the costs and crime-reduction benefits of four particular strategies. Here we discuss the relative cost-effec-
tiveness of these strategies, in comparison with long mandatory sentences, and the implications of these findings for public policy.

Greenwood et al. (1994) estimate that the California three-strikes law, if applied in all eligible cases, would reduce the number of serious felonies committed by adults in any one year by approximately 28 percent (or 329,000 crimes). They also estimate that such application would cost $5.5 billion a year in additional criminal-justice funding, primarily reflected in the costs of constructing and operating additional prison facilities. That works out to $16,000 per serious felony prevented. Other, more selective extended-sentencing policies were examined, but even with the best of these, the cost per serious crime prevented would still be about $12,000. These estimates were derived from the mathematical model mentioned near the beginning of this chapter.

Since we have analyzed the cost-effectiveness of early interventions in the same units as that for California’s three-strikes law, we can now compare programs. Figure 1 graphs each early-intervention
program and California’s three strikes in terms of crimes prevented per million dollars.

As the figure shows, two of the four early interventions considered should be more cost-effective at reducing serious crime than California’s three-strikes law. A third intervention should be roughly equivalent. However, four major caveats need to be kept in mind when considering the results presented in this graph.

First, the benefits and costs we have presented so far for the early interventions have been restricted to crimes averted and costs for program operation. They do not include the reduction in prison operating and other criminal-justice system costs associated with the crime reduction. These costs are particularly important in a comparison with the three-strikes law, which achieves its crime-reduction benefits through additions to criminal-justice-system costs. Figure 2 illustrates the criminal-justice-system savings achieved through early intervention, as estimated by the same mathematical model used to

![Figure 2—Criminal Justice System Savings from Some Early Interventions Are a Substantial Fraction of Program Costs](image-url)
estimate the costs and benefits of the three-strikes law. As we did with the crime-reduction benefits in Figure 1, we present savings per million dollars of program cost. Savings are presented relative to costs that would have been incurred under sentencing laws extant prior to three strikes and relative to the new three-strikes regime. We show both because true savings are likely to fall somewhere between the two.\textsuperscript{13} The model’s estimates of three-strikes costs assume application to all eligible cases, and, as mentioned above, universal application is unlikely to transpire.

As shown in the figure, a million dollars spent on graduation incentives should result in a savings to the criminal-justice system of $600,000 to $1.1 million. In other words, over the long term the program would probably save enough money to pay most of its costs. Criminal-justice-system savings would pay about a third of the costs of parent training and about a quarter of the costs of delinquent supervision.

Other costs will also accrue. For example, some individuals rescued from criminal careers by early intervention will need social-services support in the form of publicly provided health care and other welfare programs. Of course, others will work and pay taxes, providing additional cost offsets.

The second caveat is that the criterion used for the comparisons in Figure 1 does not satisfy all criminal-justice policymaker goals. Crimes prevented per dollar of program cost is just one important evaluation criterion; another is total crimes prevented. A highly cost-effective approach that could prevent only a tiny portion of the state’s crime might not be viewed as very useful. Another useful criterion, particularly in a constrained-budget environment, might be total cost. In Table 4, we show total cost and crime prevented for the three-strikes law, assuming application to all eligible cases\textsuperscript{14} and...
Table 4

Total Benefits and Costs from Program Alternatives at Full Scale Across California

<table>
<thead>
<tr>
<th></th>
<th>Three Strikes</th>
<th>Home Visits/Day Care</th>
<th>Parent Training</th>
<th>Graduation Incentives</th>
<th>Delinquent Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of cohort treated</td>
<td>NA&lt;sup&gt;a&lt;/sup&gt;</td>
<td>25</td>
<td>25</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Total benefit (% serious crime reduction)</td>
<td>21.4</td>
<td>5.5</td>
<td>6.6</td>
<td>15.5</td>
<td>1.8</td>
</tr>
<tr>
<td>Total program cost (millions of dollars per year)</td>
<td>5,520</td>
<td>3,155</td>
<td>360</td>
<td>570</td>
<td>240</td>
</tr>
</tbody>
</table>

NOTE: Costs are discounted.

<sup>a</sup>Not applicable (three strikes not implemented on cohort basis).

for each of the early interventions, assuming application as given above (under “Population Treated and Crime Committed” and repeated in the table’s first row).

In Figure 3, we plot the projected benefits of the three-strikes law and the early-intervention alternatives at full scale against total program costs. The most favorable position in this graph is to the upper left—high benefit, low cost. As is evident from the figure, while the early-intervention alternatives would be much less costly than the three-strikes law, none of them would come close to matching the total impact of the law. However, graduation incentives do provide most of the benefit at about one-tenth the cost.<sup>15</sup>

The third caveat is that these results cannot be generalized to other incarceration alternatives. California’s three-strikes law is notably

22.7 percent of serious crimes, the Greenwood et al. estimate is the equivalent of a 21.4 percent reduction in all serious crime, which is the number shown in the table.

<sup>15</sup>The total benefits shown are dependent on the percentage of the cohort treated, which is consistent with that in the cost-benefit analysis above. Any of the interventions could be expanded somewhat to achieve a larger total impact on crime by treating a greater percentage of the cohort. Cost would also go up, and cost-effectiveness would come down. However, for parent training and graduation incentives, some increase in impact might be achieved at a benefit-cost ratio that is still greater than that of the three-strikes law.
inefficient because the breadth of applicability of third-strike life sentences ensures that many will be given to criminals who do not commit serious crimes at high rates.\textsuperscript{16} Other jurisdictions, e.g., Washington state, have passed three-strikes laws more narrowly focused on violent criminals than California’s. However, while these laws might be more cost-effective than California’s, their narrow focus is likely to limit their total impact on crime.

Finally, as we have mentioned, there is considerable uncertainty associated with the data on which the crime-reduction benefits are based. In the next subsection, we try to quantify the implications of that uncertainty for the cost-benefit comparisons.

\textsuperscript{16}This is not to say that such sentences are undeserved. We are making an observation based on efficiency, not justice.
Sensitivity to Parameter Assumptions

To quantify the implications of uncertain parameter values, we varied those values to determine the effects. Specifically, we used threshold analysis, which permits identification of parameter changes necessary to reverse the direction of the results. Here, we identify the parameter changes necessary for California’s three-strikes law to become as cost-effective as early intervention.\(^{17}\) We concentrate here on the two early interventions that are most likely to be more cost-effective than California’s three-strikes law: parent training and graduation incentives.

First, we examined one-way thresholds, i.e., the threshold value for each parameter while holding equal all other parameter values (see Table 5). One-way threshold values were calculated for each variable by using values for the other parameters from Table 2. Analysis of these thresholds suggests that the cost-effectiveness of these early interventions relative to the three-strikes law is quite insensitive to variations in one parameter at a time. The threshold targeting ratios for parent training and graduation incentives were 0.4 and 0.7, respectively. That is, the targeting ratio for parent training has to drop to 0.4 before the three-strikes law becomes as cost-effective. Recall that the targeting ratio is the ratio of crimes committed in the target population to those committed in the whole population. Thus, populations targeted for early intervention could be less at risk of criminal careers than the population as a whole and early interventions would still be more cost-effective than the three-strikes law.

The thresholds on pilot prevention rate were 12 percent and 17 percent for parent training and graduation incentives. That is, the pilot prevention rates (and ultimate prevention rates) would need to be less than a third of those shown in Table 2 for these early interventions to be less cost-effective than the three-strikes law. Among the thresholds on modifying assumptions, those on additional decay for adult crimes are the most striking. Even at 100 percent for both parent training and graduation incentives, these decay rates cannot reverse the cost-effectiveness results. That is, these programs are more cost-effective even if their effects only last through the years of ju-

\(^{17}\)We hold constant the parameters generating the three-strikes cost-effectiveness results; however, they are also uncertain.
### Table 5

**Sensitivity of Assumptions—Threshold Parameter Values Beyond Which Three Strikes Is More Cost-Effective Than Early Intervention**

<table>
<thead>
<tr>
<th>Assumption</th>
<th>Home Visits and Day Care</th>
<th>Parent Training</th>
<th>Graduation Incentives</th>
<th>Delinquent Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost per person treated (1993$)</td>
<td>&gt;$5,413</td>
<td>&gt;$7,744</td>
<td>&gt;$52,885</td>
<td>&gt;$11,795</td>
</tr>
<tr>
<td>Targeting ratio:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crime per person in treatment group vs. crime in population cohort</td>
<td>&lt;10.9</td>
<td>&lt;0.4</td>
<td>&lt;0.7</td>
<td>&lt;3.8</td>
</tr>
<tr>
<td>Pilot prevention rate:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of treatment-group crime prevented</td>
<td></td>
<td>&lt;12%</td>
<td>&lt;17%</td>
<td>&lt;8%</td>
</tr>
<tr>
<td>Modifiers of pilot prevention rate:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage decay due to scale-up</td>
<td>NA</td>
<td>&gt;88%</td>
<td>&gt;81%</td>
<td>&gt;28%</td>
</tr>
<tr>
<td>Additional percentage decay for adults</td>
<td>NA</td>
<td>&gt;113%</td>
<td>&gt;111%</td>
<td>&gt;26%</td>
</tr>
<tr>
<td>Additional percentage decay for juveniles</td>
<td>NA</td>
<td>&gt;69%</td>
<td>&gt;76%</td>
<td>&gt;15%</td>
</tr>
<tr>
<td>Discount rate</td>
<td>NA</td>
<td>&gt;16%</td>
<td>&gt;100%</td>
<td>&gt;7%</td>
</tr>
</tbody>
</table>

**NOTES:** NA indicates not applicable—the analysis results in values greater than 100 percent (for percentage of treatment-group crime prevented) or less than zero (for the modifiers and discount rate). "\(>\)" indicates that the parameter must be greater than the threshold, while "\(<\)" indicates that the parameter must be less than the threshold for three strikes to be more cost-effective than early intervention. Parameter values assumed in the analysis are given in Tables 1 and 2, except for discount rate, which was 4 percent. No analysis was run for percentage of cohort treatable by a program, because that affects cost-effectiveness only through the targeting ratio.

Venile crime. Note that the findings are not sensitive to plausible changes in discount rate, for which conventionally assumed values are 5 percent or less.18

We also conducted a two-way threshold analysis in which we varied both pilot prevention rate and program cost. The analysis for parent training is shown in Figure 4. The star indicates our assumed pilot

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18In running the sensitivity analysis for the discount rate, we adjusted only the early-intervention rate, not the three-strikes rate. Adjusting the latter would have little effect on the outcome, because the profiles of costs and benefits for the three-strikes law do not vary greatly.
prevention rate and program cost. For every combination of prevention rate and program cost lying below the diagonal line, parent training is more cost-effective than the three-strikes law. For every combination above the diagonal, three strikes is more cost-effective. Thus, if the discounted value of parent-training program costs turned out to be $8,000 instead of our projected $3,000, and if the pilot prevention rate were 50 percent instead of 60 (point A in Figure 4), three-strikes would be more cost-effective. The same analysis is depicted for graduation incentives and delinquent supervision in Figures 5 and 6 (note that vertical scales differ). Here, we do not consider early-childhood interventions since the parameter values required for cost-effectiveness greater than three strikes are impossible to achieve (e.g., having to prevent more than 100 percent of an individual’s crimes).

The threshold graphs reflect the variation among the early-intervention alternatives in their cost-effectiveness relative to the three-
strikes law. The closer the star is to the diagonal, the smaller the parameter change required for three strikes to surpass the cost-effectiveness of the early intervention. As expected, these points are relatively far from the threshold line for parent training and graduation incentives since these programs are quite cost-effective relative to three strikes under our parameter assumptions. The point is much closer to the line for delinquent supervision since this program is only marginally more cost-effective under our assumptions. Thus, only a small change in parameter values would be necessary for delinquent supervision to be less cost-effective than the three-strikes law. Since such changes are well within our uncertainties, we do not conclude that delinquent supervision is more cost-effective than the three-strikes law. However, for graduation incentives, our assumed prevention rate would have to be 25 percentage points too high and our cost off by a factor of 3 for three strikes to be more cost-effective. It therefore seems prudent to conclude that it is not likely to be so.
Final Observations

Our analysis indicates that two early-intervention alternatives appear to be more cost-effective than one high-profile, widely endorsed incarceration alternative—California’s three-strikes law. We have already made the point that these results cannot be generalized to all other incarceration alternatives. Neither should it be inferred from our results that California’s three-strikes law is a bad deal for the state. No analysis can confidently demonstrate that the law’s projected 21 percent reduction in crime is not worth its $5.5 billion-per-year cost. In fact, it might be inferred from the initiative’s overwhelming approval by California voters that the state’s citizens think the benefits are worth the cost.

But it is worth noting that, at least according to this preliminary analysis, the graduation incentives and parent-training interventions could together reduce serious crime by 22 percent at a combined an-
nual cost of less than $1 billion. That would be a substantial increment to the projected benefits of the three-strikes law. If it is indeed worth $5.5 billion a year to reduce serious crime by 21 percent, it might be worth spending another $900 million a year to roughly double that reduction.\textsuperscript{19} Of course, that $900-million figure is very uncertain, but, at a minimum, it should be worth spending a fraction of that sum to verify the potential of such promising interventions.

\textsuperscript{19}Because parent training would make it unnecessary for some of its beneficiaries to need graduation incentives, and because both early interventions would divert youth from criminal careers and the consequent strike-related sanctions, the benefits are not strictly additive.