

# Benefit-Cost Analysis of Supermax Prisons: Critical Steps and Considerations

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This policy brief is part of a larger study on supermax prisons conducted by the Urban Institute's Justice Policy Center. The goal of the study, funded by the National Institute of Justice (NIJ), is to guide research on the goals and impacts of supermax housing and to provide corrections officials with information that can assist them in thinking about and conducting benefit-cost assessments of existing or proposed supermax facilities. In addition to this policy brief, the study will produce a Microsoft® Excel-based tool that will allow users to learn how to conduct their own benefit-cost analyses of supermax prisons.

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# Overview

During the past two decades, states have increasingly relied on super-maximum security units to handle their most violent and disruptive inmates. The hope is that greater order and safety will result, along with other corrections goals. But what exactly is the “bang for the buck” of supermax prisons? That is, how do the benefits compare with the costs of investing in these high-security correctional facilities? The question is important because supermax housing constitutes a significant investment of scarce resources and because of the greater emphasis states currently are placing on accountability and fiscal responsibility.

Benefit-cost analysis (BCA) is an economic analysis tool that can assist policymakers and corrections officials to determine whether investing in supermax housing likely represents an effective allocation of resources. This policy brief presents the basic steps involved in a BCA:

1. Clearly state the question under consideration.
2. Determine the perspective.
3. Identify benefits and costs.
4. Assign values to benefit and cost items and compare total benefits and total costs.
5. Address issues of uncertainty using sensitivity analysis.
6. Incorporate a time (temporal) dimension and discounting into the analysis.
7. Articulate the limitations of the methodology and the analysis.

We believe that benefit-cost analysis can be understood by policymakers and corrections officials, that it can be informed by their knowledge and insights, and that the critical decisions about what goes into a BCA should not simply be left to researchers and consultants. We also believe that if applied and interpreted with care and caution, this analytical tool can greatly assist states to make more informed and fiscally responsible decisions.





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# Introduction

The number of state correctional facilities doubled between 1974 and 2000, from 592 to 1,158 (Beck and Harrison 2001; U.S. Department of Justice, Law Enforcement Administration 1975). An important contribution to this growth has been the proliferation of super-maximum security prisons. Supermax facilities are the highest security level in most correctional systems, and are typically designed to control the most violent and disruptive inmates (Kurki and Morris 2001). Twenty years ago, only one state had a supermax, but by 1999, two-thirds of states operated some type of supermax prison or housing (Briggs et al. 2003; King 1999; National Institute of Corrections 1997).<sup>1</sup>

The increased use of supermax housing may be due to several factors. First, many policymakers and practitioners believe that prisons are harder to manage now than in the past. Some have argued, for example, that prison overcrowding created increased prison management problems (Riveland 1999a). Second, prison officials say that they are currently confronted with tougher inmate populations, such as gang members and drug dealers (Riveland 1999a, b). Third, an increase in public concern about violent crime, especially during the early 1990s, led to greater political support for “get tough” criminal justice policies (Austin and Irwin 2001). And finally, states allocated increasingly larger shares of their budgets to prison construction and operations in the 1980s and 1990s (Caplow and Simon 1999).

Regardless of the reasons, the fact remains that states have invested in supermax housing and continue to do so. Yet the fiscal situation confronting most states looks far different today than it did 10 to 15 years ago, as most states currently face significant reductions in state revenue (Campbell 2003). With the prospect that budgets will continue to shrink, states need more and improved information about how to allocate corrections funding. Such information is especially needed for supermax prisons (Riveland 1999b).

This policy brief provides an introduction to benefit-cost analysis (BCA), an analytic methodology that compares the benefits and costs of proposed or existing initiatives, such as programs, capital investments, and public policies.<sup>2</sup> The primary goal of the brief is to familiarize policymakers and corrections officials with this economic analysis tool, which can assist in determining whether investing in supermax security facilities constitutes an appropriate and effective allocation of resources.

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Section 1 briefly provides examples of practical applications of benefit-cost analysis. Section 2 provides an overview of the logic of benefit-cost analysis. Section 3 then details the specific steps a BCA entails. Section 4 extends this discussion by examining these steps in the context of supermax housing. Although we rely heavily on criminal justice examples throughout this brief, we also provide examples unrelated to criminal justice to better convey some concepts.

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# Practical Uses of Benefit-Cost Analysis 1

**W**hat are the potential gains of applying benefit-cost analysis to supermax housing initiatives? The following examples illustrate a few of the ways in which this analytical tool can help improve decisions about supermax initiatives. Benefit-cost analysis (BCA) can help us to:

- Identify more systematically than we otherwise might the potential benefits and costs associated with a supermax project;
- Consider the dollar values of, and the appropriateness of assigning values to, these benefits and costs;
- Compare a variety of supermax options, as well as other public policy options, in terms of whether they are cost-beneficial; and
- Think systematically about the specific goals, benefits, costs, and outcomes of a supermax.

Our central contention is that benefit-cost analysis can improve corrections-related decisionmaking. However, such improvement requires that those who request, perform, or use the results of BCAs have a solid understanding of the basic steps involved, the key issues that should be addressed, and the limitations of this analytical method.

For years benefit-cost analysis has been widely used in several policy areas, such as the environment and health care, to help determine whether certain programs should be supported.<sup>3</sup> Yet use of BCA remains a relatively uncommon approach in criminal justice research and policy.<sup>4</sup> There are, for example, relatively few criminal justice BCAs, and the few that have been conducted typically focus only on substance abuse treatment programs, some sentencing options, and incarceration (Welsh and Farrington 2000).

There are those who believe that the tide is turning. In the words of one researcher, “Criminal justice researchers and policymakers will increasingly be confronted with cost-effectiveness and benefit-cost analyses—whether they like it or not” (Cohen 2000, 266). This view is echoed by prison administrators, who have emphasized that they face increased pressure to become more “business-like” due “at least partly to external

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demands by policymakers and chief executives to demonstrate and explain [the] significant consumption of fiscal resources in the operation of prisons” (Riveland 1999a, 181).

One of the most important things to know about BCA is that it is not a substitute for an overall decisionmaking process. Rather, it should be an empirically based source of information that complements other parts of a larger process. Here are a few illustrative examples in which a benefit-cost analysis might help contribute to developing a sensible decision about supermax housing:

- A prison system operates with 3 percent of its prison beds at supermax-level security. Department of Corrections (DOC) officials want to assess whether the benefits of this existing resource allocation outweigh the costs.
- A prison system considers whether to add a new supermax facility or to expand an existing maximum-level facility to include supermax beds. Officials want to know which design option is relatively more cost-beneficial.
- Due to budget cuts, legislative staffers examine the benefits and costs of closing existing supermax units.

In each instance, a BCA could help corrections officials and policymakers make informed decisions based on the best available empirical evidence. But a BCA cannot ultimately solve debates, some of which may involve value-based judgments, about which of several strategies should be pursued. Rather, it can inform these debates and in so doing help promote rational, evidence-based practice and accountability.

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# Overview of 2 Benefit-Cost Analysis

**W**hat exactly is a benefit-cost analysis? It is a methodology in which all of the relevant benefits of a proposed or existing initiative (e.g., a program, policy, or capital investment) are compared to all of the relevant costs in dollar terms.<sup>5</sup> The ultimate goal of a BCA is to accurately and comprehensively value all relevant benefits and costs and show which of the two summed values is larger for a given initiative. The results of the BCA then can be used to inform such decisions as whether to fund a program (or stop funding it), build something (or shut it down), or institute new regulations (or scale back existing ones).

The most common results of a benefit-cost analysis are the presentation of (1) the net difference between benefits and costs (i.e., the total benefits minus the total costs) and

## What's the Difference between "Benefit-Cost Analysis" and "Cost-Effectiveness Analysis"?

Several analytical methods can be used to evaluate the "bang for the buck" of different spending initiatives. Two of the more common techniques include cost-effectiveness analysis (CEA) and benefit-cost analysis (BCA). Selecting the most appropriate technique for a specific evaluation is important. Understanding the critical differences between the two tools increases the chances that the most appropriate method will be applied.

A CEA can assess initiatives that aim to achieve the same goal or outcome (e.g., reduced crime). The value of benefits is assessed for a single "unit of outcome," such as the dollar cost for each averted robbery.

A BCA takes a cost-effectiveness analysis one step further and converts the outcome, as well as non-monetized costs, into dollars and generates a ratio that indicates the amount of benefits achieved for every dollar spent. A significant advantage of a BCA over a CEA is that it allows for comparison of initiatives that focus on fundamentally different outcomes (e.g., a program that aims to reduce crime and another that tries to reduce teen pregnancy).

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(2) the benefit-cost ratio (BCR, i.e., the total benefits divided by the total costs), as shown in figure 1. If the net difference is positive, then the total benefits outweigh the total costs, and if the net difference is negative, then the costs exceed the benefits. Similarly, if a benefit-cost ratio is greater than 1.0, then the initiative is cost-beneficial, and if it is less than 1.0, the costs outweigh the benefits.

The BCR is intuitive and convenient to use. We can say, for example, that we obtain \$3 of benefits for every \$1 spent. But it does not address the issue of scale. By contrast, the net difference does, enabling us to make comparisons between, say, a \$1 million and a \$10 million program. The difference is easy to grasp if we imagine a situation where two initiatives have identical BCRs: the initiative that is larger in scale will produce the greater total benefits even though it has the same BCR as the other initiative. Although the issue of scale is important, to simplify the discussions below, we focus on BCRs.

In addition to assessing whether a single initiative is cost-beneficial, a BCA can be used to compare the net difference and BCRs of a variety of initiatives. Benefit-cost analysis is especially useful for comparing programs and policies with different goals and outcomes. For example, because BCA results are expressed in the common metric of dollars, they can be used to compare the relative merits, expressed in monetary terms, of a new prison program and a new school.

Compare, for example, Project A and Project B. If the benefit-cost ratio for both Project A and Project B is greater than 1.0, then both projects are cost-beneficial (i.e., the benefits outweigh the costs). At the same time, if Project A's ratio is greater than Project B's (say, 2.20 for A versus 1.30 for B), then Project A is relatively more cost-beneficial than Project B. In this example, Project A results in \$2.20 of benefits for every \$1.00 spent, whereas Project B generates \$1.30 of benefits for every \$1.00 spent.

Figure 1 presents three examples of using BCRs to make decisions about supporting different initiatives. Case 1 considers whether buying an insulation kit would reduce a school's heating bill. Because the value of the benefits is greater than the value of the costs (or the benefit-cost ratio is 1.12, which is greater than 1.0), the insulation kit is a cost-beneficial purchase.

Case 2 compares two alternatives for improving the heating efficiency of the school. Here, both alternatives are cost-beneficial because their ratios are greater than 1.0. However, the water heater is relatively more cost-beneficial than the insulation kit (its BCR is 1.22 compared with 1.10 for the insulation kit).

Finally, Case 3 applies benefit-cost analysis to a school faced with two needs—purchasing a water heater or purchasing computer software—and, because of a fixed pool of funds, the necessity of selecting one or the other. In the example, the new water heater is more cost-beneficial (BCR = 1.22) than the new software (BCR = 1.11), suggesting that the school officials would gain more benefits, all else equal, by purchasing the water heater.

**FIGURE 1. Calculating Benefit-Cost Ratios**

$$\text{Benefit-Cost Ratio} = \frac{\text{Sum of Benefits in Dollars}}{\text{Sum of Costs in Dollars}}$$

**Case 1: The benefits of one option are greater than its costs.**

Administrators want to decrease the annual heating bill for one of the district's older schools. If the cost of a winter insulation kit is \$500 and it reduces the annual heating bill by \$600, then the BCR for the kit is \$600/\$500, or 1.12. The purchase is cost-beneficial because the BCR is greater than 1.0. The benefits of the kit accrue for one year only, because the kit would need to be replaced annually. (We discuss the issue of time periods for benefits and costs later.)

**Case 2: One option is relatively more cost-beneficial than a second option.**

Another option for reducing the heating bill is to install a more efficient water heater that would reduce the annual heating bill by \$1,100 per year. The purchase price of the water heater is \$4,500, with an annual operating cost of \$400. If only one year is taken into consideration, then the BCR is \$1,100/(\$4,500 + \$400), or 0.12. Purchasing the water heater is not cost-beneficial when a single year is considered.

However, unlike the insulation kit, the water heater can serve the school for many years. If the expected lifetime of the heater is nine years, then the cost is \$4,500 + \$3,600 (i.e., \$400 x 9 years), for a total cost of \$8,100. Over this nine-year period, the total benefits are \$9,900 (i.e., \$1,100 x 9), resulting in a BCR of \$9,900/\$8,100, or 1.22. Accounting for the total lifetime of the heater indicates that the water heater is cost-beneficial in and of itself (i.e., BCR > 1.0), and it is relatively more cost-effective than the insulation kit (1.22 > 1.12). (This example is illustrative only and so does not include factors such as discounting future operating costs and accounting for declining annual savings for an aging water heater.)

**Case 3: One public-spending project is less cost-beneficial than another.**

Benefit-cost estimation allows for the comparison of all types of initiatives. School administrators may have several issues that warrant attention in addition to the heating bill, such as improving the school's computer system. Say a software program allows teachers to calculate grades in less time and saves the school \$8,300 in personnel costs each year. The annual license fee for the software is \$7,500, resulting in a BCR of \$8,300/\$7,500, or 1.11. The administrators may only have the funds for one project. In this case, purchasing a new water heater is more cost-beneficial than purchasing new software (1.22 > 1.11), and so, all else equal, the administrators would gain more benefits by purchasing a new water heater.





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# Benefit-Cost Analysis: 3 Step by Step

The goal of this section is to provide the reader with a step-by-step understanding of how to conduct a benefit-cost analysis. As figure 2 shows, the first step involves framing the focus of the analysis—that is, articulating what exactly the question is concerning an existing or proposed initiative. The next step is to determine from whose perspective the analysis will be conducted. Pulling together the critical pieces of a BCA, such as identifying relevant cost and benefit items and assigning dollar values to these items, are the next steps. A BCA then involves an examination of any special considerations—for example, any areas where uncertainty in estimates or assumptions exist. The last steps consist of incorporating temporal dimensions and discounting issues, and stating explicitly the limitations of the analysis. Below, we discuss each of these steps in more detail.

## 3.1 Stating the Question

Before any data are collected, computations made, or results produced, the specific question that the analysis will strive to answer should be clearly stated. In other words, what exactly is the question being addressed? This may appear to be an obvious step, but quite frequently it is given insufficient attention. A benefit-cost analysis may focus on a single proposal, it may compare several proposals, or it may evaluate an existing program or policy. Refer to the second column of figure 2—possible questions could include, “Is building a new facility a cost-beneficial investment?” and “What is the benefit-cost ratio of an existing supermax facility?” Stating the question clearly at the outset will bring focus to the analysis and make subsequent steps considerably easier.

## 3.2 Determining the Perspective

From whose perspective is an initiative being assessed? Is a government agency, a rural community, an individual, or society as a whole interested in whether something is cost-beneficial for them? Thinking about the perspective is an essential part of benefit-cost analysis. Consider, for example, that those who receive the benefits of a particular initiative are often not the same as those who bear the costs. As Cohen (2000, 277) has emphasized, “Although crime reduction benefits are important social benefits, they might not

**FIGURE 2. Key Steps in Conducting a Benefit-Cost Analysis**

Steps	Examples
1. Clearly state the question under consideration.	<ul style="list-style-type: none"> <li>● Is building a new supermax facility a cost-beneficial investment?</li> <li>● What is the benefit-cost ratio of an existing supermax facility? That is, do the benefits of an existing supermax facility outweigh the costs?</li> </ul>
2. Determine the perspective.	<ul style="list-style-type: none"> <li>● The analysis will be from the perspective of a government agency (e.g., a department of corrections).</li> <li>● The analysis will be conducted from the perspectives of a government agency and of society.</li> </ul>
3. Identify benefits and costs.	<ul style="list-style-type: none"> <li>● The benefits may include fewer prison assaults and increased observance of prison rules.</li> <li>● The costs may include hiring additional correctional officers and providing specialized training for each new officer.</li> </ul>
4. Assign values to benefit and cost items and compare total benefits and total costs to determine net value and the benefit-cost ratio.	<ul style="list-style-type: none"> <li>● The benefit of avoiding one prisoner assault of a correctional officer is (hypothetically) \$1,200 based on DOC medical records.</li> <li>● The average hourly wage for an entry-level correctional officer is \$20 per hour.</li> <li>● Net value = total benefits (\$) – total costs (\$).</li> <li>● BCR = total benefits (\$) / total costs (\$).</li> </ul>
5. Address issues of uncertainty using sensitivity analysis.	<ul style="list-style-type: none"> <li>● BCR changes from 1.1 to 1.3, assuming a 10 percent reduction in assaults.</li> <li>● BCR changes from 1.1 to 1.6, assuming a 15 percent reduction in assaults.</li> </ul>
6. Incorporate time and discounting into the analysis.	<ul style="list-style-type: none"> <li>● This project will accrue benefits and costs for one year.</li> <li>● This project will accrue benefits and costs for many years.</li> <li>● The discount rate will be 7 percent, but it may be as low as 5 percent.</li> </ul>
7. Articulate the limitations of the methodology and the analysis.	<ul style="list-style-type: none"> <li>● This analysis does not include costs of increased domestic violence incidents.</li> <li>● This analysis uses wage data from 1999, the most recent year available.</li> <li>● This analysis does not reflect the governor’s opposition to this proposal.</li> </ul>

enter into the decision calculus of the public health agency.” Understandably, those who pay for an initiative may have a particular interest in costs and benefits that directly accrue to them. Indeed, it is for this reason that simply changing the perspective can change the outcome of a benefit-cost analysis. Here, we describe three perspectives: a government agency, society as a whole, and a local community.

Corrections officials may be interested in how a spending decision would affect the budget and operations of their agency, in this case the Department of Corrections (DOC).

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For example, whenever a DOC hires additional correctional officers, the associated costs typically are paid for by that agency's budget. These new staff positions probably have little or no cost implications for other government agencies. The DOC is the primary beneficiary of the additional staff (e.g., it will benefit from improved prison management). By contrast, individuals and agencies not affiliated with the DOC are unlikely to receive any benefits from the DOC's investment in more officers, though perhaps some reduction in recidivism might occur.

From the perspective of society as a whole, the bottom-line question is, Is society better or worse off as a result of this initiative? The societal perspective can differ significantly from a government agency's perspective, as the benefits and costs that society cares about may not be relevant to the DOC. Suppose that placing a prisoner in supermax housing reduces the allowable number of family visits to the prisoner. Conceivably, this could weaken the relationship between a supermax prisoner and his or her children, more so than being housed in the general prison population. To the extent that society cares about healthy and strong relationships between incarcerated parents and their children, the weakening of such relationships would be a cost from society's perspective. But, in all likelihood, the negative effects on children would not be considered a cost from the DOC's perspective.

The benefits from public investments generally are not equally distributed among individuals. Rather, they accrue to specific populations and subgroups within society. Consider the case of increased policing. During the 1990s, President Clinton made a pledge to put 100,000 additional police officers on the streets. The communities that received additional police officers were the primary beneficiaries of this national program; yet taxpayers from across the country paid for the additional officers.

The societal perspective is probably the one most often adopted in research and academic studies. Because these studies often assess a policy's impact on total social welfare, assuming the societal perspective is often appropriate. However, performing benefit-cost analyses from other perspectives is useful in many situations.

A third type of perspective is the community-level perspective. Some analysts have argued that the construction and operation of prisons economically benefit the communities in which they are placed. Indeed, the hope of job creation and increased tax revenue has led some communities to use lobbying techniques to increase the chance of obtaining a new prison (Duke 2000; Kilborn 2001; Schlosser 1998). These communities are often in rural areas that have experienced higher-than-average unemployment rates or declines in manufacturing jobs. A benefit-cost analysis from the local community's perspective would include the creation of local jobs as a benefit. At the same time, the additional jobs would be viewed as costs from both the DOC and society's perspectives, regardless of where the prison is built, because they are paid for with correctional budgets and taxpayer dollars.

Table 1 presents several examples of how the perspective of analysis affects the inclusion of benefits and costs in the construction of a supermax. Rows "a" and "b" show that improvements in prison management and reductions in prison assaults are two possible benefits (see section 4.1 for further discussion of these benefits). Because both of these

**TABLE 1. Three Different Perspectives of Analysis**

BCA items	Perspectives		
	DOC	Society	Local community
a. Improved prison management	Benefit		
b. Fewer in-prison assaults	Benefit		
c. Improved postrelease success for general population prisoners	Benefit	Benefit	
d. Weakened family relationships of supermax prisoners		Cost	
e. Increased recidivism of supermax prisoners	Cost	Cost	
f. Increased mental health problems among supermax prisoners	Cost	Cost	
g. Increased domestic dispute incidents among prison staff and families of supermax prisoners	Cost	Cost	Cost
h. Additional property taxes	Cost	Cost	Benefit
i. Increased numbers of jobs	Cost	Cost	Benefit

benefits take place within the correctional system, they would apply only to the DOC perspective. Improved prison management would have no obvious direct impact on society at large or on the local community; thus, this benefit does not apply to the other perspectives shown in table 1. Similarly, fewer prison assaults would have no obvious bearing on society or the local community and would likely only directly benefit the DOC.

Row “c” shows another possible benefit of building supermax housing: improved postrelease outcomes of general population inmates, including reduced recidivism. This reduction is a potential indirect benefit of supermax housing. It may be the case, for example, that removing supermax prisoners from the general prison population would lead to a more orderly and safer correctional environment systemwide, which in turn would create opportunities for more rehabilitation and, ultimately, improved behavior among the inmate population after their release.

Some costs associated with new supermax units would apply to the societal perspective only, and not the perspective of the government (i.e., the DOC) or the local community. Weakened family relationships for supermax prisoners is one example (row “d”). As described above, to the extent that society values healthy family relationships, any negative impact on such relationships would be a societal cost. Yet neither the DOC nor the local community would likely be affected by changes in family relationships of supermax prisoners.

Some researchers and prisoners’ rights groups believe that imprisoning an individual in a supermax cell may result in increased recidivism of supermax prisoners after their release from prison. Increases in postrelease criminal activity would be a cost to society (row “e”). Increased recidivism would also be a cost to the DOC if an offender is returned to prison. In addition, some researchers and prisoner advocacy groups think that housing individuals in supermax-level confinement could result in increased mental health problems of these prisoners. As shown in table 1, row “f,” psychological harm, such as

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major depression or posttraumatic stress disorder (PTSD), would be a cost from society's perspective. Row "g" suggests a related cost, domestic disputes, among prison staff and the families of supermax inmates, which may arise from the stress associated with working in or having a family member in a supermax. This impact would be a cost to the DOC, society, and the local community, where many prison staff reside. (Assigning monetary values to these items is difficult. Section 3.4 addresses this issue.)

The last two rows of table 1, "h" and "i," illustrate instances where an item would be considered a cost from one perspective and a benefit from another. Part of operating a new supermax facility is paying property taxes, which is a cost from the DOC perspective. Property taxes are a cost to society as well, because taxes would be paid by the DOC and, thus, would be paid for by taxpayers. At the same time, for the community in which the prison would be located, property taxes would be a benefit, because it would be a new revenue source.

Table 1 illustrates some important lessons about conducting benefit-cost analyses:

- The relevant set of benefits and costs depends on the perspective of the analysis; and
- A benefit from one perspective can be considered a cost from another.

For any given perspective, both intended and unintended items should be included in a BCA. In table 1, for example, reducing recidivism may not be an explicitly stated DOC goal of adding supermax housing. However, if recidivism does decline, then this benefit should be included in a DOC-perspective analysis.

### **3.3 Identifying Benefits and Costs**

Creating a list of all of the relevant benefits and costs for a particular project is often one of the first steps of a benefit-cost analysis.<sup>6</sup> It can be a useful exercise in and of itself because it allows stakeholders to discuss the objectives, clarify project details, and identify impacts that would not have otherwise been considered. However, before developing lists of benefits and costs, we recommend, as emphasized above, first identifying the perspective of analysis.

#### **Articulating the Goals**

We also recommend articulating the goals of an initiative before creating benefits and costs lists. Although this step is not required, it often makes identifying benefits and costs an easier exercise. For instance, a substance abuse treatment program may aim to reduce prison-rules infractions or participants' postrelease drug use, or both. Identifying the goals up front ensures that the analysis includes important benefit and cost measures. In this instance, improved rule compliance could be measured by the number of reported infractions, while improved postrelease drug use could be measured by the frequency or levels of drug use. Including measures of goals is critical because the omission of any important measures can substantially alter the results of a benefit-cost analysis.

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## Including “Less than Obvious” Items

All initiatives will have benefit and cost items that are fairly easy to identify. The challenge in conducting a thorough BCA is to identify items that are not readily apparent but that nonetheless should be included. We use an example of a proposed highway exit ramp to illustrate this point. One fairly obvious benefit that would result from a new highway exit is reduced travel times to the highway from certain destinations, and obvious costs include materials and labor to construct the new ramp. But perhaps the new highway exit would also allow ambulances to reach the local hospital in less time; this should be counted as a benefit. And perhaps the new ramp creates environmental damage at the construction site; this should be counted as a cost. Such items are not necessarily obvious considerations at first, yet they clearly should be included in a benefit-cost analysis of the proposed highway exit.

Consider a second example to illustrate some less-than-obvious items: what are the benefits and costs of an in-prison program for convicted drug dealers? This program may strive to reduce drug selling and to help program participants rely on legal sources of income. An apparent benefit is a reduction in the number of drug-related crimes committed by program participants and an apparent cost is the salaries of program instructors. But a less-than-obvious benefit may be a reduction in crime in the neighborhoods where drug sales took place. In terms of cost items, people who rely financially on drug sellers may also incur costs. If a family’s primary source of income is money from drug sales, then their income may be reduced if wages from legal employment are lower relative to illegal income. It is precisely these exercises in logic that can help in developing complete lists of benefits and costs.

## Deciding What to Include

In general, whether to include a benefit or cost item in an analysis can be determined by answering the following question:

*Will the cost still be incurred (or the benefit still be accrued) if the initiative being considered is not undertaken?*

If the answer to this question is yes, then that item would not be included in a BCA. In other words, the cost would occur (or the benefit would accrue) regardless of whether the initiative is undertaken. If the answer is no, then that item would be included in the BCA because this cost or benefit would exist only if the initiative is undertaken. Put differently, items that should be included in a BCA are those that would change based on the initiative under consideration.

Understanding this concept is crucial to identifying a correct and complete set of items to include in a BCA. Table 2 uses an example of the construction of a new hospital wing to illustrate this point. Which of the costs listed in table 2 are appropriate to include in a BCA? Asking the above question (Will these costs be incurred if the hospital wing is not built?) helps to determine which cost items are appropriate for inclusion. Wages for

nurses who work in the new unit should be included, while wages for nurses in existing wings should not. This second group will be employed regardless of the addition of the new wing. Similarly, the cost of food for the additional patients should be included, while wages of cafeteria workers should not because the cafeteria will operate (or incur costs) regardless of whether the new wing is built.

When thinking about costs, it should be emphasized that budgeting and accounting practices rely on standard terms and definitions to categorize costs. For example, there are fixed costs, incremental or marginal costs, and opportunity costs. Each type may be included in a BCA, depending on the specific initiative under evaluation. Here are three types of costs that frequently play a role in benefit-cost analysis.

**TABLE 2. Relevant Cost Items for a New Hospital Wing**

● Construction costs of new wing	Yes
● Original construction costs of existing wing	No
● Nurses hired for the new unit	Yes
● Nurses working in existing units	No
● Human resources staff	No
● Cafeteria staff	No
● Construction costs of cafeteria	No
● Per-patient cost of food	Yes
● Additional property taxes for the expansion	Yes

- A fixed cost is one “that remains constant, in total, regardless of changes in the level of activity within the relevant range” (Garrison and Noreen 2000, 58). In other words, a fixed cost is all or nothing and does not change with the size or amount of activity. Common types of fixed costs include purchase price and start-up costs. Referring back to our school heating example (figure 1), the purchase price of a new heater is a fixed cost because it will not change based on how much the heater is actually used. Fixed costs should be included in some, but not all, benefit-cost analyses. Inclusion depends on the details of each individual initiative. If a fixed cost occurs as a direct result of an initiative, then it should be included in the BCA. As shown in table 2, construction costs for a new hospital wing would be incurred only if the new wing was approved. However, construction costs associated with the original hospital are irrelevant and would not apply to a BCA of the proposed wing.
- Another type of cost is an incremental, or marginal, cost. Unlike fixed costs, incremental costs are not “all or none.” Incremental costs change based on the size of a project or the level of activity. For example, the total cost to feed prisoners depends on the number of prisoners; the total personnel costs of a facility depend on the number of correctional officers and other staff members.
- Finally, the concept of opportunity costs also is an important consideration in benefit-cost analysis. An opportunity cost is the cost associated with giving up an opportunity or passing up the next best choice when making a decision. Opportunity cost is often an important element of public expenditures, as the funding of one initiative often precludes the funding of other initiatives.

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Additional types of costs, as well as definitions of key BCA terms, are listed in appendix A. However, as a review of fixed, marginal, and opportunity costs alone should suggest, a BCA requires careful consideration of the question and perspective under examination, because it is this question that will largely affect which benefits and costs, including types of costs, are included. And, as emphasized above, the accuracy of the benefit and cost list improves if less-than-obvious items are considered.

### 3.4 Assigning Values to Benefits and Costs

Once the benefits and costs of an initiative have been identified, we can move to the next step of a BCA, assigning dollar values to these items. As we have discussed, the results of a benefit-cost analysis include the net difference in benefits and costs (i.e., total benefits minus total costs) and a benefit-cost ratio (i.e., total benefits divided by total costs). These measures, which require the assignment of dollar values to all benefits and costs, allow for comparisons of diverse programs and policies with different goals and different outcomes.

The exercise of assigning values to, or monetizing, benefit and cost items is controversial in many policy areas, criminal justice among them. There are philosophical differences about whether certain types of benefits and costs can be and should be

assigned dollar values. The debate generally surrounds valuing “intangible” items as opposed to “tangible” items. Tangible costs are items that typically pass through the market system and have a price, such as articles of clothing or computer equipment. Intangible costs and benefits are unlikely to pass through the market system (e.g., pain and suffering) and therefore do not have a price. Nonetheless, they are of value to society.

One side of this debate argues that a comprehensive BCA must assign monetary values to all relevant benefit and cost items. From this view, society implicitly assigns a dollar value to everything and, therefore, a BCA should assign a dollar value to every item. The other side of this debate holds that certain items should not be assigned values for at least one of the following two reasons: (1) lack of data, which makes it essentially impossible to estimate the monetary value of certain

#### Philosophical Differences: Using the “Right” Measures and Values

Identifying ways to measure benefits and costs and then assigning them values is rarely an easy task. Policymakers, administrators, and researchers may have different ideas about what is the “right” way to measure specific benefits and costs. For example, a warden’s idea about the best measure of prison safety may be different from a researcher’s. A legislator may believe that the value of a benefit is significantly higher than what a corrections administrator believes. Rarely is there one “right” or correct measure. The strength of a BCA ultimately rests on whether key stakeholders agree that relevant measures of the benefits and costs of an initiative are included and, in turn, that appropriate strategies for assigning values have been adopted.



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items, or (2) the view that some items should not, on principle, be assigned dollar values. One example of the former is an individual's sense of safety. The amount of money we as a society spend on local law enforcement and security-related items illustrates the importance we place on feeling safe. At the same time, it is difficult to estimate in dollars what personal safety is worth. One example of the latter is pain and suffering. Some people may believe that it is inappropriate to put a dollar value on a human life or on human suffering because these essentially are "priceless" (Hahn and Wallsten 2003). We will not delve further into the details of this debate, but we wish to make readers aware that assigning dollar values to benefit and cost items can be a controversial aspect of a BCA.

The U.S. Office of Management and Budget (OMB) publishes general guidelines that provide a summary about the assignment of values and other key issues involved in performing benefit-cost analyses. The guidelines are included in the OMB publication, "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs," Circular No. A-94 (U.S. Office of Management and Budget 1992). Articles that discuss the difficulties of assigning values in benefit-cost analyses include Zedlewski (1987), Greenberg (1991), Lynch (1994), Zimring and Hawkins (1995), and Piehl et al. (1999).

### 3.5 Dealing with Uncertainty

BCAs are often based on assumptions or predictions about what will happen in the future, which in turn can greatly affect the results of a BCA. At least two types of uncertainty exist. The first is when we can be relatively confident about the accuracy of our estimate (e.g., on average, two-thirds of inmates will be rearrested [Langan and Levin 2002]), but we know that there may be a wide range of values that nonetheless are possible (e.g., re-arrest rates among states may be substantially lower or higher than the national average). The second type is when we have little empirical foundation for estimating the value of a particular cost or benefit (e.g., we may have no studies that tell us what the average rate of recidivism is for supermax inmates).

Accounting for the uncertainty of benefits and costs is an important and challenging aspect of benefit-cost analysis. The underlying logic is that the better the quality of the information that goes in, the better the quality of the results that come out. But inevitably, a BCA will encounter items that should be included yet come with some uncertainty. Fortunately, there are strategies available to deal with uncertainty—strategies that in turn contribute to higher quality analyses and confidence in the results.

One such strategy is "sensitivity analysis." Sensitivity analysis is a process of testing a range of values for a particular variable to see the extent to which the results will change. Such tests allow us to take into account the uncertainty associated with estimation of certain items. For example, does a benefit-cost ratio go from greater than 1.0 to less than 1.0 when a particular benefit is decreased? Does the net difference in benefits and costs go from a negative value to a positive value when one cost item is reduced?

### Some Key Terms Used in Benefit-Cost Analysis

**Tangible items:** Items that typically pass through the market system and have a price.

**Intangible costs and benefits:** Items that are unlikely to pass through the market system, and therefore do not have a price, but are of value to society.

**Present value:** To account for inflation, future benefits and costs are adjusted to reflect their present values. These adjustments are made using a discount rate.

**Sensitivity analysis:** The process of testing a range of values for a particular variable to determine the extent to which outcomes are affected.

**Note:** See appendix A for more terms.

Consider the example of a proposed new airport runway. The additional runway may look like a good decision when we assume that 10,000 flights will land and depart from this airport next year. Assume, for example, that the benefit-cost ratio is greater than 1.0 and the total benefits are larger than the total costs when the number of flights equals 10,000. However, if we assume that only 7,500 flights will use the airport and this results in the total benefits being less than the total costs (i.e., a BCA less than 1.0), then the runway may no longer look like a good investment. Suppose, on the other hand, that with 7,500 flights the BCR remains greater than 1.0 and the value of benefits is greater than the value of costs. Knowing that a more conservative estimate still results in a cost-beneficial outcome would allow us to be more confident about the decision to build a new runway, even though we still do not know precisely how many flights will use that airport next year.

## 3.6 Incorporating the Element of Time

Temporal dimensions—what we refer to here as the element of time—can play an important role in BCA results. Two time-relevant questions should be considered when framing an analysis: (1) Will benefits and costs be spread out over more than one year? (2) At what rates will future benefits and costs be discounted?

Too often, benefit-cost analyses take into account only a single year. Although this may be appropriate for some costs (e.g., an insulation kit that must be replaced every winter) and some benefits (e.g., a preventative medical exam that is performed every year), rarely does a BCA fit neatly into a 12-month period.

In many cases, benefits and costs accrue over several years, requiring a multiyear time frame to obtain accurate results. For example, if a job-training program provides participants with a marketable skill, this training will probably help participants for years to come and not just for the year in which they participated in the program. Similarly, if a new prison is constructed, then the construction costs may be spread out and paid over several years, what commonly is referred to as amortization.

What if benefits are “delayed”? There are instances where benefits are not realized until years after costs are incurred. A medical exam in 2003 may not save medical costs until 2005. An in-prison substance abuse program may not reduce recidivism until years after a prisoner is released. In such cases, there will be years in which only costs will incur

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and benefits will not accrue. Accounting for delayed benefits is another time-related issue that is important when conducting a benefit-cost analysis.

If an analysis includes multiyear benefit and cost items, then we must account for the value of money over time. Future benefits and costs should be adjusted to reflect the decreased value of money over time. The end result of such adjustments is to estimate the present value (PV) of total benefits and total costs, which allows for comparisons of the combination of both current and future benefits and costs. PVs depend on the rate at which future benefits and costs are discounted (i.e., reduced), otherwise known as a “discount rate.” The U.S. Office of Management and Budget publishes general guidelines on discounting and recommends using a rate of 7 percent for public investments.<sup>7</sup>

By its very nature of accounting for the future, a discount rate involves a degree of uncertainty. Different discount rates may produce different results and, therefore, it is one of the variables ideal for sensitivity analysis.

### 3.7 Limitations of Benefit-Cost Analysis

The quality of the results of any BCA rests on the quality of the data used and on all underlying assumptions. To improve understanding about how an analysis was performed and improve confidence in the results, being as explicit and clear as possible about the methods, assumptions, and values that went into a BCA is critical. Transparency will allow others to understand better the strengths and limitations of the analysis. This applies in particular to politically and analytically controversial issues.

We have already described advantages of using benefit-cost analysis to improve decisionmaking, but like all analytical methods, BCA has its limitations. Some limitations relate to the actual methods used to conduct a BCA. Others relate to the practical uses of BCA results. The more notable limitations are described below.

#### **BCA is only one part of a process.**

*Issue:* Benefit-cost analysis should be considered one part of a larger decisionmaking process and should serve as a supplement to other sources of information. Public expenditure decisions should not be based solely on the results of a benefit-cost analysis.

*Concern:* A public expenditure decision is based solely on the results of a BCA.

*Remedy:* Be as explicit and as clear as possible about how a BCA result fits into a “bigger picture” decisionmaking process and highlight other sources of information that might inform that process.

#### **Relevant items can be “hard to value.”**

*Issue:* In some cases, there will be a lack of consensus on the extent to which certain benefits and costs can, or should, be assigned dollar values. At one end of the spectrum will be the belief that all benefits and costs should be translated into dollars and cents. At the other end will be the belief that many types of benefits and costs are nonquantifiable and should not be put into dollars.

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*Concern:* The results of a BCA are discredited or dismissed because of disagreement with some assumptions and valuations. Unlike concerns about uncertainty, where the range of values is in question, the challenge here is that no value is appropriate.

*Remedy:* State explicitly where in the spectrum the analysis falls. Trying to have all stakeholders agree on a single position is not feasible. It may be useful to present results in which all controversial and hard-to-value items are excluded.

### **Data are missing or incomplete.**

*Issue:* Data on benefit and cost items that would be most appropriate are, unfortunately, often unavailable or incomplete. For example, a DOC may not collect information on the number or type of staff assaults. Or a DOC may intend to collect information on staff assaults, but in practice only a handful of facilities in the prison system actually record the information.

*Concern:* Results of an analysis are based on data that do not accurately reflect the true state of the world and subsequent recommendations therefore are premised on inaccurate results.

*Remedy:* Strive to include the highest quality data available. Be explicit about which sources of data are questionable. Use sensitivity analysis to test a range of values for items involving questionable data.

### **BCA does not account for political pressures and influences.**

*Issue:* Political pressures and influences from groups such as legislatures, executive agencies, advocacy groups, or lobby organizations are not typically incorporated in benefit-cost analyses.

#### **Politically Sensitive Issues**

Political pressures and influences are **not** accounted for in benefit-cost analysis. Regardless of whether the results of an objective analysis clearly recommend one option over another, political considerations may be the final determinant of whether that option should be pursued. This may be especially true with a high-profile issue such as supermax prisons. Suppose that both the construction of a supermax prison and the construction of a drug treatment center are under consideration. The political feasibility of appearing to be tough on criminals may be easier than offering treatment services, despite the results of a benefit-cost analysis.

*Concern:* These pressures can affect debates about a program or policy. A BCA may suggest that a particular initiative should not be pursued because it is not cost-beneficial. Politically, however, the initiative may be extremely important for one constituency or another. A BCA cannot address such considerations.

*Remedy:* Ensure that a BCA is only one source of information for making a decision and that political pressures are taken into account in the larger decisionmaking process.

### **BCA results are misused or misinterpreted.**

*Issue:* Consumers of BCAs—such as people who sponsor studies, read final reports, or cite existing studies—may not fully appreciate the lack of precision that often comes with benefit-cost results.

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*Concern:* There are two concerns. First, findings may be misused. For example, the BCA results of a new prison in one community may be used to help decide about a new prison in another community, yet the two communities may have different tax rates and prevailing wages. Second, findings may be misinterpreted. For example, a BCA presents an overall net savings and this may be thought of as endorsement for project approval, yet several hard-to-value cost items may have been excluded from the calculation.

*Remedy:* State explicitly the specific scenarios and contexts to which the BCA results do and do not apply.

### **BCA does not typically account for equity-related and procedural justice issues.**

*Issue:* The initiative being evaluated may include elements that are considered unfair or may be guided by arbitrary and subjective decisions. Measures of fairness, equity, and “procedural justice” are typically not accounted for in benefit-cost analyses.

*Concern:* Certain negative aspects of an initiative are not included in a decisionmaking process. For example, prisoners may be placed in supermax for seemingly arbitrary reasons, without some level of due process, and with no means for appeal. If true, such aspects would be relevant to deciding whether the supermax should be supported, but a BCA generally would not be able to include this dimension.

*Remedy:* Attempt to quantify levels of procedural justice or fairness. Highlight concerns about perceived inequities or injustices when describing the results of a BCA.

### **BCA is used to “make a case.”**

*Issue:* Benefit-cost analysis may be manipulated to support or discredit a particular initiative. For example, stakeholders may ignore benefits that are deemed counterproductive to their position or they may exclude costs that are thought to be of secondary importance.

*Concern:* This analytical technique may be used inappropriately to advocate for certain positions.

*Remedy:* Become an educated consumer of BCA results. Look for the inclusion of items that are counterproductive to the author’s position, which will allow you to gain confidence in the results. We are not suggesting that advocates of one policy or another should not use BCA. But such groups would be served well to give due attention to including items that do not support their position.

#### **Procedural Justice Concerns**

There currently is no comprehensive documentation of who is placed in supermax confinement and why they are placed there. Some states have guidelines for placement, while others do not. Even with guidelines, inappropriate placements may occur. This situation raises procedural concerns about whether sufficient “checks and balances” exist to prevent unfair placements in supermax confinement. Are decisions about supermax placement arbitrary? Are they perceived as arbitrary? Is there a factual basis for these decisions? Is some level of due process guaranteed? Are there avenues for appeal and/or periodic review of a decision? Answers to these and other questions could be important elements to consider but typically would not be addressed in benefit-cost analysis.

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We have covered many important aspects of conducting a BCA, such as determining the perspective of analysis, identifying benefits and costs, assigning dollar values, assessing uncertainty, accounting for the element of time, and stating the limitations of the analysis. A solid grasp of these steps, outlined in figure 2, should help readers become savvier in requesting, conducting, and interpreting benefit-cost analyses.

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# Applying Benefit-Cost Analysis to Supermax Housing

# 4

We now shift the discussion from benefit-cost analysis as a general analytical tool to some key considerations in applying this tool to supermax housing. The section begins by considering definitional issues, goals, and examples of specific policy questions associated with supermax facilities, including questions about whether building a new supermax facility would be cost-beneficial. The discussion then turns to a review of some of the major benefit and cost measures that should be included in a benefit-cost analysis of supermax housing. We briefly emphasize the fact that a BCA will generate potentially quite different answers if undertaken from the perspective of legislators rather than corrections officials, and conclude with a “start-to-finish” illustrative example of a BCA.

## 4.1 Definitions and Goals of Supermax Housing

Currently, there is no universally accepted definition of a supermax facility or a supermax unit. Some states use other terminology to describe units that would be considered supermax by other jurisdictions.<sup>8</sup> Figure 3 presents one definition of supermax from a 1996 survey of departments of corrections conducted by the National Institute of Corrections (NIC). The NIC definition provides a general sense of the motivations states have for operating supermax facilities and the types of prisoners placed in them.<sup>9</sup> According to NIC, supermax housing generally is the strictest level of security that segregates the most violent and disruptive prisoners from the general prison population. Supermax-level security is generally

**FIGURE 3. One Definition of Supermax Housing**

A freestanding facility, or a distinct unit within a facility, that provides for the management and secure control of inmates who have been officially designated as exhibiting violent or seriously disruptive behavior while incarcerated. Such inmates have been determined to be a threat to safety and security in traditional high-security facilities, and only separation, restricted movement, and limited direct access to staff and other inmates can control their behavior.

Source: National Institute of Corrections (1997, 1).

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characterized as single-cell confinement for 23 hours per day. It typically differs from other types of segregation in that placement can be for an indefinite period of time.

To make appropriate comparisons between supermax and non-supermax housing, applying a consistent definition is crucial. For example, it would be inappropriate and misleading to apply the results of a benefit-cost analysis of a supermax in one state to a facility that is fundamentally dissimilar in important respects. To facilitate appropriate comparisons, researchers and benefit-cost analysts ideally should collect information that enables them to answer questions about some of the critical dimensions associated with supermax housing, such as:

- What are the characteristics of the facility and do they correspond to those of a supermax as defined by the NIC (1997)? How do these characteristics differ from those of lower custody level prisons?
- What types of prisoners (e.g., offense type, age, gender, mental disability) are placed in supermax confinement?
- What types of in-prison behavior, preprison criminal records, or affiliations are necessary for a prisoner to be removed from the general population and placed in supermax?
- How are decisions made about who is placed in supermax housing?
- What are the day-to-day living conditions associated with the supermax housing (e.g., number of hours in isolation, level of interaction with staff, frequency of visitors)?
- Is there a minimum length of time that a prisoner is required to stay in supermax housing?
- What determines when, or if, a prisoner returns to the general prison population?

Answers to these questions are essential not only for comparisons of supermax housing across states, but also for comparisons between supermax and non-supermax housing within states. In the latter case, answers to these questions allow policymakers and corrections officials to distinguish more clearly whether supermax housing substantially differs from maximum-security housing.

The placement of the most violent and disruptive prisoners in supermax housing suggests that this alternative form of housing somehow increases safety throughout correctional systems. Indeed, review of the NIC report and other sources suggest that the two primary goals for operating supermax-level units are (1) to improve the overall safety in prisons for correctional staff and prisoners and (2) to improve management's ability to maintain order and control in prisons (Kurki and Morris 2001; National Institute of Corrections 1997).<sup>10</sup>

Observers of correctional trends believe that levels of stress and violence in correctional facilities have increased over the past 25 years, making it more difficult to maintain safe prison environments (Riveland 1999a, b). Supermax housing arguably contributes to systemwide prison safety by removing certain types of inmates from the



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## Supermax Prisons Primarily Focus on Achieving Correctional System Goals, Not Public Safety

The goals of supermax housing are, for the most part, geared toward improving in-prison environments, including order and safety. And so the primary beneficiaries of a supermax are people within the correctional systems, such as correctional officers and prisoners.

Public safety is rarely mentioned as a goal of supermax housing. In fact, there are questions about how such housing could result in improved public safety. Some possible mechanisms? Supermax prisons might reduce the recidivism of both general population and supermax inmates or deter would-be offenders in society.

However, because most general population inmates know that placement in a supermax is unlikely, it remains unclear whether a supermax would substantially deter this population. In addition, since supermax inmates constitute a small fraction of most prison populations (typically less than 5 to 10 percent, and less than 1 percent in many states), their contribution to aggregate crime rates may be minimal. Finally, there is little evidence that would-be offenders in society refrain from criminal behavior out of fear that they might be placed in a supermax. Nonetheless, even a small deterrent effect among general population inmates or members of society might result in sizeable reductions in crime rates.

Valuing public safety outcomes is one of the most difficult and contested aspects of benefit-cost analysis. In this report, we do not focus on valuing public safety benefits but on the more commonly cited goals of supermax prisons (i.e., order and safety). However, research does exist on ways to account for public safety gains in benefit-cost analyses (see Cohen 2000).

general prison population. These inmates typically are individuals who cannot be adequately controlled through standard disciplinary practices and may as a result commit violent acts on a frequent basis or incite others to do so. Prison safety may also be improved if supermax inmates are deterred by their supermax confinement from committing violence when they return to the general prison population. Since little empirical research on this issue exists, the safety hypothesis remains to be evaluated. Some studies suggest that supermax housing can contribute to safety, while others suggest that such benefits are unlikely and, even if they do exist, are likely to be outweighed by negative unintended effects (Kurki and Morris 2001; Ward and Werlich 2003).

Supermax housing may contribute to greater systemwide order and control in a similar manner to how it improves safety. Namely, removing the most disruptive and violent inmates prevents them from encouraging or causing others to violate rules and gives prison staff more time to focus on other inmates. As with the systemwide safety hypothesis, there are few empirical studies to support this claim. In addition, many discussions of safety and order make it difficult to understand how the two differ. One common view is that safety involves inmate and staff violence (e.g., physical injury) whereas order involves adherence to prison rules and procedures.<sup>11</sup> To use a school analogy, safety would reflect the extent to which students are physically assaulted or injured, whereas order would reflect the extent to which students conform to rules (e.g., raising hands before

### Who Are the “Worst of the Worst”?

#### South Carolina

“Inmates who have demonstrated an inability to conform to rules and regulations of Administrative Segregation and have a history of violent, assaultive, or disruptive behavior.”

#### Michigan

“Inmates who threatened or injured other prisoners or staff, possessed deadly weapons or dangerous drugs, disrupted the orderly operation of a prison, or escaped or attempted to escape in a manner that involved injury, threat of life, or use of deadly weapons.”

#### Federal System

Inmates who are deemed “the most dangerous and aggressive inmates in the federal system.”

Source: National Institute of Corrections (1997).

speaking, not walking around without permission). Because the two concepts are distinct, empirical tests of the safety and order hypotheses should employ distinct empirical measures (see the discussion in section 4.3 and the examples in figure 4).<sup>12</sup>

## 4.2 Benefit-Cost Analysis Applied to Supermax Housing

Clearly stating the question behind a benefit-cost analysis can make the entire undertaking easier, more relevant, and more useable. Below are some policy questions that may be of interest to legislators, agency officials, or researchers. In each instance, they generally imply an “opportunity cost” logic—that is, what else could the funds be used for besides a supermax? For example, would some other investment yield a greater benefit-cost ratio? The list that follows is far from complete, but it should provide a general sense of the different questions a benefit-cost analysis may answer and illustrate how the nature of the question dictates the perspective and details of the analysis.

- **What is the benefit-cost ratio of an existing supermax facility?** Today, at least 34 states operate supermax housing units. Whether existing supermax housing is cost-beneficial may be an issue that states will have to confront in the future.
- **Is building a new supermax facility from the ground up cost-beneficial?** Because prison populations likely will continue to grow, the decision of whether to build a new prison is an ever-present consideration. From a cost perspective, the decision to build a supermax facility is similar to the decision to build a new minimum, medium, or maximum security prison—cost items associated with building and operating a prison are often the same regardless of the security level involved. Similarly, the costs to feed and clothe a prisoner are probably the same no matter what the level of confinement. But there can be differences in costs. One example is the use of enhanced security measures. Supermax facilities typically have higher staff-to-prisoner ratios and rely more heavily on technology for control and surveillance.
- **What is the benefit-cost ratio of upgrading maximum-security units to supermax-security units?** Increasing the security level of an entire existing facility, or part of a

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facility, is another way to add supermax-level capacity. Identifying the appropriate benefits and costs of this option are more difficult than for building a new facility, as the incremental costs of an upgrade may not be as apparent as when constructing a facility from the ground up.

- **Should a supermax facility be closed based on cost considerations?** When state budgets are tight, the likelihood increases that state correctional facilities will be subject to economic analysis and review. This review increases the possibility of closing an existing facility. However, because most supermax facilities are relatively new (i.e., less than 20 years old) and because they still enjoy considerable political support, serious thought of closing many supermax facilities is unlikely.<sup>13</sup>
- **Would it be cost-beneficial to convert existing supermax units to lower security level units?** Interest in converting supermax units to lower security level units likely would be driven by a goal to save money. Politically, this may be a more palatable option than closing a facility.

Review of these questions should convey that simply asking if the benefits of supermax prisons outweigh their costs generally will only take us so far—we need to ask whether the benefits of building or closing a supermax facility, or of a supermax facility as compared with another alternative, outweigh the costs. In short, policymakers must examine specific investment options, and these options almost invariably will be determined by a specific policy issue (e.g., How can we most cost-beneficially create greater systemwide prison order?).

### 4.3 Measuring Benefits and Costs of Supermax Housing

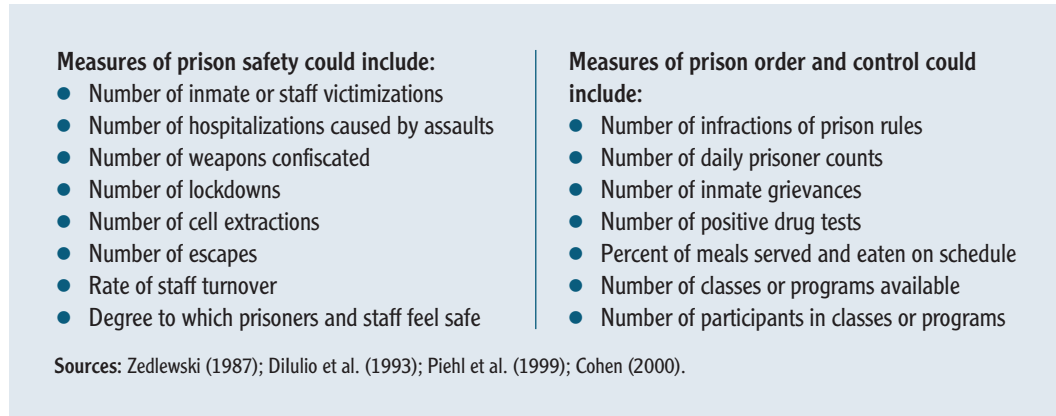
This section discusses some benefit and cost items that likely would be suitable for most benefit-cost analyses of supermax housing. Where appropriate, we note the perspective of analysis and items that distinguish supermax housing from other types of prison housing.

#### Benefits Measurement

If improving prison safety is a primary goal, as discussed in section 4.1, then achieving this goal would be considered a benefit in a BCA and we would need ways to assess whether safety has improved, declined, or stayed the same (if safety declined, it would be counted as a negative benefit and thus essentially as a cost). But how do we actually measure levels of safety in prison? Some of the more obvious measures relate to violence and injury, such as the number of staff or prisoner victimizations and the number of hospitalizations resulting from assault. Other, perhaps less obvious, measures might include the number of weapons confiscated or the number of lockdowns (see figure 4).<sup>14</sup>

Improving prison order and control is another major goal of supermax housing and would be counted as a benefit (or as a negative benefit, and thus a cost, if order declined).

**FIGURE 4. Possible Measures of Prison Safety and Order**



Examples of measures of prison order and control are also shown in figure 4 and include the extent to which prison activities occur on schedule, such as meals and classes, and the number of reported prison rule infractions.

Both order and safety would apply to a benefit-cost analysis that is done from the perspective of the government (e.g., the Department of Corrections). These benefits likely would not be realized by other perspectives, such as society as a whole or the community where a prison is located (for more information on this issue, see section 3.2).

### Costs Measurement

Whereas some of the benefits of supermax prisons may be unique, the costs of building and operating supermax prisons are, in many ways, the same as the costs of building and operating other types of prisons. For example, personnel costs for correctional officers, administrative staff, and management staff are applicable to a BCA of any type of prison. Utility costs of a facility, such as heat, electricity, and water, are another example of costs that should be included in a BCA of a supermax facility, as well as a BCA of any other type of confinement facility (see figure 5).

However, supermax costs likely differ from other prisons with respect to the surveillance and control techniques employed. For example, most supermax facilities have higher staff-to-prisoner ratios, which leads to higher personnel costs. Also, the fact that most supermax facilities are relatively new and strongly emphasize surveillance results in higher technology costs, such as camera systems and computer systems.

There are other cost considerations as well. Correctional officers may suffer from higher (or lower) stress levels when assigned to supermax housing. Stress is difficult to measure and value, but if supermax prisons affect it, then it should be included in a BCA, whether from the perspective of a correctional system or society. A weakened parent-child relationship for a child of a supermax prisoner is another example of an intangible and difficult-to-measure cost that could be important to include if supermax housing substantially affected it.

**FIGURE 5. Prison Cost Items and How They May Differ for Supermax Housing**

<p><b>Costs common to most prisons . . .</b></p> <ul style="list-style-type: none"><li>● Land where the facility is located</li><li>● Construction, including labor and supplies</li><li>● Facility utilities, such as water, electricity, and telephone service</li><li>● Personnel, including hiring, training, salaries, and benefits</li><li>● Security operating costs, such as alarm systems and surveillance cameras</li><li>● Food for prisoners</li><li>● Maintaining medical services</li></ul>	<p><b>Costs that may be higher for supermax prisons . . .</b></p> <ul style="list-style-type: none"><li>● Higher equipment and technology costs</li><li>● Higher staff-to-prisoner ratios</li><li>● Additional stress for correctional officers</li><li>● Weakened parent-child relationships because of fewer visits</li><li>● Reduced ability for prisoner to reintegrate into society successfully</li></ul>
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Ultimately, the actual measures used in a particular BCA will depend upon the specific interests of stakeholders and the availability and quality of data. Policymakers, practitioners, and researchers can, however, devise strategies to generate new, useful data. For example, to examine prison safety, conducting a new survey may be more attractive than using existing correctional data, since research indicates that prison records typically provide reliable and accurate information only for the most serious forms of violence, such as homicide (Reisig 2002).

### **Dealing with Uncertainty**

Conducting sensitivity analyses, or testing a range of values, can address the uncertainty that surrounds assumptions or empirical estimates used in BCAs and, at the same time, strengthen the confidence in BCA results. We obviously do not know with certainty how many fewer prisoner-on-prisoner assaults will occur after opening a supermax unit. But we can estimate benefit-cost ratios using a range of values, such as 10 to 25 percent fewer assaults. If the smaller impact is considered a conservative estimate (i.e., the impact is unlikely to be less than 25 percent) and the benefit-cost ratio is greater than 1.0 using this value, then we can be fairly confident that the reduction in the number of assaults will not affect the overall outcome of the analysis. Conversely, if the ratio switches from greater than 1.0 to less than 1.0 simply by changing the decrease in assaults from 25 percent to 10 percent, then the overall BCA results depend largely on the size of this reduction.

### **The Element of Time**

Recall that accounting for multiple-year benefits and costs is based on a discount rate and calculating the present value (see section 3.6). Multiyear items are likely to apply to supermax prisons, as large public investments typically have lifetimes of more than 12 months. For example, new or upgraded structures last for many years, and improvements in prison

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safety may be sustained for more than a year. For this reason, most BCAs of supermax prisons should be calculated using a multiyear time frame.

#### 4.4 Benefit-Cost Analysis Questions Involving Alternatives

As stated earlier, a benefit-cost ratio is the primary result of a benefit-cost analysis. The ratio is considered an absolute outcome. It tells us whether the benefits exceed the costs. If the BCR is greater than 1.0, the benefits exceed the costs; if the BCR is less than 1.0, the costs exceed the benefits. But we may also be interested in the relative outcomes of BCAs for public spending proposals that may not be related to supermax housing. For example, how does the benefit-cost ratio of a new supermax facility compare with the BCRs of proposals for such things as other prison safety options, public safety strategies, or new schools?

If improving prison safety is a primary goal, then the results of alternative prison safety strategies may be useful comparisons. A state-of-the-art system of security cameras may also strive, for example, to improve safety. If the benefit-cost ratio of a supermax proposal is less than the benefit-cost ratio of the camera system, then the camera system is

#### The Costs of Supermax Prisons from the Perspective of Supermax Prisoners

Prisoners who are held in supermax prisons often describe their experiences as traumatic (Haney and Lynch 1997). Haney (2003), for example, has reviewed literature on the impacts of incarceration on prisoners and suggests that the impacts are especially pronounced among supermax inmates: “There are few if any forms of imprisonment [like supermax incarceration] that produce so many indices of psychological trauma and symptoms of psychopathology,” including “an impaired sense of identity; hypersensitivity to stimuli; cognitive dysfunction (confusion, memory loss, ruminations); irritability, anger, aggression, and/or rage; other-directed violence, such as stabbings, attacks on staff, property destruction, and collective violence; lethargy, helplessness, and hopelessness; chronic depression; self-mutilation and/or suicidal ideation, impulses, and behavior; anxiety and panic attacks; emotional breakdowns and/or loss of control; hallucinations, psychosis, and/or paranoia; and overall deterioration of mental and physical health” (p. 53).

Any one of these conditions would give pause to most policymakers and practitioners. It should be emphasized, however, that few rigorous empirical studies exist that document the prevalence of these conditions among supermax inmates or a causal relationship between supermax confinement and development of these conditions (Kurki and Morris 2001).

Apart from mental health concerns, supermax prisoners may suffer additional personal costs, including a lack of access to educational and vocational programming. It is evident from the restrictive nature of supermax prisons that providing any kind of service is difficult, but this population of inmates particularly needs services.

To the extent that these types of costs arise, they bear mentioning in a BCA, even if they are not directly relevant to the perspective at hand. For example, increases in mental illness may not be directly relevant to systemwide prison order and safety, and so one might argue that they should not be included in a BCA conducted from the perspective of a corrections department. However, the issue clearly raises potential constitutional and human rights concerns, and so a BCA analyst would want to highlight the concern.

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relatively more cost-beneficial. If both outcomes are greater than 1.0, however, then both alternatives are cost-beneficial in absolute terms.

Most of the examples used here have been from the perspective of a Department of Corrections. But other perspectives, such as that of a state legislator, can be assessed. Legislators may have a broad range of options to consider, as they are often confronted with a variety of public spending alternatives. Thus, their perspective on supermax housing initiatives may differ significantly from a DOC's perspective. If, for example, they are contemplating how to allocate a specific amount of funding and face two competing alternatives—such as supermax prisons versus new schools—one way they could help decide which way to go is to compare the results of a benefit-cost analysis for each option and see which approach has the larger BCR.

#### 4.5 Example of a Benefit-Cost Analysis from Start to Finish

In this section, we provide a simplified example of a benefit-cost analysis—from framing the problem to reporting the results—to illustrate each of the requisite steps of a BCA (listed in figure 2). This example is also intended to illustrate some of the key considerations and issues discussed in this policy brief. Because it is meant to be illustrative, the example does not, as will be clear, cover all perspectives or benefits and costs.

**The Scenario.** Suppose that a state's Department of Corrections is struggling with how to reduce an unacceptable level of prisoner-on-prisoner violence throughout its prison system. One proposal is to remove the most violent prisoners from the general population and house them in a centralized, supermax security unit. This proposal entails converting an empty building on a maximum-security campus to a freestanding, operational supermax unit.

**Step 1: State the question.** Would upgrading a currently empty building from maximum security to a supermax security level and moving violent prisoners to this centralized unit be a cost-beneficial decision?

**Step 2: Determine the perspective.** The perspective of this BCA is that of a government agency—a state Department of Corrections. The DOC is only concerned with how the new unit will affect the budget and operations of the state's prison system.

**Step 3: Identify benefits and costs.** Based on the stated goal for the new supermax building, the following items could be included in this BCA. The first benefit, as shown in table 3, is the most obvious—reducing violence among prisoners (row “a”). The benefit of reducing violence between prisoners and correctional staff is also included (row “b”) because improvements in violence among prisoners may contribute to reduced violence involving correctional staff. This benefit would be realized by the DOC and, therefore, is appropriate to include with this perspective of analysis. A reduction in the number of violent incidents that require medical attention is another, fairly tangible benefit that could result. Less-obvious benefits are shown in rows “d” and “e”—decreased levels of stress among inmates and staff in the facilities from which supermax prisoners were removed.

Cost items for this scenario are listed in rows “f” through “j.” Although this proposal does not call for the construction of a new building, construction costs would be incurred

**TABLE 3. Benefit and Cost Measures for Step-by-Step Example**

	Measure	Baseline value
<b>Benefits could include . . .</b>		
a. Reduced violence among prisoners	Number of reported violent incidents among prisoners in one year	\$1,200 per assault
b. Reduced violence between prisoners and correctional officers	Number of reported violent incidents between prisoners and staff in one year	\$1,200 per assault
c. Fewer violent incidents that require medical attention	Number of hospitalizations in one year	\$2,500 per hospitalization
d. Less stressful living conditions for the general prison population	Number of prisoner grievances filed in one year	\$500 per grievance
e. Less stressful working conditions for the correctional staff	Number of sick leave days and personal days used by correctional officers	\$800 per day
<b>Costs could include . . .</b>		
f. Construction to upgrade the building, including labor and materials	Total construction-related upgrade costs	\$500,000
g. Purchasing and installing new surveillance equipment and control technologies, such as a security camera system and a computer system	Total purchase and installation costs	\$25,000
h. Correctional officer training on the procedures and responsibilities of working on a supermax unit	Fully loaded average hourly wage	\$20 per hour
i. Correctional officers who work in the supermax unit	Fully loaded senior-level hourly wage	\$30 per hour
j. Ongoing utility expenses	Total of monthly electric, heat, and water bills	\$4,000 per month

to upgrade the empty building to supermax security level. Costs associated with purchasing new equipment and hiring new staff would also be included. Once the building becomes operational, the costs of paying the wages of new employees and maintaining the building would be ongoing.

This analysis is from the perspective of the DOC and, therefore, all benefits and costs that apply only to the societal perspective or the local community perspective are not included. Because this example involves upgrading an existing building, the concept of incremental costs is very important (see section 3.3). Two cost items should not be included in this BCA and are worth noting:



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- Costs for prison management and administrative staff should not be included. Because the new supermax units would be incorporated into an existing maximum-security campus, the current management and administrative staff could add the supermax unit to their current responsibilities. In other words, no additional management or administrative staff would need to be hired. The annual cost of feeding, clothing, and providing standard medical care for supermax prisoners would not be included. Because the DOC is already paying for these services for the would-be supermax prisoners in other facilities, it would not incur any additional per-prisoner costs if the supermax unit were opened. This assumes, for the purpose of a simple example, that (1) the services at the maximum-security campus, such as the cafeteria and medical unit, can accommodate the supermax prisoners, (2) the state prison population would not increase as a result of this new unit, and (3) the daily cost to feed, clothe, and provide medical care is the same across all facilities.
  - Property taxes would not change, as the DOC was already paying taxes on the building.

**Step 4: Assign values to benefits and costs and compare totals.** In this step, shown in table 3, we add possible measures for the relevant benefit and cost items and assign values to them. The suggested measures for the benefit items (rows “a” through “e”) may be data that are already collected by the DOC. Although the quality of data would need to be investigated, such data may provide relatively low-cost ways to measure benefits. Rows “f” through “j” list possible cost measures for this scenario. These costs are all relatively straightforward to measure and could be information that is readily available from the DOC.

Based on the values listed in table 3, the total benefits equal \$640,000 and the total costs equal \$886,600, resulting, as table 4 shows, in a net loss of \$246,600. The benefit-cost ratio equals 0.72, showing that the proposed building upgrade would not be cost-beneficial under these conditions.

**Step 5: Conduct sensitivity analysis.** What pieces of information have the potential to vary significantly from the assumed baseline values shown in table 3, and how do they affect the results of the analysis shown in table 4? Table 5 shows a set of sensitivity analyses conducted on the reduction in assaults, on the value of an assault in dollar terms, and on the construction-related costs for upgrading the building to supermax security.

The first row for each assumption presents what we have assumed to be the baseline value, or the most likely value. The second row for each assumption shows the values that would have to exist for the scenario to break even—that is, not to gain or lose any money and be revenue neutral. The break-even scenarios assume the baseline values shown in table 4 for all items except the one on which sensitivity analysis is being conducted. The third and fourth rows illustrate what would happen to the overall results if values that are higher and lower than the baseline were to become reality.

As should be evident from the example, the BCA results can vary considerably depending on the values used, though in some cases the implications for a policy decision might be similar. For example, in the “reduction in prisoner-on-prisoner assaults” example, the

**TABLE 4. A Benefit-Cost Analysis from Start to Finish**

	Measure	No. units	Per unit value (\$)	Total (\$)
<b>Benefit items</b>				
Reduced violence among prisoners	Number of prisoner-on-prisoner assaults	150	1,200 per assault	180,000
Reduced violence between prisoners and staff	Number of prisoner-on-staff assaults	50	1,200 per assault	60,000
Fewer violent incidents that require medical attention	Number of hospitalizations	40	2,500 per hospitalization	100,000
Less stressful living conditions	Number of prisoner grievances filed	200	500 per grievance	100,000
Less stressful working conditions	Number of sick/personal days taken	250	800 per day	200,000
			<b>Total benefits</b>	<b>\$640,000</b>
<b>Cost items</b>				
Construction costs	Sum of charges related to construction			500,000
New equipment and technology	Cost of new equipment and technology			25,000
Staff hiring and training	Personnel costs for hiring and training	80	20 per hour (average)	1,600
Ongoing personnel costs <sup>a</sup>	Personnel costs for five new officers	10,400	30 per hour (senior level)	312,000
Utilities	Additional amount of monthly utility bills	12	4,000 per month	48,000
			<b>Total costs</b>	<b>\$886,600</b>
a. For the purpose of showing a straightforward example, we assume a one-year time period.				
<b>Summary of Results</b>				
	Total benefits	\$640,000	Net (benefits minus costs)	(\$246,600)
	Total costs	\$886,600	Ratio (benefits divided by costs)	0.72

low and high estimates (rows 3 and 4, respectively) both result in BCRs that are less than 1.0. This indicates that even the use of the most generous (high) estimate of reduction in prisoner-on-prisoner assaults reveals that the investment is not cost-beneficial. By contrast, in the last example (“construction/upgrade costs”), whether the investment is cost-beneficial depends entirely on whether the low or high estimate is used. When the low value of \$200,000 is used, the BCR is 1.09 (with a net gain of \$53,400), and when the high value of \$700,000 is used, the BCR is 0.59 (with a net loss of \$446,600).

Clearly, the results of a benefit-cost analysis will be largely a function of the level of change in certain measures (e.g., the change in the number of assaults) and the

**TABLE 5. Sensitivity Analysis of Selected Assumptions**

Assumption	Value per year	Net gain or loss	Benefit-cost ratio
Reduction in prisoner-on-prisoner assaults	150 (baseline)	Loss of \$246,600	0.72
	355 (break-even level)	No loss or gain	1.00
	75 (low)	Loss of \$336,600	0.62
	300 (high)	Loss of \$66,600	0.92
Cost per prisoner-on-prisoner assault	\$1,200 (baseline)	Loss of \$246,600	0.72
	\$2,844 (break-even level)	No loss or gain	1.00
	\$500 (low)	Loss of \$351,600	0.60
	\$2,000 (high)	Loss of \$126,600	0.86
Construction/upgrade costs	\$500,000 (baseline)	Loss of \$246,600	0.72
	\$253,400 (break-even level)	No loss or gain	1.00
	\$200,000 (low)	Gain of \$53,400	1.09
	\$700,000 (high)	Loss of \$446,600	0.59

monetary values assigned to these measures. It will almost inevitably be the case that assessments of these changes and the methods used to monetize the changes will rely on questionable data and assumptions. And in some cases, we simply cannot know, even with good data and research, what exactly the expected change will be. For this reason, it is imperative that those who conduct and use BCAs be aware of this possibility and factor it into their judgment about how to present and use the BCA results.

**Step 6: Incorporate time and discounting into analysis.** The sample calculations used here, for the sake of illustration, cover a one-year period. For simplicity's sake, we have not included discounting of future costs and benefits. However, in reality the costs and benefits of upgrading an existing building would likely span a multiyear period. For example, the government may need to pay the costs of construction for several years. Similarly, the benefit of reducing prisoner-on-prisoner violence may accrue for several years. And the costs of operating the newly opened building will certainly be incurred for years to come. A comprehensive BCA for this scenario would need to incorporate time and discounting into the analysis.

**Step 7: State the limitations of the methodology and analysis.** Articulating the limitations of an analysis is an important final step of BCA, allowing others to understand better the strengths of and potential problems with an analysis. This in turn helps others have greater confidence that the results are not systematically biased. A few limitations of the example presented here are worth noting. The first limitation relates to measuring the primary objective: reducing in-prison violence. The quality of the results is, in part, based on the quality of the data used to measure in-prison violence. In this example, the DOC may not have a reliable system for recording incidents of violence, either between prisoners and staff or among prisoners. Perhaps some correctional officers do not report all incidents involving violence. Perhaps rules about the types of events that should be

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reported vary across prisons. These possibilities can lead to concerns about data quality and in turn reduce confidence in the results. One partial remedy is, however, to test several levels of assaults to discern how sensitive the results are to the data.

A second limitation is the uncertainty behind the outcomes of opening a supermax unit. Corrections officials expect that in-prison violence will decline if the most violent prisoners are segregated. The extent to which violence actually declines is an important piece of the analysis, but it comes with uncertainty. No one can say for sure how much violence will decline in the future (if at all). Informed guesses or estimates based on prior experiences are probably the best we can do. Like all projections, what actually happens in the prisons may be quite different from our best estimates. Again, testing a range of reduction levels can shed light on this limitation (e.g., table 5 tests a low of 75 assaults and a high of 300 assaults).

Two other limitations merit brief mention. Some may argue that reduced stress is something that cannot be quantified and, therefore, should not be included in the analysis. And some may claim that if placement in supermax is unpredictable or perceived to be unjust, stress levels in prisons could actually increase. In these and other cases, being honest and explicit about possible weaknesses of an analysis brings credibility and increases the chances that the BCA results will be used appropriately to facilitate effective decisionmaking.

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# Conclusion 5

**B**enefit-cost analysis can be a useful and practical analytical tool and can positively contribute to larger decisionmaking processes of supermax initiatives. The steps presented in this policy brief represent the key ingredients to conducting a practical, comprehensive, and well-defined BCA.

Ultimately, any analysis is only as good as the foundation on which it rests, and BCA is no exception. Part of that foundation includes using complete and reliable data and undertaking rigorous analyses of program and policy impacts. It also includes explicit discussions about the scenarios to which the analysis does and does not apply, and the conditions and assumptions that might significantly alter the BCA results.

It is our hope that, armed with an appreciation of the steps and issues discussed in this report, policymakers and practitioners will be better able to request and use benefit-cost analyses to inform and improve their decisionmaking.

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## Endnotes

1. In this report, supermax “housing” and “prisons” both refer to stand-alone supermax facilities, as well as supermax units or beds within another facility.
2. “Benefit-cost analysis” is the same as “cost-benefit analysis” (CBA). We prefer the BCA nomenclature because it places benefits first, indicating how much benefit, in dollars, one obtains for every dollar spent (i.e., the cost)—this approach seems more in keeping with how one typically thinks about an investment (e.g., if I invest \$1.00 in X, how much will it be worth at some later time?). The CBA approach inverts the ratio and indicates how much cost is involved for every dollar of benefit.
3. See, for example, Hanley and Spash (1995) and Brent (2003).
4. Roman and Harrell’s (2001) analysis constitutes one of the few exceptions. See Cohen (2000) for a general overview of benefit-cost analysis in the criminal justice system.
5. The U.S. Office of Management and Budget (1992) defines a benefit-cost analysis as “a systematic quantitative method of assessing the desirability of government projects or policies when it is important to take a long view of future effects and a broad view of possible side effects” (p. 11, Appendix A). By contrast, it defines a cost-effectiveness analysis as “a systematic quantitative method for comparing the costs of alternative means of achieving the same stream of benefits for a given objective” (p. 12, Appendix A).
6. Our discussion here relies heavily on Cohen (2000).
7. Appendix C of OMB Circular A-94 provides more detail on debt financing of public investments (U.S. Office of Management and Budget 1992). For a step-by-step example of applying a discount rate and calculating a present value, see Allen Lynch’s example of a prison construction project (1994).
8. Texas, for example, calls its supermax housing “administrative segregation housing,” but this housing in most respects reflects what the National Institute of Corrections terms supermax. Similarly, in the 1990s, Ohio built what it called a supermax facility. But in recent years the Ohio Department of Rehabilitation and Correction has begun calling it a “level 5” institution.
9. The definition may not accord with definitions employed by specific states, and, according to some researchers, it is less than ideal (King 1999). However, no other definitions have been developed and applied on a national basis.
10. Few states clearly list the goals of supermax housing, but simply state that the housing is for the most serious and violent offenders. When goals are stated, they include a range of possibilities other than systemwide safety and order, including increasing public safety, punishing disruptive and violent inmates, and rehabilitating general population inmates or supermax inmates who, for various reasons, may not benefit from programs in traditional correctional housing environments.
11. A good overview of these concepts and competing definitions is provided in Sparks, Bottoms, and Hay (1996).
12. It should be emphasized that levels of prison safety and prison order may not necessarily be associated with one another. For instance, a high-security facility with strict rules and limited prisoner movement may still have high rates of assault. Conversely, a safe facility may experience very little violence but also may not be terribly orderly.
13. Closings are, however, possible. For example, Maryland opened a new supermax facility in 1989 but recently has discussed tearing it down (Fesperman 2003).
14. Several sources provide many examples of measures that can be used for examining the impacts and operations of prisons: Burt (1981); DiIulio et al. (1993); and Bottoms (1999).

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# Definitions and A Key Terms

**Amortization:** The gradual payment of debt over a period of time, generally including payment of the principal and interest.

**Direct cost:** A cost that can be easily and conveniently traced to the particular cost object under consideration.\*

**Discount rate:** The rate at which future benefits and costs are discounted to obtain a present value.

**Fixed cost:** A cost that remains constant, in total, regardless of changes in the level of activity within the relevant range. If a fixed cost is expressed on a per unit basis, it varies inversely with the level of activity.\*

**Incremental cost:** A cost that varies based on the size of an initiative or the level of activity.

**Indirect cost:** A cost that cannot be easily and conveniently traced to the particular cost object under consideration.\*

**Intangible cost or benefit:** An item that is unlikely to pass through the market system, and therefore does not have a price, but is of value to society.

**Opportunity cost:** The costs associated with giving up an opportunity or passing up the next best choice when making a decision.

**Present value:** To account for inflation, future benefits and costs are adjusted to reflect their present values. These adjustments are made using a discount rate.

**Sensitivity analysis:** The process of testing a range of values for a particular variable to determine the extent to which outcomes are affected.

**Tangible cost or benefit:** An item that typically passes through the market system and has a price.

\* Definition from Garrison and Noreen (2000).





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