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R E P O R T

Valuing Benefits in Benefit-Cost Studies of Social Programs

Lynn A. Karoly

Sponsored by the John D. and Catherine T. MacArthur Foundation

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This study was funded through a grant from the John D. and Catherine T. MacArthur Foundation. The research was conducted within RAND Labor and Population, a division of the RAND Corporation.

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Preface

Benefit-cost analysis (BCA) has garnered increased interest among both public- and private-sector decisionmakers who seek to make choices between social programs that aim to improve the lives of children, youth, and families. However, application of the benefit-cost approach for evaluating social programs has yet to reach maturity. One important challenge for analysts is to devise appropriate “shadow prices,” or dollar valuations, for the various program benefits—in other words, the economic values to attach to the short- and long-term outcomes that may be affected by a given social program.

This study assesses the state of the art with respect to the measurement and use of shadow prices in the application of BCA to social program evaluation. The study provides a review and synthesis of the social programs for which high-quality evaluations have been conducted and the subset for which BCAs have been performed. The short- and long-term outcomes that were affected and the outcomes for which shadow prices have been generated are documented for the programs with favorable effects. The resulting review classifies outcomes in three broad groups: (a) outcomes where there is a more-established methodology for generating economic values; (b) outcomes where economic values have been generated but the literature has not reached consensus on the appropriate methodology for deriving them; and (c) outcomes for which economic values are rarely, if ever, calculated. This classification suggests directions for future methodological work to advance the use of BCA in evaluating social programs.

The study was funded through a grant from the John D. and Catherine T. MacArthur Foundation as part of its initiative called The Power of Measuring Social Benefits. The report should be of interest to decisionmakers in the public and private sectors and to researchers and practitioners who seek to use BCA to assess the economic returns from investing in social programs.

This research was undertaken within RAND Labor and Population, a division of the RAND Corporation. RAND Labor and Population has built an international reputation for conducting objective, high-quality, empirical research to support and improve policies and organizations around the world. Its work focuses on labor markets, social welfare policy, demographic behavior, immigration, international development, and issues related to aging and retirement, with a

common aim of understanding how policy and social and economic forces affect individual decisionmaking and the well-being of children, adults, and families.

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Summary

There is growing interest in the application of benefit-cost analysis (BCA) to evaluate the economic returns from investing in social programs that seek to improve the lives of children, youth, and families. The use of BCA for this purpose requires estimates of the economic value, or “shadow price,” associated with the various short- and long-term outcomes that may be affected by a particular social program. This study assesses the state of the art with respect to the measurement and use of shadow prices in the application of BCA to social program evaluation and identifies directions for future methodological research to strengthen the use of BCA to assess the economic returns from investing in such programs.

The study examines 39 effective social programs whose effects have been evaluated using scientifically rigorous methods. These programs were selected because they have been identified by one or more of three organizations that screen social programs for the soundness of their evaluations and evidence of their effectiveness:

- the Blueprints for Violence Prevention project at the University of Colorado at Boulder (10 “Model” programs)
- RAND’s Promising Practices Network (20 “Proven” programs)
- the Coalition for Evidence-Based Policy (20 “Social Programs That Work”).

The 39 programs intervene with populations across the life course and often work simultaneously with two generations (i.e., parents and children). They can be categorized into the following social policy areas: early childhood interventions (10 programs); K–12 education interventions (7 programs); general youth development programs (1 program); mental health supports and behavior modification interventions (6 programs); substance abuse prevention programs (5 programs); teen pregnancy prevention programs (2 programs); crime/violence prevention programs (3 programs); and adult employment and welfare programs (5 programs).

The outcomes affected by these social programs are diverse across programs, and often within programs, with measured favorable effects in such domains as physical and mental health; individual and family behavior; motivation, approaches to learning, and other noncognitive skills; child maltreatment; cognitive skills, school achievement, and other education outcomes; crime and delinquency; smoking, substance abuse, and other risky behaviors; contraceptive use and teen pregnancy; employment and earnings; utilization of social welfare programs; and utilization of other services (e.g., health care, child welfare systems). All 39 programs have proven effectiveness in settings within the United States.

One or more BCAs have been conducted for 22 of the 39 programs, either a BCA specific to the program itself or one that is part of multiprogram BCA studies conducted by independent analysts. The fact that only about one in two social programs with a proven track record of effectiveness has an associated BCA indicates that many social programs produce outcomes that cannot be readily translated into dollar benefits, given the current state of the art, and thus cannot be assessed in an economic framework. Key findings from a comparison of the outcomes measured in the evaluations and the monetization of benefits in the BCAs studied here include the following:

- **Many important benefits that accrue from effective social programs are rarely, if ever, monetized.** Certain favorable outcomes of social programs are generally not monetized in benefit-cost studies. These include benefits in the domains of cognition (e.g., IQ), socio-emotional behavior, mental health, and family behavior (e.g., parenting skills or adult-child interactions). To a lesser extent, academic achievement measures such as test scores and grades are also not directly monetized. For some programs, these benefits may be a subset of the outcomes measured, and other benefits may accrue in domains that can be monetized. In such cases, analysts focus on valuing enough benefits so that the benefit-cost ratio is greater than 1 and then argue that their estimates of the economic returns are conservative. For other programs, however, the main benefits accrue in the domains that are not monetized, which limits the feasibility of employing the benefit-cost methodology. Indeed, only one in five of the interventions we reviewed that focus on mental health supports and behavior modification of children and youth has an associated BCA. Only one of seven of the K–12 education interventions has been assessed using a BCA. Attaching shadow prices to these outcomes is complicated by the nonexistence of markets from which to derive prices and the lack of direct

effects on public-sector outlays or revenues. These are benefits that are more likely to accrue to program participants or to generate spillover effects in other domains where the outcomes can be monetized, but those outcomes may be realized only with longer-term follow-up. To date, other methods for valuing such benefits used in the application of BCA in other areas of public policy—e.g., contingent valuation or hedonic methods—have not been applied.

- **Shadow prices for outcomes valued in BCAs of social programs do not consistently capture the full range of societal benefits or costs.** The application of BCA to social programs is not firmly grounded in the economic foundations of the benefit-cost framework. Typically, analysts value the economic costs or benefits that are most readily measured rather than performing a complete accounting. Examples of this gap between theory and application include the failure to account for the value of participants' time—time associated with either the intervention itself or its outcomes. Equilibrium effects of programs on markets, such as prices (e.g., effects on equilibrium wages) or quantities (e.g., displacement of workers in programs that generate labor market benefits), if they are implemented on a large scale, are usually not taken into account. This shortcoming means that analyses can be viewed as incomplete and potentially not credible when decisionmakers make choices among competing programs.
- **Even when there is a well-established literature for valuing outcomes, the use of shadow prices is not consistent across studies of social programs.** To some extent, there is a measure of built-in consistency in the use of shadow prices for 14 of the 22 programs we examined that have an associated BCA. This is because the programs are assessed in the context of a multiprogram comparison in which a common set of shadow prices is applied across all programs. When the distinct methodologies are compared across all 22 BCAs, there is still variation in the use of shadow prices even in areas where the methodology is relatively well established. This results in part from the desire to value benefits and costs in a specific geographic locale or to use more or less conservative shadow prices based on the existing literature. An example is the value attached to the intangible costs of crime for crime victims: Some studies exclude this component altogether, while others use differing estimates. In light of these differences, it is unfortunate that analysts seldom examine the sensitivity of their estimates to a range of shadow prices.

- **Program benefits that extend into the future may be monetized, but uncertainty associated with future projects needs to be recognized.** For some social programs, the most significant economic benefits do not accrue until some years after the program has ended. This is especially true for programs that intervene early in the lives of children and their families. While some BCAs use methods to project future outcomes (e.g., labor market earnings) based on early outcomes (e.g., school achievement measures), such approaches have yet to become routine and standardized. Moreover, the added uncertainty associated with these estimates is often not explored. In the absence of such projections, the benefits from programs without long-term follow-up cannot be readily monetized. For such programs, BCAs have therefore been conducted only when there is sufficient long-term follow-up. Among the 10 early childhood interventions included in our review, for example, four of the six that have an associated BCA had a minimum follow-up period to age 15, and three had follow-up periods at least to early adulthood. The other two early childhood programs with BCAs had only short-term outcomes at the time the BCA was conducted, and for one of those programs, the BCA valued no benefits. Until longer-term projection models are developed to link early outcomes with later-life outcomes that have economic consequences or until sufficient time has passed to measure long-term benefits, there will be only a limited ability to apply the benefit-cost methodology to fully account for the expected benefits from such programs.

In light of these findings, we conclude that further investments in methodology to support BCA for social programs will advance the state of the art. These advancements will support the broader use of BCA for proven programs, where the analyses would be comprehensive and comparable, more aligned with economic theory, and more transparent in the sensitivity of findings to the methodological approach. The following areas of investment merit further consideration:

- ***Building a consensus among experts on the best practices for the application of BCA to social programs and publishing guidelines for BCA analysts.*** The use of BCA in other policy arenas has benefited from expert guidance in defining best practices that support more consistent and comparable use of BCA.

- *Developing shadow prices for outcomes that are rarely monetized but that are significant in social program evaluations and likely to have important economic impacts.* Among the outcomes affected by the programs reviewed in this study, the most promising candidates for the development of shadow prices are child and adult mental health outcomes and school performance measures such as suspensions, expulsions, attendance, and engagement. These outcomes are significantly improved by mental health and behavior modification interventions and K–12 education programs.
- *Refining current methods for valuing the long-term benefits of improved outcomes in early childhood or the school-age years.* Methods to project long-term outcomes from short-term benefits have been developed and applied in the BCAs reviewed in this study. New longitudinal data should support improvements in methods for estimating causal linkages of outcomes through time.

While this analysis has not fully assessed the costs associated with these methodological investments, the growing importance of BCA in evaluating social programs in the United States means that there is likely to be a multiplier effect in terms of the payoff from improving the methodology used to estimate benefits and costs across a multiplicity of social programs and that the payoff could thus more than outweigh the associated costs.

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Abbreviations

AFDC	Aid to Families with Dependent Children
ALERT	Adolescent Learning Experiences in Resistance Training
APPP	Adolescent Pregnancy Prevention Program
BBBS	Big Brothers Big Sisters
BCA	benefit-cost analysis
CAN	child abuse and neglect
CBITS	Cognitive Behavioral Intervention for Trauma in Schools
CEA	cost-effectiveness analysis
CPC	Child-Parent Centers (Chicago)
CPS	Current Population Survey
CSC	Coping with Stress Course
DSC/NIDCAP	Developmentally Supportive Care/Newborn Individualized Developmental Care and Assessment Program
EITC	earned income tax credit
FFT	Functional Family Therapy
GA	General Assistance
GAIN	Greater Avenues for Independence
GCBT	Group Cognitive Behavioral Therapy
HFNY	Healthy Families New York
IHDP	Infant Health and Development Program
JOBS	Job Opportunities and Basic Skills
LST	Life Skills Training
MFIP	Minnesota Family Investment Program
MPP	Midwestern Prevention Project
MTFC	Multidimensional Treatment Foster Care
MST	Multisystemic Therapy for juvenile offenders
NFP	Nurse-Family Partnership

OMB	Office of Management and Budget
PATHS	Promoting Alternative THinking Strategies
PPN	Promising Practices Network
PTC	Prison Therapeutic Community
PTSD	post-traumatic stress disorder
SMART	Start Making a Reader Today
SSI	Supplemental Security Income
SSP	Self-Sufficiency Project
STAR	Students Taught Awareness and Resistance
TANF	Temporary Assistance for Needy Families
TND	Towards No Drug Abuse
UI	unemployment insurance
WSIPP	Washington State Institute of Public Policy

1. Introduction

When making choices about social policy, decisionmakers in both the public and private sectors increasingly focus on evidence that a given program generates benefits that exceed the program costs. Such evidence, typically the result of a formal benefit-cost analysis (BCA), has increasing saliency because of the growing emphasis on results-based accountability and social policy investments that generate positive economic returns. As noted by Greg Duncan and Katherine Magnuson, “translating effects into dollars enhances policy relevance because it enables researchers to aggregate impacts across different types of outcomes and show the cumulative impact in a manner that resonates with policymakers” (Duncan and Magnuson, 2007, p. 46).

Despite the weight attached to such BCAs in decisionmaking, the application of the benefit-cost methodology in evaluations of social programs has not reached maturity. One significant challenge in applying the benefit-cost approach is that of devising appropriate “shadow prices,” or dollar values, to attach to each of the short- and long-term outcomes that a social program may affect. For example, the economic value of reducing crime or increasing educational attainment must be calculated in order to derive a dollar benefit for a social program that lowers crime or raises education levels. In some cases, such economic values may be readily obtained, while in others, their derivation may be more complex and subject to debate among experts.¹

Within this context, the objective of this study is to assess the state of the art of measurement and use of shadow prices associated with the benefits of social programs. To achieve this objective, we review and synthesize the social

¹ As an example, the New Hope program provided financial work incentives tied to a requirement for full-time work as an alternative to the traditional welfare system. While the program has demonstrated a wide array of short-term and longer-term benefits, it has not been evaluated to date using a formal BCA. In a recent book describing the program and its impacts, Duncan, Huston, and Weisner (2007) perform a “back-of-the-envelope” accounting of the program’s readily measurable benefits in terms of the earnings gains to participants, but the gains are not enough to offset the program costs. The authors stop short of going further, however, because other benefits fall in domains that are more difficult to monetize, such as favorable effects on children’s behavior and school performance and on adult health status, stress levels, and depressive symptoms, not to mention such intangible gains as the enhanced quality of family life.

programs for which high-quality evaluations have been conducted and the subset for which a BCA has been performed. For the social programs that have demonstrated favorable effects, the full array of short- and long-term outcomes affected by the program are tallied to identify those that may be affected by social programs. We then identify the outcomes that have been measured for which economic values (i.e., shadow prices) have been estimated and examine how those estimates were derived. Ultimately, our aim is to classify outcomes into three broad groups: (a) outcomes for which there is a well-established methodology for generating economic values; (b) outcomes for which economic values have been generated but the literature has not reached consensus on the appropriate methodology for deriving them; and (c) outcomes for which economic values are rarely, if ever, calculated.

To set the stage for the analyses that follow, we first provide an overview of the analytic approach. For readers who are not familiar with the benefit-cost methodology and use of shadow prices, we provide a brief primer that introduces the key concepts and methodological approach. The final section of the chapter provides a roadmap for the rest of the report.

Approach

Our focus is on social programs proven to be effective in settings in the United States. These programs can be broadly classified into the following categories:

- Early childhood intervention programs (e.g., home visiting, parent education, center-based preschool)
- Education (K–12) intervention programs (e.g., specialized curricula, tutoring, mentoring, out-of-school-time activities, and other school reforms designed to raise academic achievement)
- Youth development programs (e.g., curricula; mentoring; out-of-school-time activities; therapies and other supports to promote mental health and/or prevent school dropout, teen pregnancy, violence, delinquency, crime, and use of tobacco, alcohol, and drugs)
- Employment and welfare programs (e.g., youth/adult job training and welfare-to-work programs).

The types of programs and interventions we consider thus span the life course. Some programs start even before birth, while others focus on segments of the preschool years, children in primary and secondary education, and adults. Most of the programs we examine target at-risk or otherwise disadvantaged children,

youth, and families, although some are intended to serve more-general populations.

We limit our analysis to social programs that have rigorous evaluations in order to identify those in which causal effects have been most convincingly demonstrated. The programs selected have well-implemented experimental or quasi-experimental designs, adequate sample sizes, and low rates of attrition in longitudinal follow-up. We exclude programs that do not show any favorable effects at some point in the evaluation (e.g., in early or follow-up periods). We focus our attention on programs that have been proven to be effective in the United States in order to identify the range of outcomes that social programs can produce in the context of the U.S. population and institutional features (e.g., the structure of schools and other institutions, as well as the nature of existing government supports).

Since the main objective of building an inventory of social programs with scientifically sound evaluations is to catalog the array of benefits associated with such programs, we also consider whether our selection criteria place limits on the outcomes we identify. Likewise, BCAs have been primarily conducted for those social programs that have the most rigorous evaluations and that have found favorable effects for at least one key outcome. In our analysis, we note social programs with evaluations that would not meet our selection criteria but that have measured outcomes not identified in other evaluations that do meet our criteria or that have conducted a BCA that merits consideration in our synthesis. Because our focus is on the use of shadow prices, we do not consider cost-effectiveness analyses (CEAs), since they do not require shadow prices. However, we do note when programs we consider have been examined in a cost-effectiveness framework.

For program evaluations that meet our selection criteria, we inventory the range of statistically significant outcomes measured in the evaluations and identify whether the demonstrated effects were favorable or unfavorable. We classify the outcomes into key domains, such as those that accrue to participating children and youth (where relevant) versus those that accrue to participating adults (where relevant). We also classify outcomes in terms different substantive domains such as educational outcomes, health outcomes, crime and delinquency, labor market behavior, and program participation.

For those programs with associated BCAs, we determine which outcomes were monetized and the methodology used to generate economic values for all relevant stakeholders, in particular, private benefits to program participants,

benefits to the public sector (i.e., taxpayers), and private benefits to the rest of society (i.e., nonparticipants). When delineating the methodologies used to derive economic values for any of these outcomes, we note the specific outcome measured in a given domain, the associated shadow price, and whether the shadow price was a national average or specific to a certain geographic locale (e.g., state or city). We also indicate whether economic values were forecast for future outcomes in addition to those observed in the evaluation.

Use of BCA to Evaluate Social Programs and the Role of Shadow Prices

Benefit-cost analysis (BCA), cost-effectiveness analysis (CEA), cost-savings analysis, cost analysis, and related methods are specific examples of the general class of cost and outcome analyses.² Such methods have increasingly gained favor in the public policy arena because of the interest in applying “business principles” and “investment analysis” to social policy issues. The federal Office of Management and Budget (OMB) has institutionalized the use of BCA and CEA through its Circular A-94, which provides guidelines for using these methods to “promote efficient resource allocation through well-informed decision-making by the Federal Government” (OMB, 1992). State policymakers have also turned to cost and outcome analysis in support of decisionmaking in such areas as criminal justice and programs for children and youth (see, for example, the work by Aos et al. (2001, 2004) and Aos, Miller, and Drake (2006) for the Washington state legislature; related analyses by Fowles, Byrnes, and Hickert (2005) for Utah; and Small et al. (2005) for Wisconsin). In this section, we provide a brief overview of the types of cost and outcomes analysis and some overarching principles. We then discuss some of the finer points of the use of shadow prices as part of BCA.

Overview of Cost and Outcomes Analysis

The main types of cost and outcome analysis are summarized in Table 1.1, in order from the least to most comprehensive in terms of the outcome of the

² This section draws on Karoly et al. (2001), as well as other standard references in the field, including Gramlich (1981, 1990), Nas (1996), Boardman et al. (2001), and Zerby and Bellas (2006).

Table 1.1—Types of Cost and Outcome Analysis and Associated Information Requirements

Type of Analysis	Outcome of Analysis	Information Requirement
Cost	Cost of program	<ul style="list-style-type: none"> • Comprehensive measure of program costs
Cost-effectiveness	Measure of cost per unit change in a specific outcome, value for one impact at a time	<ul style="list-style-type: none"> • Comprehensive measure of program costs • Measures of program impacts in natural units
Cost-savings	Measure of net savings to government, inclusive of all impacts ^a Measure of ratio of government savings to costs Measure of internal rate of return to government	<ul style="list-style-type: none"> • Comprehensive measure of program costs, specific to government sector • Measures of program impacts at each point in time in natural units • “Shadow prices” to value all outcomes in dollars, specific to government sector
Benefit-cost	Measure of net benefit to society, inclusive of all impacts ^a Measure of ratio of benefits to costs Measure of rate of return to society	<ul style="list-style-type: none"> • Comprehensive measure of program costs at each point in time, in aggregate and specific to various stakeholders • Measures of program impacts at each point in time in natural units • “Shadow prices” to value all outcomes in dollars, in aggregate and specific to various stakeholders

^a When costs and/or benefits accrue over multiple time periods, the dollar streams are discounted to reflect the time value of money. Thus, the relevant outcome is net present-value savings or benefit.

analysis and the information required.³ The least demanding is cost analysis, which generates a measure of program cost based on a comprehensive measurement of the economic value of the resources required for program implementation. CEA requires cost measurement and also the measurement of program impacts that may be either favorable or unfavorable. For CEA, the focus may be on one domain of impact (e.g., crime, student achievement), or multiple areas of impact may be measured. However, measures of cost-effectiveness can account for only one area of program impact at a time. Since program impacts are measured in natural units, those units must be common across all areas of impact to make it possible to aggregate across them.

³ Other types of cost and outcome analysis include constant-cost analysis, constant-budget analysis, constant-effectiveness analysis, and cost-consequences analysis. See Karoly et al. (2001) for further detail.

Cost-savings analysis and BCA (also called cost-benefit analysis) address the aggregation issue by valuing all program impacts in dollars. Attaching a dollar value, or shadow price, to each area of program impact enables all outcomes to be measured in a common unit, and they can be aggregated to provide a total dollar value of program impact. In the case of cost-savings analysis, costs and program impacts are measured only from the perspective of the government sector: government outlays for program implementation and net savings (or costs) to the government sector from the associated program impacts. BCA, in contrast, takes the perspective of society as a whole and considers the costs and dollar-valued outcomes aggregated across all stakeholders. The stakeholders are typically divided into the government sector (or individuals as taxpayers), program participants (as private individuals), and the rest of society (program nonparticipants as private individuals).⁴ The output from cost-savings analysis or BCA can be measures of net savings (savings – costs) or net benefits (benefits – costs), the ratio of savings or benefits to cost (savings-cost or benefit-cost ratios), or the internal rate of return (discussed further below). By requiring comprehensive measurement of costs and program impacts and the ability to place a dollar value on program impacts across all stakeholders, BCA is the most demanding of the cost and outcome analysis approaches. At the same time, it is the most comprehensive in providing a full accounting of the net benefits to society as a whole, as well as to various stakeholders.

Several general principles underlie the application of cost and outcome analysis methods to social programs. First, the social program of interest is compared with one or more alternatives. The baseline may be the status quo (i.e., a “no program” alternative), or it may be some other program. There may be multiple alternative programs to be compared, either in pairwise comparisons or against a common baseline. The use of a baseline or alternative means that all costs and outcomes for a given program are measured as differentials over that baseline.

Second, the measure of the incremental costs associated with program implementation—compared with the baseline—should be comprehensive, accounting for all consumed resources of value to society, across all the parties involved. Costs may be incurred by the agency implementing the program and also by other public-sector agencies or private-sector entities. Such costs would include both on-budget outlays for staff, space, materials, and other resources

⁴ Other subdivisions of the stakeholders are possible, such as different agencies within the government or different generations within the group of program participants (e.g., children versus parents).

and the value of goods and services provided in-kind, as well as intangible costs. Costs to program participants should also be included, such as the opportunity cost of their time to participate in the program—for both children and adults—or out-of-pocket costs (e.g., for transportation or child care). Program costs will thus reflect the costs to different stakeholders: the public sector, program participants, and other members of society (i.e., nonparticipants). Costs can be measured in natural units (e.g., hours of labor, square footage of space, quantities of materials), most of which can be readily valued in dollar terms, using market prices for those goods or services. When such market prices do not exist or do not capture the value society places on the resources (e.g., because of market imperfections such as externalities, monopoly power, underemployed resources, or taxes and subsidies), costs must be imputed using shadow prices that reflect the true opportunity cost of the resources.

Third, for cost and outcome analyses that require the measurement of program impacts, those impacts should be the causal effects of the program on the full range of tangible and intangible outcomes, both positive and negative, that may be affected by the program. The gold standard for capturing causal impacts is a well-designed and well-implemented experimental evaluation, where members of the target population for the program are randomly assigned to participate or not participate. When an experimental evaluation is not possible, various quasi-experimental methods can also generate causal measures of program impact with a high degree of confidence. While it is desirable to be comprehensive in measuring program impacts, program evaluations often focus on a specific set of outcomes that the program is designed to affect, rather than considering other secondary effects on participants or their families (e.g., parents, siblings, children) and peers (e.g., classmates, neighbors). Another problem with measuring program impacts is that it may take time to observe all the possible effects of a program. This is especially true for programs that intervene with young children with the expectation of improving their educational outcomes and prospects for eventual economic success. In such cases, it may be feasible to project the stream of future outcomes based on observations during the evaluation period. This may be an interim solution until enough time has passed that the outcomes for program participants and nonparticipants can again be observed and longer-term program impacts can be calculated.

Fourth, since program costs and program impacts may occur over time, cost and outcome analyses that aggregate dollar values over time must account for the time value of money such that a dollar today is worth more than a dollar in the future. In cost and outcome analysis, future dollar benefits and costs are

discounted to present-value dollars, using a set discount rate. There is no consensus as to the correct discount rate to use, although in some areas, guidelines have led to a narrow range of discount rates being used. For example, 3 percent and 5 percent are recommended real discount rates in medicine (Gold et al., 1996). OMB's guidelines generally recommend a real discount rate of 7 percent, "the approximate pre-tax rate of return on an average investment in the private sector in recent years" (OMB, 1992). The net present-value benefits of a given program can also be calculated using a range of discount rates to see how high the discount rate can go before net benefits are zero (or how low it must go before net benefits are positive). Alternatively, the internal rate of return is the discount rate that equates the present value of the future stream of benefits with the present value of the future stream of costs. Discount rates below the internal rate of return will result in positive net present-value benefits, while the reverse is true for discount rates above the internal rate of return.

Fifth, cost and outcome analysis should recognize the uncertainty associated with estimates of costs and benefits. Uncertainty may arise because outcomes are based on estimates derived from study samples, which results in sampling variability. Statistical uncertainty may also arise from the use of other model-based parameters (e.g., projecting future benefits based on observed outcomes). Knowledge about standard errors associated with such parameters can be used to place error bands on estimates of net present-value benefits (see Karoly et al. (1998) for an example). Other sources of uncertainty can be associated with having to estimate various parameters used to calculate costs and benefits (e.g., shadow prices). In such cases, sensitivity analyses can be performed to determine how robust results are to alternative assumptions and parameter estimates.

Shadow Prices in BCA

Shadow prices are used in BCAs to reflect the appropriate economic value—the social benefit (or cost)—associated with a given social program outcome. In some cases, shadow prices correct for distortions in market prices (e.g., as a result of externalities, monopoly power, rent-seeking, underemployed labor or other resources, taxes or subsidies, or other market imperfections). In other cases, shadow prices may be used to value outcomes for which there are no market prices or those for which there are both tangible and intangible benefits.

Conceptually, costs and benefits should be valued according to willingness to pay, i.e., what consumers are willing to forgo to obtain a given benefit or avoid a given cost. Market prices for commodities or factors of production (e.g., labor),

while convenient to use, capture only the desired concept of the scarcity value of resources under the first-best conditions of perfectly competitive markets, full information, and well-defined property rights—and this result holds only for projects that would entail small incremental changes. Projects that are large enough to change market prices should account for the general equilibrium effects on market prices to value project costs and benefits, even under competitive market conditions.⁵ And deviations from this ideal mean that market prices do not capture efficiency measures, and adjustments must be made to capture the relevant economic construct. Finally, when social programs involve taxes for financing or generate benefits that affect tax or transfer flows, the valuation of changes in taxes and transfers needs to account for the deadweight loss associated with the distortionary effects of taxes and transfers on economic behavior.

Consider how these concepts apply to the derivation of shadow prices associated with the impacts from a welfare program. Welfare-to-work programs may increase employment and earnings of program participants, but the earnings gains compared with those of the control group will not represent the societal benefits if program participants take jobs that would have been held by other people. A full economic analysis would take into account such displacement effects, which would be expected to depend on the state of the economy (e.g., the unemployment rate) and other factors. Moreover, the earnings gain may be attributable to an increase in the individual's wage with no change in hours, a change in hours with no wage gain, or some combination of the two. While the earnings gain attributable to an increase in wages can be treated as surplus from the standpoint of the participant, only a portion of the earnings gain that derives from greater work effort may be considered surplus if a positive value is placed on the lost leisure time.⁶ In addition, to the extent that the program reduces welfare dependency, the reduction in transfer payments, if used to reduce the tax

⁵ Many social programs, including most of those discussed in this report, are implemented on a small scale and therefore are unlikely to have general equilibrium or spillover effects. For larger-scale programs, the evaluations typically do not try to measure spillover effects on market prices or quantities, or they do not have sufficient power to detect such changes. However, any associated BCA needs to recognize potential general equilibrium effects, especially if the intention is for large-scale program implementation (e.g., a BCA for a universal preschool program based on an evaluation of a demonstration project).

⁶ In a simple labor-leisure tradeoff model, the loss of leisure time would be considered an economic cost. However, a more complex framework would account for the other intangible benefits of work (e.g., psychic income from social interactions or social status), as well as the benefits that would accrue from greater work effort to those who are underemployed or to third parties who value work effort over the alternatives (e.g., idleness or crime).

burden overall, would have the added benefit of reducing the associated deadweight loss.

Another consideration is whether shadow prices are based on local or national estimates. For example, the cost of a program may vary from market to market as a result of differences in wages and the prices for other goods and services. The value associated with the various program benefits may also differ across geographic locations. For example, transfer payments for welfare programs often vary by state and the cost of a year of schooling can vary at the district or even school level. For many applications, the BCA is intended to inform local decisionmakers, such as state policymakers, so it may be most relevant to use shadow prices specific for the state. However, it is important to acknowledge that the estimated program effects may depend on the prices in the community where the program was implemented and evaluated.⁷

As noted above, shadow prices may also be used to value outcomes where there is no corresponding market. In the case of social programs, some outcomes may generate both tangible and intangible benefits. A reduction in crime will have the tangible benefit of reducing property loss or medical costs from injuries, as well as the intangible benefits of reduced pain and suffering. Some intangible benefits may accrue to program participants, such as the psychic benefit a child or parent would receive by remaining in regular education classes, rather than in special education. Other intangible benefits may accrue to nonparticipants, such as having improved educational outcomes for children, a reduction in poverty, or a more equal distribution of income.

In the absence of market prices, analysts have used various methods to infer willingness to pay through stated or revealed preferences, although many of the applications have been outside the realm of BCA for social programs (see Carson and Hanemann (2006) for applications in environmental economics). For instance, survey methods are used to measure contingent valuation—how much people are willing to pay to obtain a given positive outcome (e.g., preserving the environment) or how much they are willing to accept to incur a negative outcome (e.g., an increased risk of death). Another approach is to infer the value placed on given outcomes based on observed market behavior—so-called hedonic methods. For example, the value of a human life has been inferred on

⁷ This is really a more general point regarding the generalizability of estimated program impacts. A program implemented in one community may not have impacts of the same magnitude in another community for a variety of reasons, including differential behavioral responses resulting from price differences.

the basis of prices paid for products that reduce the risk of death or variation in wages with workplace injury levels. Such methods, although widely used in BCAs of health, safety, and environmental projects, have been criticized on a variety of grounds (see, for example, Frank (2000)). With the exception of valuing the intangible costs of crime, these methods have generally not been applied to outcomes from social programs (an exception is Escobar, Barnett, and Keith (1980), who use contingent valuation to estimate the value participating parents placed on a preschool program serving their handicapped children).

Although these economic principles underlie the benefit-cost methodology, in practice, as we will see later in this study, analysts do not always implement the relevant economic concepts, because of data limitations or a desire to be practical. Indeed, most analysts likely undertake their own assessment of the gains from generating more-accurate estimates versus the associated costs of the calculations. This is especially true in measuring the social surplus associated with program outcomes. Many outcomes, especially those that are intangible, are simply not valued at all. In some cases, this is justified because such estimates are difficult to obtain. In other cases, analysts are willing to be conservative and simply demonstrate that a program's net benefits are positive, even when such benefits are likely to be underestimated. Outcomes that have implications for public-resource expenditures or are associated with market-based outcomes (e.g., in the labor market) are more likely to be valued. But even then, analysts often do not attempt to measure the appropriate theoretical construct and instead opt to use approaches that are expedient and arguably conservative approximations to what economic theory dictates is the appropriate measure. Again, the costs of more-accurate estimation may be viewed as outweighing the potential benefits.

Finally, it is important to keep in mind that there are grounds, in both theory and application, for critiquing the BCA approach and the associated methods for calculating shadow prices (see, for example, Frank (2000), Posner (2000), and Richardson (2000)). These limitations are often at the root of controversies over the use of BCA, such as the issues associated with placing an economic value on a human life. For example, BCA typically does not account for distributional considerations such as placing a greater weight on improving outcomes of the poor than on improving outcomes of those with higher income. When deriving economic values, willingness to pay may depend on conditions such as where the individual is in the income distribution, with the expectation that those with higher income will have a higher willingness to pay and therefore will implicitly receive a higher weight in the benefit-cost calculation. Valuations may depend on other factors as well, such as prices for goods and services. And beyond these

concerns, there are methodological challenges associated with eliciting contingent valuations (see Carson and Hanemann (2005) for a discussion).

Organization of the Report

To continue our investigation of the outcomes affected by social programs and the use of shadow prices to value those outcomes as part of BCAs, Chapter 2 introduces the set of social programs that we review. The chapter describes the range of policy areas represented by the programs, the features of their evaluations, and the set of outcomes that have been demonstrated to be affected by them. We turn our attention in Chapter 3 to the subset of the social programs with rigorous evaluations that also have an associated BCA. We identify the set of outcomes those programs affect that were monetized as part of the BCA and those that were not monetized. For the outcomes that were monetized, we examine the methods used to derive shadow prices and the consistency in such derivations across BCAs. We also identify the limitations in the application of shadow prices in light of the economic constructs that provide the foundation for BCA. Finally, we summarize our findings in Chapter 4, highlighting those social program outcomes that are rarely, if ever, monetized in BCAs, those that are monetized but with less consensus in the literature about the appropriate shadow prices, and those that are routinely monetized using a consistent approach to deriving shadow prices. We also offer several recommendations for advancing the state of the art in the use of shadow prices for BCAs of social programs.

2. Social Program Evaluations and Outcomes Measured

Social programs to which BCA can be applied must have credible evaluations with a demonstrated impact on outcomes that can then be expressed in dollar terms. In this chapter, we identify a set of social programs with scientifically rigorous evaluations that form the basis for an analysis of the outcomes such programs can affect. The programs we include span the life course, ranging from interventions in early childhood to programs serving adult welfare recipients and prison populations. We begin by describing the criteria we used to identify the programs to include and reviewing the methods used for the associated evaluations. We then place a spotlight on the range of outcomes that have been identified through program evaluation to be affected by the selected programs, outcomes that likewise extend from the early years into adulthood.

Selection Criteria and Programs Covered in Review

Our objective in conducting this review was to identify social programs covering various areas of intervention that have rigorous evaluations demonstrating program effectiveness. As noted in Chapter 1, the gold standard for program evaluation is a well-implemented experimental design (or randomized control trial) where the target population for program services is randomly assigned to receive the intervention or to participate in the control group. The control group may receive an alternative intervention or no intervention. When properly implemented, random assignment ensures that treatment and control groups are well matched on both characteristics that can be observed by the program evaluator and characteristics that cannot be observed. Any differences in outcomes between the treatment and control groups can then be attributed to the only systematic factor that differs between the two groups, the program intervention. Other desirable features of well-implemented random assignment evaluations include adequate sample sizes to have sufficient statistical power to detect meaningful differences in outcomes between the groups and low rates of attrition for evaluations that follow participants and nonparticipants over time. Experimental evaluations can be compromised by other implementation issues

such as deviations from random assignment to treatment and control groups or crossover of study subjects from the treatment and control groups.

In some cases, an experimental evaluation is not feasible because of resource constraints or other issues, such as ethical concerns. In such cases, well-designed quasi-experimental evaluations can provide a high degree of confidence that the measured program effects are the result of the intervention and are not caused by some other factor. Quasi-experimental designs often exploit so-called “natural experiments” to identify treatment and control groups that are determined by factors outside the control of the unit of intervention (e.g., the individual or family) that is participating or not participating in the program. In some cases, programs are implemented in a limited geographic area or limited service unit (e.g., a classroom or school) so a matched control group can be identified in a similar setting where the program was not available. In other cases, participants are selected from those on a waiting list, using a lottery so that a random process determines who accesses the program and who does not. In the best of these and other quasi-experimental designs, care is taken to define the appropriate treatment and control groups and also to use statistical methods to control for other potential confounding factors that are observed by the program evaluator. Like experimental evaluations, quasi-experimental designs may entail a control group that experiences the status quo or an alternative intervention.

In selecting the programs to include in this review, we relied on the set identified by three organizations that employ strict standards for identifying effective social programs with scientifically sound evaluations.⁸ In two cases, we excluded programs that had been evaluated only in another country or for which the most rigorous research to date had been conducted overseas. The organizations, the

⁸ A number of similar organizations provide a clearinghouse for information on effective programs or practices, either in a specific domain or across a broad array of policy areas. Examples include the “What Works Clearinghouse” under the U.S. Department of Education, the Office of Juvenile Justice and Delinquency Prevention (OJJDP) “Model Program Guide,” and the “Best Evidence Encyclopedia” operated by the Center for Data-Driven Reform in Education at The Johns Hopkins University. With the exception of the OJJDP registry, these sites are generally less discriminating in that they simply catalog existing program evaluation studies without rating them, or they focus on narrow areas of program impact (e.g., the effect of a particular curriculum on reading achievement). We reviewed these sites to see if any programs excluded from our analysis would either (1) add policy-relevant outcomes that are not covered by the programs identified through the three preferred organizations or (2) add BCAs for social programs based on a rigorous program evaluation. We concluded that the scan of program evaluations captured by the three preferred organizations covered the relevant territory to meet our study objectives.

selection criteria, and the resulting numbers of programs used in our review are shown in Table 2.1.⁹ The organizations are

- the Blueprints for Violence Prevention project, conducted by the Center for the Study of Violence Prevention, which has reviewed over 800 programs to identify 11 “Model” prevention or intervention programs (10 of which are included in our review) that are effective in preventing or reducing violence, delinquency, and substance abuse¹⁰
- the Promising Practices Network (PPN), operated by the RAND Corporation with other partners, which has reviewed over 200 programs to identify 20 “Proven” programs that are effective in improving the lives of children and families and their communities
- the Coalition for Evidence-Based Policy, which has identified 21 “Social Programs That Work” (20 of which are used in our review) across a broad span of the social policy spectrum, from early childhood intervention to adult training and welfare programs.^{11 12}

As seen in Table 2.1, the criteria used by the three organizations to identify effective social programs are similar in overall approach, although some of the specifics vary. For example, each organization requires a strong research design. The Blueprints for Violence Prevention project and PPN have a preference for randomized control trials, but social programs with well-designed and implemented quasi-experimental evaluations may be included. The Coalition for Evidence-Based Policy, in contrast, limits the programs it features to randomized control trials.

⁹ The set of programs identified by these three organizations is not static. New programs are identified over time, and some programs previously identified as effective may be removed from the list. The programs used for this analysis were those identified as of January 1, 2008.

¹⁰ We exclude the Olweus Bullying Prevention Program because the experimental evaluation demonstrating program effectiveness was implemented in Norway. The U.S. evaluation employed a less-rigorous quasi-experimental design and found weaker effects.

¹¹ We exclude the Canadian Self-Sufficiency Project (SSP), a welfare reform program implemented in Canada as an alternative to the traditional welfare program known as Income Assistance. Its primary feature is the use of an earnings supplement that is very similar to the Minnesota Family Investment Program, a program that we do include. SSP does have a BCA, but the methods are very similar, subject to differences in the institutional features, to the BCAs for the other welfare programs we do include. There are no outcomes affected by SSP that are not already covered in the included welfare programs.

¹² The Social Programs that Works website also lists widely used programs that have been demonstrated, through rigorous evaluation, to be ineffective. These ineffective programs are not included in our review.

Table 2.1—Organizations Screening for Effective Social Programs with Rigorous Evaluations

Organization/Website	Inclusion Criteria	Number of Programs in This Review
Center for the Study of Violence Prevention, University of Colorado at Boulder, Blueprints for Violence Prevention project www.colorado.edu/cspv/blueprints	<ul style="list-style-type: none"> • Strong research design (preference for random assignment, with adequate sample sizes, low attrition, and accurate measurement of outcomes) • Effective in preventing or reducing violence (including childhood aggressive and conduct disorder), delinquency, and/or drug use for at least one year beyond treatment with no subsequent evidence of fade-out • Replication in more than one setting or site or more than one study population • Evidence that targeted risk or protective factors mediate the change in behavior • Reasonable program costs that do not exceed program benefits 	10 “Model” programs
RAND Corporation and partners. Promising Practices Network www.promisingpractices.net	<ul style="list-style-type: none"> • Strong research design with convincing comparison group (either through random assignment or valid quasi-experimental design) • Evaluation sample size exceeds 30 in treatment and control groups • Program directly affects at least one of the indicators used in the site (child and family outcomes) with a statistically significant effect and substantial effect size (0.25 or higher) • Publicly available documentation of program evaluation 	20 “Proven” programs
Coalition for Evidence-Based Policy, Social Programs That Work www.evidencebasedprograms.org	<ul style="list-style-type: none"> • Well-designed and implemented randomized control trial evaluation with adequate sample sizes, low attrition, valid measurement of outcomes that are of policy importance • Preference for evaluation of program as implemented in a real-world community setting • Preference for long-term follow-up • Preference for replication in multiple sites and/or populations 	20 “Social Programs That Work”

SOURCE: See the organization websites listed in the first column.

NOTES: For additional detail on the program selection criteria, see the organization websites.

Each organization assesses the quality of the program evaluation in terms of various criteria that can compromise internal or external validity, such as small samples, high attrition, or lack of replication. The PPN criteria include thresholds on such aspects as the size of the samples and the magnitude of effect sizes. The Blueprints project is the only one that incorporates costs and benefits as part of

the inclusion criteria. Of the three organizations, the Blueprints project has the most-limited policy focus, targeting only programs that affect violence, delinquency, or substance abuse. The Coalition for Evidence-Based Policy, in contrast, has the broadest coverage of the social policy landscape.

Each organization uses a panel of independent expert reviewers to determine which programs meet the specified criteria. In the Blueprints and PPN screening processes, programs that do not meet the most rigorous requirements may be assigned to a “promising” category if, for example, long-term effects have yet to be demonstrated. The Blueprints project has classified 18 programs as “promising”; PPN lists 45 promising programs, while three others are labeled as “proven/promising” because the ratings differed across outcomes.

Because of the consistency in the inclusion criteria, many of the programs identified by these three organizations overlap. Thus, the combined set consists of 38 different social programs. Given our objective of identifying the range of outcomes affected by social programs and the application of BCA to such programs, we further broadened our scan to consider whether there are other evaluations of social programs that (a) are scientifically sound, (b) show evidence of program effectiveness, (c) measure outcomes that would not already be reflected in those covered by the 38 programs in our initial set, and/or (d) have an associated BCA based on the program evaluation. After examining other literature reviews of effective social programs and benefit-cost studies, we identified one additional program, Job Corps, for inclusion, primarily as a result of meeting criterion (d) (i.e., it had a BCA).¹³

Table 2.2 lists the full set of 39 programs covered in our review, grouped into the following social policy areas:¹⁴

- (a) early childhood interventions (10 programs)
- (b) K–12 education interventions (7 programs)

¹³ An example of a program we considered but did not add is the New Hope program, which offers a package of benefits for low-income families to make work pay (Huston et al., 2003). As noted earlier, the New Hope evaluation did not include a BCA, and the range of outcomes affected by the program does not extend beyond those covered by the welfare programs already included in the review.

¹⁴ The grouping of programs by area is somewhat arbitrary. For example, several of the early childhood intervention programs show long-term benefits in reduced crime and delinquency and could therefore be considered crime/violence prevention programs (as indeed they are on the Blueprints website). The grouping we employ here is based on a combination of the stage in the life course when the program services are delivered and the primary program purpose.

- (c) general youth development programs (1 program)
- (d) mental health supports and behavior modification interventions (6 programs)
- (e) substance abuse prevention programs (5 programs)
- (f) teen pregnancy prevention programs (2 programs)
- (g) crime/violence prevention programs (3 programs)
- (h) employment and welfare programs (5 programs).

For each program, Table 2.2 also provides a brief descriptor and an indication of which of the three reference sources, if any, feature the program. The key references for each program's evaluation (and, where relevant, the program-specific BCA) are listed in the Appendix.

Key features of the evaluation(s) associated with each social program are summarized in Table 2.3. These include the initial evaluation year, the study design (i.e., random assignment or quasi-experimental), the combined sample size for treatment and control groups at randomization, the number of years after random assignment that the last follow-up took place, and whether or not a BCA has been conducted. Several of the programs have had more than one evaluation, so the sample sizes are shown separately when there are two evaluations and as a range when there are three or more evaluations. The length of the follow-up period is the longest follow-up that applies across the evaluations.

This tabulation reveals that the social programs we review capture a 40-year history of social policy experimentation and evaluation, from the High/Scope Perry Preschool evaluation of 1962 to the Success for All evaluation, which began in 2001. With two exceptions, the programs have been evaluated using at least one randomized control trial. Interventions implemented at the classroom or school level typically randomize at that level, rather than at the individual level. The sample sizes vary considerably, from fewer than 100 treatment and control subjects to more than 15,000. The largest sample sizes accompany the employment and welfare evaluations in panel H. There is also wide variation in the length of the follow-up period. Several of the early intervention programs in panel A have the longest longitudinal designs, 37 years in the case of the Perry Preschool evaluation. At least one intervention in each of the other social policy areas in Table 2.3 measures outcomes five years or more past the start of the program evaluation.

Table 2.2—Social Programs Included in the Analysis

Program Name	Description	Reference
A. Early Childhood Intervention Programs		
Carolina Abecedarian Project	Full-day year-round center-based educational day care for children at risk of developmental delays, starting at birth and continuing through the preschool years along with a school-age follow-on	PPN Proven, SPTW
Chicago Child-Parent Centers (CPC)	Part-day school-year preschool program serving disadvantaged children in high-poverty neighborhoods, starting at age 3 with follow-on kindergarten to 3rd-grade programs	PPN Proven
DARE to Be You	Multilevel prevention program for parents of 2- to 5-year-olds in high-risk families, with center-based parent training workshops, concurrent children's programs, and other services	PPN Proven
Developmentally Supportive Care: Newborn Individualized Developmental Care and Assessment Program (DSC/NIDCAP)	Relationship-based program serving families with infants in neonatal intensive-care units, with follow-up home visits until the child reaches age 2	PPN Proven
Early Head Start	Federally funded community-based program providing child and family development services to low-income pregnant women and families with infants and toddlers up to age 3	PPN Proven
Healthy Families New York (HFNY)	Intensive home visitation services by trained paraprofessionals targeting expectant parents and parents with infants less than 3 months who are at risk for child abuse and neglect, with services continuing until the child reaches age 5 or entry into Head Start	PPN Proven
High/Scope Perry Preschool Project	Center-based part-day school-year preschool program combined with home visits, serving 3- and 4-year-olds in low-income families	PPN Proven, SPTW
Incredible Years	Comprehensive curricula for children ages 2 to 8 and their parents and teachers, delivered through parent training and small-group child programs, targeting high-risk children or those displaying behavior problems	Blueprints Model, PPN Proven
Infant Health and Development Program (IHDP)	Home visits, center-based child development program, and parent group meetings provided to families with low-birthweight premature infants from birth to age 3	PPN Proven
Nurse-Family Partnership (NFP) Program	Comprehensive home visitation by public health nurses targeting low-income first-time pregnant women, starting in pregnancy and continuing until the child reaches age 2	Blueprints Model, PPN Proven, SPTW

Table 2.2—Social Programs Included in the Analysis, *Continued*

Program Name	Description	Reference
B. Education (K–12) Intervention Programs		
Class Wide Peer Tutoring	Students in grades K–8 are paired up and take turns in a classroom setting tutoring each other in spelling and math and reading passages and testing each other's learning comprehension	PPN Proven
Career Academies	Offers a college preparatory curriculum combined with technical and occupational courses; partners with local businesses to provide after-school, career-related learning opportunities to minority high school students ages 15 and 16 from low-income urban areas and at risk of school failure	SPTW
Check and Connect	Assigns high school students with learning, emotional, and/or behavioral disabilities who are at risk of dropping out a monitor who tracks their attendance, behavior, and academic performance and meets with them regularly	SPTW
Good Behavior Game	Classroom management strategy for decreasing aggressive/disruptive student behavior among 1st and 2nd graders	SPTW
SMART (Start Making a Reader Today)	Community volunteers are recruited to tutor low-performing K–2 students in reading	SPTW
Success for All	Comprehensive schoolwide reform program for high-poverty elementary schools, emphasizing early detection and prevention of reading problems	SPTW
Tutoring with the Lindamood Phonemic Sequencing Reading Curriculum	Classroom-based curriculum for K–2 students with poor phonological processing, delivered through one-on-one tutoring, provides intense instruction in word-level skills	SPTW
C. Youth Development Programs		
Big Brothers Big Sisters (BBBS)	Mentors are screened and matched with young people from low-income single-parent households to meet two to four times per month and to form a supportive mentoring relationship	Blueprints Model, PPN Proven/Promising, SPTW
D. Mental Health Supports and Behavior Modification Interventions		
Cognitive Behavioral Intervention for Trauma in Schools (CBITS)	School-based program providing 10 one-hour small-group (six to eight children) sessions to help youth in grades 6 to 9 who suffer from post-traumatic stress disorder work on processing traumatic memories, expressing their grief, and learning relaxation skills	PPN Proven
Coping with Stress Course (CSC)	School-based program providing small-group (six to 10 participants) sessions for adolescents ages 13 to 18 at risk for depression to teach coping strategies and strengthen students' resistance to the development of mood disorders	PPN Proven

Table 2.2—Social Programs Included in the Analysis, *Continued*

Program Name	Description	Reference
D. Mental Health Supports and Behavior Modification Interventions, <i>Continued</i>		
Functional Family Therapy (FFT)	Provides eight to 15 sessions of direct service time by one- or two-person teams for referred youth ages 11 to 18 at risk for delinquency, violence, substance abuse, or conduct disorder and their families	Blueprints Model
Group Cognitive Behavioral Therapy (GCBT)	One or two specially trained masters- or doctoral-level cognitive therapists in a clinical setting provide small-group (six to 12 participants) intervention for youth ages 13 to 19 at risk for serious depression	SPTW
Promoting Alternative Thinking Strategies (PATHS)	Classroom-based curriculum for elementary-school-age children to promote emotional and social competencies, reduce aggression and behavior problems, and enhance the educational process in the classroom	Blueprints Model
E. Substance Abuse Prevention Programs		
Guiding Good Choices	Provides five 2-hour sessions for parents with children age 9 to 14, focused on providing skills for preventing substance abuse	PPN Proven
Life Skills Training (LST)	Regular classroom teachers who received training workshops provide 15 classroom sessions and 15 review sessions to teach social and self-management skills for middle-school students and to inform them of immediate consequences of substance abuse	Blueprints Model, PPN Proven, SPTW
Project ALERT (Adolescent Learning Experiences in Resistance Training)	Classroom-based curriculum for middle- or junior high school students to prevent non-users from experimenting with drugs and to prevent youth who are already experimenting from becoming more-regular users	PPN Proven
Project Northland	Classroom-based curriculum for 6th to 8th grades that involves education, information sharing, and activities to help students understand and resist social pressures to drink alcohol or use other drugs	PPN Proven
Project STAR (Students Taught Awareness and Resistance)/Midwestern Prevention Project (MPP)	School- and community-based prevention program that brings teachers, parents, community, and mass media together, with the goal of reducing the use of cigarettes, alcohol, and marijuana among adolescents age 12 to 13	Blueprints Model, PPN Proven
Project Towards No Drug Abuse (TND)	Twelve in-class interactive sessions for youth age 14 to 19 that provide motivational, skills-related, and decisionmaking tools for avoiding the use of cigarettes, alcohol, marijuana, and hard drugs and violence-related behavior	Blueprints Model

Table 2.2—Social Programs Included in the Analysis, *Continued*

Program Name	Description	Reference
F. Teen Pregnancy Prevention Programs		
Carrera Adolescent Pregnancy Prevention Program (APPP)	Multiyear center-based program for economically disadvantaged teens starting at age 13 to 15 and continuing through high school, providing daily academic assistance and once or twice weekly job club, family life/sex education, arts activities, and individual sports activities	SPTW
Self Center	A social worker/nurse team provides year-round school-based contraceptive and reproductive health services and education for middle- and high school students from low-income, minority, inner-city neighborhoods	PPN Proven
G. Crime/Violence Prevention Programs		
Amity Prison Therapeutic Community (PTC)	Houses 200 male inmates with drug problems who are 9 to 12 months from being released and provides them with counseling and instruction to help them stay off drugs and succeed outside of prison	SPTW
Multidimensional Treatment Foster Care (MTFC)	Provides severely delinquent youth with foster care in families trained in behavior management and emphasizes preventing contact with delinquent peers	Blueprints Model, SPTW
Multisystemic Therapy for Juvenile Offenders (MST)	Masters-level therapists provide a combination of treatments to juvenile offenders and their families for several hours per week, usually for 4 months	Blueprints Model, PPN Proven, SPTW
H. Employment and Welfare Programs		
Job Corps	Full-time residential program providing education, vocational training, counseling, health care, recreation, and job placement for at-risk youth who have dropped out of school	—
Los Angeles Jobs-First Greater Avenues for Independence (GAIN) Program	Requires low-income single parents to engage in mandatory work-related activities in order to receive cash assistance under welfare, with an emphasis on “work first” over skill-building and with associated sanctions for noncompliance	SPTW
Minnesota Family Investment Program (MFIP)	Provides low-income single parents with financial work incentives (a more generous earnings disregard) or work incentives tied to mandatory work or related activities as an alternative to traditional welfare	SPTW
Portland Job Opportunities and Basic Skills (JOBS) Program	Requires low-income single parents to engage in mandatory work-related activities in order to receive cash assistance under welfare, with an emphasis on skill-building through education and training that can lead to better employment opportunities, with associated sanctions for noncompliance	SPTW
Riverside Greater Avenues for Independence (GAIN) Program	Requires low-income single parents to engage in mandatory work-related activities in order to receive cash assistance under welfare, with an emphasis on “work first” over skill-building and with associated sanctions for noncompliance	SPTW

SOURCE: Author’s tabulations based on sources cited in the Appendix.

NOTES: PPN = Promising Practices Network; SPTW = Social Programs That Work.

Table 2.3—Features of the Evaluations for Social Programs Included in the Analysis

Program Name [Initial Evaluation Year]	Study Design	Initial Sample Size	Years Since Study Entry of Last Follow-Up	BCA Available?
A. Early Childhood Intervention Programs				
Carolina Abecedarian [1972]	RA	111	21	Yes
Chicago CPC [1983]	QE	1,539	18	Yes
DARE to Be You [1991]	RA	474	2	No
DSC/NIDCAP [1979]	RA and QE	EV1: 255 EV2: 45	2	No
Early Head Start [1995]	RA	3,001	3	Yes
HFNY [2000]	RA	1,157	2	No
High/Scope Perry Preschool [1962]	RA	123	37	Yes
Incredible Years [mid-1990s]	RA	EV*=95 to 512	2	No
IHDP [1985]	RA	985	18	Yes ^a
NFP [1978]	RA	EV*=300 to 760	15	Yes
B. Education (K–12) Intervention Programs				
Career Academies [1993]	RA	1,764	8	No
Check and Connect [1996]	RA	EV1: 206 EV2: 94	EV1: 4 EV2: 1	No
Class Wide Peer Tutoring [early 1980s]	RA and QE	EV*=4 to 400	0.25 to 4	No
Good Behavior Game [1985]	RA	EV1: 14 classrooms with 407 students EV2: 27 classrooms with 678 students	EV1: 13 EV2: 7	Yes
SMART [1996]	RA	127	2	No
Success for All [2001]	RA	41 schools	3	No
Tutoring with Lindamood Curriculum [1994]	RA	180	2.5	No
C. Youth Development Programs				
BBBS [1991]	RA	1,138	1.5	Yes

**Table 2.3—Features of the Evaluations for Social Programs Included in the Analysis,
Continued**

Program Name [Initial Evaluation Year]	Study Design	Initial Sample Size	Years Since Study Entry of Last Follow-Up	BCA Available?
D. Mental Health Supports and Behavior Modification Interventions				
CBITS [2000]	RA	EV1: 113 EV2: 126	0.5	No
Coping with Stress Course (CSC) [mid-1990s]	RA	EV1: 150 EV2: 94	2	No
Functional Family Therapy (FFT) [1973]	RA and QE	EV*: 54 to 86	5	Yes
GCBT [1991]	RA	EV1: 94 EV2: 231	3	No
PATHS [n.a.]	RA	378 classrooms	1	No
E. Substance Abuse Prevention Programs				
Guiding Good Choices [1997]	RA and QE	EV1: 387 EV2: 424	3	Yes
LST [1985]	RA	56 schools (5,594 students)	6	Yes
Project ALERT [1984]	RA	EV1: 30 schools EV2: 48 school clusters	2	Yes
Project Northland [1991]	RA	24 districts	3	Yes
Project STAR / MPP [1984]	RA	8 schools (1,607 students)	3	Yes
Project TND [1994]	RA	EV*: ~ 3,000 combined	2	No
F. Teen Pregnancy Prevention Programs				
Carrera APPP [1997]	RA	1,163	3 to 7	Yes
Self Center [1981]	QE	1,700	3	No
G. Crime/Violence Prevention Programs				
Amity PTC [1993]	RA	715	5	No
MTFC [1991]	RA	EV1: 85 EV2: 81	2	Yes
MST [1978]	RA	EV*: 105 to 409	13.7	Yes

**Table 2.3—Features of the Evaluations for Social Programs Included in the Analysis,
Continued**

Program Name [Initial Evaluation Year]	Study Design	Initial Sample Size	Years Since Study Entry of Last Follow-Up	BCA Available?
H. Employment and Welfare Programs				
Job Corps [1994]	RA	15,386	4	Yes
Los Angeles Jobs-First GAIN [1996]	RA	15,683	2	Yes
MFIP [1994]	RA	4,882	6	Yes
Portland JOBS [1993]	RA	4,028	5	Yes
Riverside GAIN [1988]	RA	5,508	5	Yes

^aBCA is based on follow-up data eight years after study entry.

SOURCE: Author's tabulations based on sources cited in the Appendix.

NOTES: See Table 2.2 for full program names. RA = random assignment; QE = quasi-experimental;
EV1 = evaluation 1; EV2 = evaluation 2. * indicates three or more studies with range of sample sizes as listed.

Table 2.3 further demonstrates that benefit-cost studies are far from ubiquitous for this set of programs. Somewhat more than half—22 of the 39 programs—have an associated BCA, with at least one such economic analysis associated with each of the social policy areas.¹⁵ There is a BCA for the one youth development program and all five employment and welfare programs in panels C and H, respectively. Five of the six substance abuse prevention programs (panel E) and two of three crime/violence prevention programs (panel G) have an associated benefit-cost study. Such analyses are less common among the mental health and behavior modification interventions in panel D (one of five), the education interventions in panel B (two of seven), the teen pregnancy prevention programs in panel F (one of two), and the early childhood interventions in panel A (six of ten).

Outcomes Affected by Social Programs

One of our main goals in examining this set of 39 proven social policy programs was to catalog the range of outcomes affected by them. Given that the programs cover the life course from early childhood to adulthood, in terms of both the stage of intervention and the length of the follow-up period, we find it natural to subdivide outcomes on the basis of those that are measured for children and youth and those that are measured for adults. Keep in mind that the adult outcomes may be those observed for programs that serve children and youth who are later followed into adulthood, or they may measure outcomes for their parents at the time of the intervention or during a later follow-up. Since some of the programs we review also target adult participants, their outcomes would naturally fall into the adult outcome category. However, adult program participants may also have children for whom the outcomes are measured.

It is also important to acknowledge that the outcomes discussed in this section are the product of what is measured in any program evaluation and what is statistically significant. Programs that appear to have a narrow range of causal effects may in fact affect other outcomes, but they were not measured as part of

¹⁵ As we note in the more detailed discussion in Chapter 3 of the BCAs associated with the programs we review, we do not include CEAs that have been conducted for several of the programs in Table 2.3. We also exclude BCAs based on programs related to those in Table 2.3 but with less-rigorous evaluations. For example, Stern et al. (1989) provide a BCA of a quasi-experimental evaluation of the California Peninsula Academies—a program similar to the Career Academies model listed in Table 2.3, which has been evaluated using a randomized control trial (Kemple and Snipes, 2000; Kemple and Scott-Clayton, 2004).

the evaluation. For example, relatively few of the early childhood interventions in panel A measure outcomes for the parent(s) of the focal child. However, depending on the nature of the program, parents may be able to obtain additional schooling, be employed, or work longer hours as a result of the care supplied. Likewise, we focus on outcomes that are statistically significant, meaning that a program impact (the difference between the treatment and control groups) has to be large enough, given the sample size, to reject the null hypothesis that the treatment and control groups have the same level of the outcome. Thus, the evaluations we review often demonstrate a favorable program impact for a wider array of outcomes than those that pass the statistical significance test.

To organize the discussion in the remainder of this chapter, as well as in the chapter that follows, we categorize outcomes into five domains each for child and youth outcomes and for adult outcomes, as shown in Table 2.4.

Table 2.4—Outcome Domains for Children and Youth and for Adults

Domain	Examples
Child and Youth Outcomes	
Behavioral/emotional	Behavior problems, school discipline (suspended, expelled), mental health (e.g., depression, stress, other psychological dysfunction)
Cognitive	IQ, other cognitive development measures
Education	Achievement tests and other education outcomes through high school (e.g., attendance, grades, grade repetition, special education use, dropping out)
Health	Physical health, reproductive health (e.g., teen pregnancy, contraceptive use), health care utilization
Antisocial/risky behavior	Delinquency, crime, substance abuse, sexual activity
Adult Outcomes	
Family functioning	Parent-child relationships, child abuse and neglect, marriage, childbearing
Education	Postsecondary education outcomes
Economic	Labor market outcomes, use of social welfare programs
Health	Physical health, mental health, reproductive health (e.g., childbearing, contraceptive use), health care utilization
Crime and substance abuse	Criminal activity, arrests and convictions, recidivism, use of tobacco, alcohol, and drugs

Examples in the table illustrate the types of specific outcomes that would fall under each domain. While there is some overlap in the domain labels (e.g., education, health) across the child/youth and adult stages, the types of measures in these domains may differ in moving through the life course. For example, we categorize education outcomes associated with grades K–12 as child and youth outcomes, while those for postsecondary education are defined as adult outcomes. Mental health outcomes are placed in the behavioral/emotional domain for children and youth and in the health domain for adults. Separating outcomes by the stage of the life course in which they are measured is also relevant for the discussion in the next chapter with respect to placing a monetary value on program impacts. For example, a program impact on arrests, convictions, or jail time will have differing economic impacts, depending on whether those outcomes are for the juvenile justice or adult justice system.

Using these domains and their definitions, we begin with a broad overview of the outcome domains affected by the 39 social programs, as shown in Table 2.5. Each program is now associated with an index number tied to panels A to H, and boldface designates programs with a BCA. The child/youth outcome domains and adult outcome domains are shown in the columns. We place a check mark in the outcome-domain column if the program has a statistically significant effect at the 0.05 level or better on a specific outcome in that domain. In many cases, multiple measures are affected by a given program in a given domain. In addition, while most of the program effects in any given domain are favorable, we also capture the statistically significant effects that may be unfavorable. Examples include several of the welfare programs in panel H that have led to unfavorable effects on various measures of child development, education, or health.

Several points emerge from this big-picture view of the outcomes affected by the 39 social programs:

- The programs affect a wide array of outcomes for children, youth, and adults, from those that measure emotional states and social or antisocial behaviors to those that capture economic activity such as employment or use of government transfers. From the perspective of BCA, this potentially implies attaching economic values to a large number of outcomes, some of which may be more readily valued in dollar terms than others. Indeed, a casual inspection of the programs with and without a BCA and the outcomes they affect suggests that those that affect antisocial behavior

Table 2.5—Domains of Demonstrated Effects for Social Programs Included in the Analysis

Program Name	Child or Youth Outcomes					Adult Outcomes				
	Behavioral/ Emotional	Cognitive	Education	Health	Antisocial/ Risky Behavior	Family Functioning	Education	Economic	Health	Crime and Substance Abuse
A. Early Childhood Intervention Programs										
A1. Carolina Abecedarian		✓	✓				✓	✓	✓	✓
A2. Chicago CPC			✓		✓	✓				
A3. DARE to Be You	✓	✓							✓	
A4. DSC/NIDCAP		✓		✓						
A5. Early Head Start	✓	✓	✓	✓						
A6. HFNY						✓				
A7. High/Scope Perry Preschool		✓	✓					✓		✓
A8. Incredible Years	✓									
A9. IHDP	✓	✓	✓			✓		✓		
A10. NFP	✓		✓	✓	✓	✓		✓	✓	✓
B. Education (K–12) Intervention Programs										
B1. Career Academies								✓		
B2. Check and Connect			✓							
B3. Class Wide Peer Tutoring			✓							
B4. Good Behavior Game	✓				✓					
B5. SMART			✓							
B6. Success for All			✓							
B7. Tutoring with Lindamood			✓							
C. Youth Development Programs										
C1. BBBS	✓		✓		✓					

Table 2.5—Domains of Demonstrated Effects for Social Programs Included in the Analysis, *Continued*

Program Name	Child or Youth Outcomes					Adult Outcomes				
	Behavioral/ Emotional	Cognitive	Education	Health	Antisocial/ Risky Behavior	Family Functioning	Education	Economic	Health	Crime and Substance Abuse
D. Mental Health Supports and Behavior Modification Interventions										
D1. CBITS	✓									
D2. CSC	✓									
D3. FFT					✓					
D4. GCBT	✓									
D5. PATHS	✓									
E. Substance Abuse Prevention Programs										
E1. Guiding Good Choices					✓					
E2. LST					✓					
E3. Project ALERT					✓					
E4. Project Northland					✓					
E5. Project STAR/MPP					✓					
E6. Project TND					✓					
F. Teen Pregnancy Prevention Programs										
F1. Carrera APPP			✓	✓						
F2. Self Center				✓	✓					
G. Crime/Violence Prevention Programs										
G1. Amity PTC										✓
G2. MTFC					✓					
G3. MST					✓					✓

Table 2.5—Domains of Demonstrated Effects for Social Programs Included in the Analysis, *Continued*

Program Name	Child or Youth Outcomes					Adult Outcomes				
	Behavioral/ Emotional	Cognitive	Education	Health	Antisocial/ Risky Behavior	Family Functioning	Education	Economic	Health	Crime and Substance Abuse
H. Employment and Welfare Programs										
H1. Job Corps			✓					✓		✓
H2. Los Angeles Jobs- First GAIN	✓							✓		
H3. MFIP	✓		✓	✓		✓		✓		
H4. Portland JOBS								✓		
H5. Riverside GAIN								✓		

SOURCE: Author's tabulations based on sources cited in the Appendix.

NOTES: See Table 2.2 for full program names. Program names in bold are those with a BCA, as indicated in Table 2.3.

(i.e., crime, delinquency, violence, or substance abuse) and those that affect economic outcomes (i.e., employment, earnings) are more likely to have an associated BCA.

- When grouped by social policy area, programs affect, at a minimum, the outcome domain targeted by the prevention or intervention program. The education programs in panel B affect education outcomes either during childhood or in adulthood; the substance abuse prevention programs in panel E affect antisocial/risky behavior; the employment and welfare programs in panel H affect economic outcomes; and so on. However, in many cases, the programs in Table 2.5 affect a broader range of outcomes.
- Most programs that serve children and youth either do not follow participants into adulthood or, in those that do, do not find lasting effects. With few exceptions, the programs in panels B to G measure only adult outcomes if they serve adults to begin with. The early childhood interventions with long-term follow-up in panel A are the major exception.
- The early childhood intervention programs in panel A and the employment and welfare programs in panel H have the broadest reach in terms of the outcomes they have been shown to affect. Many of the early childhood interventions affect multiple domains during childhood, consistent with their broad focus on child development, and four of the ten programs also affect outcomes in adulthood. For three of the programs (A1, A2, and A7), the long-term follow-up means children served by the program are eventually observed as adults. For one program (A10), the adult outcomes are those for the child's mother, who is also observed throughout the follow-up period (until the child reaches age 15). For two of the employment and welfare programs (H3, H4), significant effects are found for the children of program participants, as well as for the adult participants themselves.
- The social programs associated with mental health supports and behavior modification, substance abuse prevention, and crime/violence prevention (panels D, E, and G, respectively) have the narrowest range of program impacts, affecting primarily one domain measured either for children and youth or for adults. With one exception, the same is also true for the education interventions in panel B.

We now turn to a more detailed discussion of the outcomes affected by the 39 social programs, starting first with outcomes that fall in the child/youth domains.

Child and Youth Outcomes Affected by Social Programs

Tables 2.6 to 2.10 detail the specific outcome measures for children and youth that have been affected by the 39 social programs, grouped by domain. In each table, we list the specific measure as well as the program series in which one or more programs have demonstrated a statistically significant effect on that outcome at the 0.05 level or better. Since many of the programs have multiple evaluations or, by virtue of following participants through time, have measurements at multiple points in time, we link outcomes to programs in a given series if the outcomes are statistically significant in at least one evaluation or significant at least at one point in the follow-up period. We also denote the frequency with which a given outcome has been found to be significant across the 39 programs. If the outcome is significant in only one or two programs, we label the incidence as “infrequent.” When three to four programs have a significant impact on an outcome, the label used is “more frequent.” We reserve the “most frequent” label for those cases where five or more programs have a significant impact on the outcome.

The behavioral/emotional measures listed in Table 2.6 are outcomes associated primarily with early childhood interventions (the A series), the mental health supports and behavior modification interventions (the D series), and, to a lesser extent, the K–12 education interventions, youth development program, and employment and welfare programs (series B, C, and H, respectively). While the theoretical goals of these measures are to capture positive or negative behaviors or mental health status, there is considerable heterogeneity across program evaluations in the measures used. Indeed, most measures are unique to a given study (hence the “infrequent” label). Exceptions include commonly used measures for behavior problems and positive behavior. It is also worth noting, as we will see in other outcome domains, that several of the welfare reform programs (series H) generate unfavorable effects for the children of the program participants, in particular those who are transitioning through adolescence during the time of the intervention (Grogger and Karoly, 2005). Unfavorable impacts are indicated by an asterisk next to the program series alphabetic index.

**Table 2.6—Specific Outcomes Affected by Social Programs:
Behavioral/Emotional Outcomes for Children and Youth**

Outcome	Program Series Affecting the Outcome	Frequency with Which Outcome Affected
Behavior outcomes		
Behavior problems scale (e.g., Behavior Problems Index)	A, C, H	More frequent
Oppositional behavior scale	A	Infrequent
Conduct disorder scale	B, D	Infrequent
Positive behavior scale	A, H	More frequent
Ability to understand emotions, social problems	D	Infrequent
Ability to develop alternative (nonaggressive) solutions	D	Infrequent
Ability to plan ahead and solve complex tasks	D	Infrequent
Cognitive flexibility	D	Infrequent
School suspensions	B	Infrequent
Ever suspended or expelled	H	Infrequent
Ever a behavior problem that affected parents' work	H*	Infrequent
Ever in a class for children with behavior problems	H*	Infrequent
Parent ever contacted regarding behavior problem at school	H*	Infrequent
Mental health outcomes		
Mental health scale	B	Infrequent
Depression symptoms/scale	D	Infrequent
Episodes of major/moderate depression	D	Infrequent
Post-traumatic stress disorder (PTSD) symptoms	D	Infrequent
Parent report of psychosocial dysfunction	D	Infrequent
Affective disorder scale	D	Infrequent
Anxiety disorder scale	D	Infrequent
Placements in foster care or institutions	D	Infrequent

SOURCE: Author's tabulations based on sources cited in the Appendix.

NOTES: See Table 2.5 for program reference series. An asterisk indicates that the effect on the outcome has been in the unfavorable direction. Frequency labels are defined as infrequent = 1 or 2 programs; more frequent = 3 or 4 programs; most frequent = 5 or more programs.

Outcomes in the cognitive domain are shown in Table 2.7. These outcomes are affected only by (and for the most part even measured as part of the evaluations of) early childhood intervention programs. Three programs demonstrate a favorable effect on IQ scores (Abecedarian, Perry Preschool, and IHDP). Four other programs show favorable effects on other cognitive measures.

**Table 2.7—Specific Outcomes Affected by Social Programs:
Cognitive Outcomes for Children and Youth**

Outcome	Program Series Affecting the Outcome	Frequency with Which Outcome Affected
IQ scores or other cognitive ability measure	A	Most frequent
Developmental level (delay) measure	A	Infrequent

SOURCE: Author's tabulations based on sources cited in the Appendix.

NOTES: See Table 2.5 for program reference series. Frequency labels are defined as infrequent = 1 or 2 programs; more frequent = 3 or 4 programs; most frequent = 5 or more programs.

The education outcomes shown in Table 2.8 are among the most likely to be affected by one of the social programs we reviewed, especially the early childhood interventions and the K–12 interventions (A and B series, respectively). These outcomes are also affected by the youth development

**Table 2.8—Specific Outcomes Affected by Social Programs:
Education Outcomes for Children and Youth**

Outcome	Program Series Affecting the Outcome	Frequency with Which Outcome Affected
Achievement test outcomes		
Reading and/or math achievement test score	A, B	Most frequent
Spelling skills	B	Infrequent
College entrance score (e.g., PSAT)	F	Infrequent
Other measures of education performance		
Ever used special education	A	Infrequent
Years (or percentage of years) spent in special education	A	Infrequent
High school GPA	A	Infrequent
Number of credits earned	B	Infrequent
Self-perceived scholastic competence	C	Infrequent
Parental report of school performance	H*	Infrequent
Education progression and completion		
Ever repeated a grade	A, B, H*	More frequent
Ever graduated from high school	A, B, F, H	Most frequent
Education engagement		
School attendance rate	B, C	Infrequent
Current engagement in school	H	Infrequent
Number of college visits	F	Infrequent

SOURCE: Author's tabulations based on sources cited in the Appendix.

NOTES: See Table 2.5 for program reference series. An asterisk indicates that the effect on the outcome has been in the unfavorable direction. Frequency labels are defined as infrequent = 1 or 2 programs; more frequent = 3 or 4 programs; most frequent = 5 or more programs.

program, teen pregnancy prevention programs, and employment and welfare reform programs (series C, F, and H, respectively). Achievement test scores—either reading or math achievement—are improved by multiple programs. Other common benefits are raising rates of high school graduation and reducing the incidence of grade repetition. While many of the education outcomes are associated with quantifiable measurement (test scores, school completion rates), others represent more subjective assessments, such as measures of engagement in school or perceived school performance by the children themselves or their parents.

As seen in Table 2.9, improving health outcomes, as we have defined this domain, is associated with a handful of early childhood programs, teen pregnancy prevention programs, and employment and welfare programs (A, F, and H series, respectively). These health-related outcomes tend to be quantifiable measures, although general health status is more subjective. In this domain, we again have an unfavorable effect associated with the welfare interventions, namely, an increased incidence in the use of emergency room visits for child accident or injury (MFIP).

**Table 2.9—Specific Outcomes Affected by Social Programs:
Health Outcomes for Children and Youth**

Outcome	Program Series Affecting the Outcome	Frequency with Which Outcome Affected
General health status		
Weight gain (in early years)	A	Infrequent
General health status	A	Infrequent
Health care utilization		
Ever emergency room visit for accident or injury	H*	Infrequent
Number of emergency room visits	A	Infrequent
Number of hospital days or stays	A	Infrequent
Reproductive health		
Ever pregnant	F	Infrequent
Ever given birth	F	Infrequent
Use of (hormonal) contraceptive at last intercourse	F	Infrequent
Attend health clinic before onset of sexual activity	F	Infrequent

SOURCE: Author's tabulations based on sources cited in the Appendix.

NOTES: See Table 2.5 for program reference series. An asterisk indicates that the effect on the outcome has been in the unfavorable direction. Frequency labels are defined as infrequent = 1 or 2 programs; more frequent = 3 or 4 programs; most frequent = 5 or more programs.

The last domain of child/youth outcomes—antisocial/risky behavior—is shown in Table 2.10. Not surprisingly, these outcomes are associated primarily with substance abuse and crime/violence prevention programs (series E and G,

**Table 2.10—Specific Outcomes Affected by Social Programs:
Antisocial/Risky Behavior Outcomes for Children and Youth**

Outcome	Program Series Affecting the Outcome	Frequency with Which Outcome Affected
Crime and delinquency outcomes		
Self-report violent offenses	G	Infrequent
Rates of victimization	E	Infrequent
Ever arrested	G	Infrequent
Ever arrested for a violent offense	G	Infrequent
Number of arrests	A, D, G	More frequent
Ever had petition to juvenile court	A	Infrequent
Ever had petition to juvenile court for a violent offense	A	Infrequent
Number of petitions to juvenile court	A	Infrequent
Number of official criminal referrals for violent offenses	G	Infrequent
Days in detention facilities, correctional facilities, jail, or prison	G	Infrequent
Sibling contact with criminal justice system	D	Infrequent
Substance use outcomes		
Current use of tobacco (smoking)	B, E	Most frequent
Current substance use (alcohol, marijuana, other drugs)	B, G	Infrequent
Current use of alcohol	E	More frequent
Current misuse of alcohol, getting drunk	E	More frequent
Current use of illegal drugs		
Current use of marijuana	A, E*	More frequent
Current use of cocaine and other hard drugs	B, E	More frequent
Initiated smoking	E	Infrequent
Initiated use of alcohol	C, E	Infrequent
Initiated use of marijuana	E	Infrequent
Initiated use of illegal drugs	C	Infrequent
Intention to use cigarettes, alcohol, or marijuana	E	Infrequent
Sexual activity outcomes		
Delay onset of sexual intercourse	F	Infrequent

SOURCE: Author's tabulations based on sources cited in the Appendix.

NOTES: See Table 2.5 for program reference series. An asterisk indicates that the effect on the outcome has been in the unfavorable direction. Frequency labels are defined as infrequent = 1 or 2 programs; more frequent = 3 or 4 programs; most frequent = 5 or more programs.

respectively), but at least one program in every category affects one or more outcomes. This is another domain where there is great heterogeneity across evaluations in how they measure outcomes. For example, crime and delinquency measures may be captured by self-reports or by administrative records, and the measures can range from delinquent activity, to violent offenses, to specific outcomes in the criminal justice systems (e.g., arrests, petitions to juvenile court, convictions, time incarcerated). In one program, FFT, there is a significant favorable effect on the siblings of the program participants. There is more concurrence in the measures of substance use, although studies vary in whether they measure use of specific substances (e.g., tobacco, alcohol, marijuana, specific hard drugs) or group substances together.

Adult Outcomes Affected by Social Programs

Tables 2.11 to 2.14 show adult outcomes that have been demonstrated to be affected by one or more of the 39 social programs. As noted earlier, these outcomes apply primarily to the early childhood intervention programs (series A) and the employment and welfare programs (series H). Five adult outcome domains are also represented, with the education and economic outcomes grouped together in Table 2.12.

**Table 2.11—Specific Outcomes Affected by Social Programs:
Family Functioning for Adults**

Outcome	Program Series Affecting the Outcome	Frequency with Which Outcome Affected
Parenting outcomes		
Home environment quality measure (e.g., HOME inventory)	A	Infrequent
Mother-child interactions measure	A	Infrequent
Child abuse and neglect outcomes		
Ever had indicated report of child abuse and neglect	A	Infrequent
Number of reports of child abuse and neglect	A	Infrequent
Number of child abuse and neglect events (self-report)	A	Infrequent
Number of minor physical aggression events (self-report)	A	Infrequent
Number of minor psychological aggression events (self-report)	A	Infrequent
Marriage/divorce outcomes		
Currently married and living with spouse	H	Infrequent
Ever divorced	H	Infrequent

SOURCE: Author's tabulations based on sources cited in the Appendix.

NOTES: See Table 2.5 for program reference series. Frequency labels are defined as infrequent = 1 or 2 programs; more frequent = 3 or 4 programs; most frequent = 5 or more programs.

Consider first the family functioning domain presented in Table 2.11 and the associated outcomes that are captured by a few of the social programs. These include general parenting outcomes and measures of child abuse and neglect—both resulting from several of the early childhood interventions—as well marriage and divorce outcomes that result from two of the welfare programs.

Effects on adult education are found in both early childhood and teen pregnancy prevention programs (series A and F, respectively). As shown in Table 2.12, the education outcome is usually captured by some measure of postsecondary enrollment. More common across social programs that measure adult outcomes are impacts on economic outcomes, also shown in Table 2.12. These economic

**Table 2.12—Specific Outcomes Affected by Social Programs:
Education and Economic Outcomes for Adults**

Outcome	Program Series Affecting the Outcome	Frequency with Which Outcome Affected
Education outcomes		
Years of completed schooling	A	Infrequent
Ever attended 4-year college	A	Infrequent
Currently enrolled in postsecondary institution	F	Infrequent
Economic outcomes		
Has work experience	F	Infrequent
Employed in skilled job	A	Infrequent
Currently employed	A, H	Most frequent
Currently employed full-time	A	Infrequent
Months employed (over some interval)	A, B, H	Most frequent
Hours employed per week	B	Infrequent
Current earnings	A, B, H	Most frequent
Ever on welfare	A	Infrequent
Current welfare receipt	H*	Most frequent
Months on welfare (over some interval)	A1, H*	Most frequent
Welfare benefit payments (over some interval)	H*	Most frequent
Current income	H	Infrequent
Current income is below poverty level	H	More frequent

SOURCE: Author's tabulations based on sources cited in the Appendix.

NOTES: See Table 2.5 for program reference series. An asterisk indicates that the effect on the outcome has been in the unfavorable direction. Frequency labels are defined as infrequent = 1 or 2 programs; more frequent = 3 or 4 programs; most frequent = 5 or more programs.

outcomes are affected by each of the employment and welfare programs (series H), as well as a handful of the programs in other categories, especially the early intervention programs (series A). These measures capture employment rates at a point in time or over time, earnings from work, participation in social welfare programs and the associated cash transfers, and income measures, including income measured relative to poverty. One of the welfare programs, MFIP, results in increased time on welfare or receiving the earnings supplement, because the reforms provide an incentive to remain on public assistance, in contrast to the status quo. We have marked this as an unfavorable outcome, although the combination of welfare and work allows for higher income and improved child outcomes as well.

The adult health-related outcomes shown in Table 2.13 are affected by only three of the early childhood programs. The reproductive health outcomes are a combination of long-term outcomes of the focal children in the Abecedarian program and long-term outcomes for the mother who is a main focus of the NFP home visiting program. The mental health outcomes are also measured for the focal parent in the DARE to Be You intervention. In contrast, the crime and substance abuse outcomes recorded in Table 2.14 result from three program categories: early intervention, crime/violence prevention, and employment programs (series A, G, and H, respectively). Most of these outcomes fall in the crime category and vary almost as much as those measured for youth, with considerable overlap in the measures taken during adolescence and adulthood. The only adult substance use impact comes from an early intervention program.

**Table 2.13—Specific Outcomes Affected by Social Programs:
Health Outcomes for Adults**

Outcome	Program Series Affecting the Outcome	Frequency with Which Outcome Affected
Reproductive health		
Had teenage birth	A	Infrequent
Age at first birth	A	Infrequent
Number of pregnancies or births (over some interval)	A	Infrequent
Months between births	A	Infrequent
Mental health		
Self-esteem	A	Infrequent
Stress measure	A	Infrequent

SOURCE: Author's tabulations based on sources cited in the Appendix.

NOTES: See Table 2.5 for program reference series. Frequency labels are defined as infrequent = 1 or 2 programs; more frequent = 3 or 4 programs; most frequent = 5 or more programs.

**Table 2.14—Specific Outcomes Affected by Social Programs:
Crime and Substance Abuse Outcomes for Adults**

Outcome	Program Series Affecting the Outcome	Frequency with Which Outcome Affected
Crime outcomes		
Ever arrested	H	Infrequent
Number of arrests	A, A, H	More frequent
Number of arrests for violent crimes	A	Infrequent
Ever convicted	H	Infrequent
Number of convictions	A, H, G	More frequent
Ever incarcerated	H	Infrequent
Ever reincarcerated	G	Infrequent
Time to reincarceration	G	Infrequent
Number of prison or jail days	A, G	More frequent
Substance use outcomes		
Substance use impairments	A	Infrequent

SOURCE: Author's tabulations based on sources cited in the Appendix.

NOTES: See Table 2.5 for program reference series. Frequency labels are defined as infrequent = 1 or 2 programs; more frequent = 3 or 4 programs; most frequent = 5 or more programs.

Summary

The 39 social programs reviewed in this chapter are interventions starting as early as the prenatal period or birth, continuing through the school-age years, and extending into adulthood. Given the range of interventions represented in these programs, it is not surprising to find a broad array of outcomes that have been demonstrated through rigorous program evaluation to be affected by the programs. We have classified these outcomes into 10 domains—five representing child/youth outcomes and five representing adult outcomes. While there are some outcome domains that have been affected by multiple interventions, it is striking that the measures used to capture any given outcome domain can vary from program to program. This can pose a challenge for BCA, as the shadow prices developed for one study in a given program area may not be relevant for another because of the differentials in outcome measures. Another challenge is that relatively few of the social programs measure outcomes in adulthood—especially those that are likely to have the greatest dollar benefits (e.g., adult employment, welfare use, and crime). This stems, in part, from the fact that most of the programs target children and youth, so the immediate program impacts

are for program participants before they reach adulthood. Only when programs serving children follow participants into adulthood are there observed measures of program impacts on participants' adult outcomes. As a result, as we will see, one strategy with BCA is to project future outcomes based on the trajectory of outcomes as of the last observation.

As noted earlier, BCAs have been conducted for only 22 of the 39 programs. Several of these programs have been evaluated as part of multiprogram benefit-cost studies, with the same methodology—including shadow prices—applied to each program. Other benefit-cost studies are specific to a given program. These studies and their use of shadow prices are the subject of the following chapter.

3. Social Programs with BCAs and the Associated Shadow Prices

Given the range of outcomes measured in the 39 social programs covered in Chapter 2, our objective in this chapter is to narrow our focus to the subset of 22 programs that have an associated BCA to determine (1) which of the outcomes affected by those programs is valued in dollar terms and (2) the shadow prices used to value those outcomes. We begin by summarizing the sources for the BCAs for the 22 programs. We then provide an overview of the measured outcomes that are monetized across the 22 studies. Finally, we discuss in detail the use of shadow prices, organizing the discussion around the child/youth and adult outcome domains delineated in Chapter 2.

BCAs for Programs Covered in This Study

The BCAs for the 22 proven social programs fall into two overlapping clusters, as shown in Table 3.1.¹⁶ The first cluster consists of 10 programs for which a specific BCA was conducted, either by the evaluation team or by independent researchers.¹⁷ In these cases, the focal program is typically not compared

¹⁶ Table 3.1 includes only the BCAs associated with our 39 programs. Several programs also have or only have an associated CEA (see, for example, Borman and Hewes (2003) for Success for All; Lynch et al. (2005) for CSC; Schoenwald et al. (1996) for MST). We exclude such analyses because cost-effectiveness studies do not require the use of shadow prices to value program outcomes. Our focus on shadow prices means we have also excluded from consideration several other multiprogram studies that provide benefit-cost results but draw on the studies already listed in Table 3.1, so no new shadow prices are used (see, for example, McCollister et al. (2003, 2004); Miller and Levy (2000); Miller and Hendrie (2005); Pacific Institute for Research and Evaluation (2005); and Small et al. (2005)). Fowles, Byrnes, and Hickert (2005) also conducted a multiprogram BCA similar to the WSIPP analysis, although they report results only for generic crime prevention programs (based on a meta-analysis of specific program evaluations) rather than BCAs for specific program models. References cited are given in the Appendix.

¹⁷ When there is more than one such study for a given program, we list the most recent core BCA in Table 3.1. For example, several earlier benefit-cost studies were conducted for the Perry Preschool program (see, for example, Berrueta-Clement et al. (1984); Barnett (1985, 1993a, 1993b, 1996)). The most recent Perry Preschool BCA has been published in several outlets in addition to the one listed in Table 3.1 (see Nores et al. (2005); Belfield et al. (2006)). Comparative analyses of the Abecedarian and Chicago CPC BCAs, based on the original studies cited in Table 3.1, are available in Barnett and Masse (2007) and Temple and Reynolds (2007), respectively. Schochet, Burghardt, and Glazerman (2001) provide an earlier BCA for Job Corps, based only on follow-up survey data.

Table 3.1—BCAs for the Social Programs Included in the Analysis

Program Name	Included in Stand-Alone BCA	Included in Multi-Program BCA
A. Early Childhood Intervention Programs		
A1. Carolina Abecedarian	Masse and Barnett (2002) ^a	
A2. Chicago CPC	Reynolds et al. (2002) ^b	
A5. Early Head Start		Aos et al. (2004)
A7. High/Scope Perry Preschool	Barnett, Belfield, and Nores (2005) ^c	
A9. IHDP		Aos et al. (2004)
A10. NFP	Karoly et al. (1998)	Aos et al. (2004, 2006)
B. Education (K–12) Intervention Programs		
B4. Good Behavior Game		Aos et al. (2004)
C. Youth Development Programs		
C1. BBBS		Aos et al. (2004)
D. Mental Health Supports and Behavior Modification Interventions		
D3. FFT		Aos et al. (2004)
E. Substance Abuse Prevention Programs		
E1. Guiding Good Choices	Spoth, Gyll, and Day (2002)	Aos et al. (2004)
E2. LST		Aos et al. (2004)
E3. Project ALERT		Aos et al. (2004)
E4. Project Northland		Aos et al. (2004)
E5. Project STAR / MPP		Aos et al. (2004)
F. Teen Pregnancy Prevention Programs		
F1. Carrera APPP		Aos et al. (2004)
G. Crime/Violence Prevention Programs		
G2. MTFC		Aos et al. (2004, 2006)
G3. MST		Aos et al. (2004, 2006)
H. Employment and Welfare Programs		
H1. Job Corps	Schochet, McConnell, and Burghardt (2003) ^d	
H2. LA Jobs-First GAIN	Freedman et al. (2000)	
H3. MFIP	Miller et al. (2000)	
H4. Portland JOBS	Hamilton et al. (2001)	
H5. Riverside GAIN	Riccio, Friedlander, and Freedman (1994)	

^a See also Barnett and Masse (2007).^b See also Temple and Reynolds (2007).^c See also Berrueta-Clement et al. (1984), Barnett (1985, 1993a, 1993b, 1996), Nores et al. (2005), and Belfield et al. (2006).^d See also Schochet, Burghardt, and Glazerman (2001).

SOURCE: Author's tabulations based on sources cited in the Appendix.

NOTES: See Table 2.2 for full program names.

with any other program assessed using the same BCA methodology or shadow prices. The second cluster contains two programs in the first cluster plus the other 12 programs that have been analyzed as part of a series of multiprogram BCAs conducted by Aos and colleagues at the Washington State Institute of Public Policy (WSIPP) (Aos et al., 2004, 2006).¹⁸ The WSIPP studies use a similar benefit-cost methodology and set of shadow prices for each program, thereby allowing comparability across programs, subject to the constraint that not all program evaluations measure the same set of outcomes over the same follow-up period. The WSIPP studies have included social programs from each of the policy areas except employment and welfare programs (series H).

Outcomes Measured and Monetized

Before discussing the specific shadow pricing used in each of the studies listed in Table 3.1, it is useful to get an overall perspective on the outcomes monetized for each social program. Tables 3.2a, 3.2b, and 3.2c provide this perspective by listing the various impact measures in the rows and the 22 programs with benefit-cost studies in the columns. An empty cell in the table means the program evaluation did not find a significant effect on that outcome. If the evaluation found a statistically significant effect for an outcome but that outcome is not monetized in the benefit-cost study, there is a C or an A in the cell, depending on whether the outcome was for a participating child/youth or adult (either the parent of the focal child for child/youth interventions or the participant in adult interventions). If the outcome was monetized, the cell has a solid border. Statistically insignificant outcomes that were monetized are indicated by a lowercase c or a in the cell and a border around the cell. A significant outcome that was not valued itself but was used to project the value of another benefit that was not otherwise observed (e.g., test scores or high school graduation used to project earnings) is indicated by a dashed border around the cell, and the projected outcome (e.g., earnings) is noted. In a few cases, as we discuss later, the projected outcomes are for descendants of the program participants (e.g., grandchildren).

Some of the outcomes that are observed are projected beyond the observation period—the point at which the last follow-up occurs—for a given projection

¹⁸ Aos et al. (2004) focus on early intervention and prevention programs for youth, while Aos et al. (2006) centers on programs that reduce crime rates and criminal justice system costs. Earlier WSIPP studies also focused on crime and violence reduction programs (Aos et al., 1998, 2001).

period, either fixed in length (e.g., a 10-year horizon) or to a specific age (e.g., age 65). In those cases where a projection is made, we add a superscript P. When the shadow prices are used only to value benefits as measured during the evaluation period, no superscript P is used.

Several programs have a standalone BCA and are also included in the Aos et al. (2004, 2006) multiprogram BCA. For those programs, we show the outcomes measured and monetized in the two BCAs side-by-side, with the multiprogram BCA listed second. Outcome rows with all blank cells in Table 3.2a, 3.2b, and 3.2c have been eliminated and are listed in the table notes.

These tables call attention to several points about the overall pattern of monetization in the BCAs:

- **Some outcomes are never monetized.** The behavioral/emotional and cognitive outcomes measured for children and youth (Tables 2.6 and 2.7) are not monetized in any of the BCAs, despite having significant impacts in these domains. In the case of the welfare programs (series H), some of the impacts for children of program participants are unfavorable, indicating that the BCAs may omit potential costs from consideration, along with potential benefits. Specific child/youth measures of program impact that are never monetized include grades, school attendance, school engagement, general health, and contraceptive use; nonmonetized adult outcome measures include parenting outcomes, marriage and divorce, mental health, reproductive health (e.g., better pregnancy timing or spacing), and income and poverty status.
- **Some outcomes are never monetized but are used to project other outcomes.** Examples include achievement test scores, the intangible values of which for the children themselves or their families are never monetized in their own right. But the scores are used in the Aos et al. (2004) methodology to project future labor market earnings. Likewise, changes in employment per se are never monetized, for example, to account for changes in leisure or the social value placed on work. Only the associated changes in earnings are treated as having monetary value.

Table 3.2a—Outcomes Measured and Monetized in Benefit-Cost Calculations for Social Programs with BCAs

	Program (Length of Follow-Up)						
	A. Early Childhood Intervention						B. Education
	Abecedarian (21 years) A1	Chicago CPC (18 years) A2	Early Head Start (1 year) A5	Perry Preschool (37 years) A7	IHDP (8 years) A9	NFP ^a (15 years) A10	Good Behavior Game (13 years) B4
Outcome							
Behavioral/emotional							
Positive/negative behavior			C		C	C C	C
School suspension/expulsion							C
Mental health							C
Cognition							
IQ or cognitive development	C	C	C	C	C		
Education							
Achievement tests	C	C	C-earnings	C	C	C C-earnings	
Grades				C			
Special education	C	C		C			
Grade retention	C	C		C			
School attendance							
High school completion	C-earnings	C-earnings		C			
Health							
General health			C		C		
Health care utilization (ER visits)						C C	
Pregnancy/birth							
Youth/adult crime and delinquency							
Arrests				C ^P		C ^P A C ^P A ^P	
Juvenile petitions		C ^P					
Convictions				C ^P		A A ^P	
Incarcerations				C ^P		A A ^P	
Youth/adult substance use							
Tobacco	C ^P						C ^P
Alcohol use						A A ^P	C
Illegal drug use	C					A A ^P	C

Table 3.2a—Outcomes Measured and Monetized in Benefit-Cost Calculations for Social Programs with BCAs, *Continued*

Outcome	Program (Length of Follow-Up)						B. Education Good Behavior Game (13 years) B4
	A. Early Childhood Intervention						
	Abecedarian (21 years) A1	Chicago CPC (18 years) A2	Early Head Start (1 year) A5	Perry Preschool (37 years) A7	IHDP (8 years) A9	NFP ^a (15 years) A10	
Adult family functioning							
Parenting outcomes			A		A		
Child abuse and neglect		A				A	A
Adult education							
College attendance	C	C		c			
Adult economic							
Employed	C			C		A	A
Earnings	A ^P			C ^P		A	A
Welfare use	c ^P			C ^P		A ^P	A
Adult health							
Reproductive health	C					A	A

^a The first column is based on Karoly et al. (1988); the second column is based on Aos et al. (2004).

SOURCE: Author's tabulations based on sources cited in Table 3.1.

NOTES: See Table 2.2 for full program names. Uppercase A or C indicates outcome measured in evaluation and statistically significant for participating adult (A) or child/youth (C). A lowercase letter indicates outcome measured but not statistically significant. Cells with a solid border indicate savings to government or private benefits are monetized in the BCA for this outcome. Cells with a dashed border indicate outcome used to project benefits in another domain that are otherwise not observed. Superscript P indicates the benefit (cost) includes a projection beyond the age the individual was last observed. No superscript indicates the benefit (cost) is based only on the observed outcome as of the time of the last follow-up. In this table, rows for the following child/youth outcomes were empty and therefore excluded: school attendance and violent or delinquent behavior; rows for the following adult outcomes were empty and excluded: marriage/divorce, income/poverty, and mental health.

Table 3.2b—Outcomes Measured and Monetized in Benefit-Cost Calculations for Social Programs with BCAs

Outcome	Program (Length of Follow-Up)							
	C. Youth Development	D. Mental Health/ Behavior	E. Substance Abuse Prevention					F. Pregnancy Prevention
	BBBS (1.5 years) C1	FFT (5 years) D3	Guiding Good Choices ^a (3 years) E1	LST (6 years) E2	Project ALERT (2 years) E3	Project Northland (3 years) E4	Project STAR (3 years) E5	Carrera APPP (3 years) F1
Behavioral/emotional								
Positive/negative behavior	C							
Foster care placement		C						
Education								
Grades / competence	C-earnings							
Grade retention								
School attendance	C							
High school completion								C-earnings
Health								
Contraceptive use								C
Pregnancy/birth								C-various
Youth/adult crime and delinquency								
Arrests		C ^P	C	C ^P				
Convictions		C ^P	C	C ^P				
Incarcerations		C ^P	C	C ^P				
Youth/adult substance use								
Tobacco				C ^P	C	C ^P	C ^P	
Alcohol use	C ^P		C ^P	C ^P	C ^P	C ^P	C ^P	
Illegal drug use	C ^P		C	C ^P	C ^P	C ^P	C ^P	
Sexual initiation								C
Adult family functioning								
Child abuse and neglect								
Adult education								
College attendance								C
Adult economic								
Employed								C
Earnings								
Welfare use								

^a The first column is based on Spoth, Guyll, and Day (2002) ; the second column is based on Aos et al. (2004).

SOURCE: Author's tabulations based on sources cited in the Appendix.

NOTES: See Table 2.2 for full program names. For notation, see notes to Table 3.2a. In this table, rows for the following child/youth domains/outcomes were empty and therefore excluded: mental health, cognition, achievement tests, special education, general health, health care utilization, and violent or delinquent behavior; rows for the following adult outcomes were empty and excluded: parenting outcomes, income/poverty, and health.

Table 3.2c—Outcomes Measured and Monetized in Benefit-Cost Calculations for Social Programs with BCAs

Outcome	Program (Length of Follow-Up)						
	G. Crime/Violence Prevention		H. Employment and Welfare				
	MTFC (2 years) G2	MST (13.7 years) G3	Job Corps (6 years) H1	LA Jobs-1 st GAIN (2years) H2	MFIP (6 years) H3	Portland JOBS (5 years) H4	Riverside GAIN (5 years) H5
Behavioral/emotional							
Positive/negative behavior				C	C		
School suspension/expulsion				C			
Education							
Grades/competence					C		
Grade retention				C			
High school completion			A				
Health							
Health care utilization (ER visits)					C		
Youth/adult crime and delinquency							
Violent or delinquent behavior	C						
Arrests	C ^P	C ^P	A				
Convictions		C ^P	A				
Incarcerations	C ^P		A				
Youth/adult substance use							
Alcohol use		C					
Illegal drug use		C					
Adult family functioning							
Marriage/divorce					A		
Adult economic							
Employed			A	A	A	A	A
Earnings			A ^P	A ^P	A ^P	A	A ^P
Welfare use			A ^P	A ^P	A ^P	A	A ^P
Income/poverty				A	A	A	

SOURCE: Author's tabulations based on sources cited in the Appendix.

NOTES: See Table 2.2 for full program names. For notation, see notes to Table 3.2a. In this table, rows for the following child/youth domains/outcomes were empty and therefore excluded: mental health, cognition, achievement tests, special education, school attendance, general health, pregnancy/birth, convictions, and tobacco use; rows for the following adult outcomes were empty and excluded: parenting outcomes, child abuse and neglect, education, health, and substance use.

- **Most outcomes that are monetized are statistically significant impacts.** In two cases, both part of the Abecedarian BCA (A1), program effects are monetized even though they do not meet conventional levels of statistical significance. These are the smoking and welfare use outcomes for the Abecedarian BCA (A1) and the college attendance outcome for the Perry Preschool BCA (A7).¹⁹
- **Some outcomes are not monetized because the BCA does not incorporate the most-current evaluation results.** For example, the Aos et al. (2004) BCA for Project Alert (E3) does not incorporate results from the latest wave of the evaluation, which shows a significant reduction in the initiation of smoking and current smoking. Thus, these outcomes could be monetized in a future update. More-recent findings are also available for IHDP than are covered in Aos et al. (2004). This reinforces the point that BCAs may change through time as new follow-up data become available. With updated data, significant new program impacts may emerge, or impacts that were previously significant may decay or completely fade away.
- **Some outcomes are not monetized because their effects are assumed to be zero.** The Aos et al. (2004) methodology adjusts program impacts as measured in evaluations downward when the research design is judged to be weak or based on a demonstration rather than “real world” conditions.²⁰ In some cases, these downward adjustments reduce program impacts to zero, so there is no longer an effect to monetize. This is the case with the IHDP evaluation, where no dollar benefit is assigned to the statistically significant gains in student achievement because the effect is adjusted to zero.

¹⁹ The inclusion of program effects that are not statistically significant in a BCA is not necessarily incorrect. In the case of the Perry Preschool BCA, the costs of college attendance are valued as an offset to the earnings gains attributable to the additional schooling. For studies with small samples and therefore low statistical power, the size of an estimated effect on a given outcome may be large but not precisely estimated. This is another argument for estimating standard errors (or confidence intervals) associated with benefit and cost estimates so that the precision with which program impacts are estimated can be reflected in the precision of the BCA results.

²⁰ Such adjustments can be viewed as arbitrary, as they are not justified by research evidence indicating that studies with weaker designs or those based on demonstration projects will systematically bias estimated program impacts upward. In the context of a meta-analysis, such studies can be given less weight so that they do not have as much influence on the estimated meta-analytic effects.

- **Some outcomes are not monetized within specific social policy areas.** For example, several of the welfare programs (series H) show significant impacts on the children of program participants (see Table 3.2c). However, while many of these impacts are for outcomes that are monetized in other BCAs (e.g., grade retention, health care utilization), they are not monetized as part of the welfare program BCAs.

Shadow Prices Used in BCAs

We now turn to a more detailed review of the shadow prices used in the BCAs listed in Table 3.1 and the specific outcomes indicated in the cells with borders in Tables 3.2a, 3.2b, and 3.2c. As noted above, none of the significant program effects on child/youth behavioral/emotional outcomes (see Table 2.6) or child/youth cognitive outcomes (see Table 2.7) are monetized in the available BCAs. Thus, we begin our discussion with the shadow prices associated with child/youth and adult education outcomes.

Child/Youth and Adult Education Outcomes

The education outcomes affected by the programs in Table 3.1 include those measured for children and youth (achievement test scores, special education use, grade retention, and high school completion), as well as that measured for adults (college enrollment).

Achievement Test Scores

None of the BCAs in which an evaluation produced an effect on achievement test scores attempts to place a dollar value on the potential intangible benefits of improved school achievement, neither to the participating child and his or her family nor for society more generally. The Aos et al. (2004) methodology, however, is the only BCA that links a change in an achievement test score to the expected change in lifetime earnings (and associated taxes), a linkage that is applied to evaluations that do not follow the children and youth served by a given social program into adulthood. For example, of the social programs we review that were analyzed by Aos et al. (2004), this methodology for attaching a dollar benefit to achievement gains is applied to Early Head Start (A5), NFP

(A10), and BBBS (C1) (based on a measure of grades).²¹ Other early childhood interventions that produce achievement test score gains follow participants long enough to either observe earnings (e.g., Perry Preschool) or project lifetime earnings based on observed high school completion rates (e.g., Abecedarian and Chicago CPC).

In particular, the Aos et al. (2004) methodology uses national data from the Current Population Survey (CPS) on the cross-sectional age-earnings profile (from ages 18 to 65) to calculate the present value of the weighted average of earnings for high school graduates and individuals with some college education but no degree. That measure of the present value of lifetime earnings is multiplied by the increase in annual earnings associated with a one-standard-deviation increase in achievement test scores, assumed to equal 12 percent, based on other research. Real wages are assumed to grow 0.5 percent per year, and a fringe-benefit rate of 25 percent is applied to earnings to capture total compensation. The taxes associated with the projected earnings are valued as well.

Two additional adjustments are made by Aos et al. (2004). First, the earnings gain is adjusted downward by 25 percent, based on the assumption that studies measuring a relationship between test scores (or educational attainment) and earnings overestimate the true causal relationship, because the estimates are based on observational data rather than experimental estimates.²² Second, other nonmarket benefits to participants from having more education, benefits that are not readily quantifiable, are also valued. As noted by Wolfe and Haveman (2002), these potential benefits include improved health status (and reduced mortality) from reductions in smoking and other behaviors that affect health; improved fertility choices (e.g., timing and spacing of births); better consumer choices in adulthood in other domains that also raise well-being through more

²¹ Although the IHDP evaluation produced a significant achievement test score gain as of age 8, Aos et al. (2004) adjust the effect size to zero so that no economic value is associated with this outcome.

²² In other words, the additional earnings of those with higher test scores (or higher education) may not be fully attributable to the increase in school achievement itself. Instead, other unmeasured factors associated with those who have more educational success, such as higher motivation or higher levels of other skills valued by the labor market, may explain part of the earnings benefit of better education outcomes. Using the same argument, a similar adjustment was made by Cohen (1998). However, that study did not acknowledge more-recent literature which indicates that the return to education estimated from econometric methods that correct for selectivity bias produces similar, if not higher, estimates of the return to schooling than models without such a correction (Ashenfelter, Harmon, and Oosterbeek, 1999).

efficient consumption; higher educational attainment and other improved outcomes for the next generation (i.e., the children of the program participants); and favorable effects on peers through effects on classrooms and neighborhoods. Aos et al. (2004) assume these benefits are 25 percent of the estimated earnings gain, arguably an arbitrary but perhaps conservative assumption, as Wolfe and Haveman's (2002) review suggests these nonmarket benefits may be at least as large as those associated with earnings gains and reductions in welfare program use.

As discussed below, a similar approach was taken by Aos et al. (2004) for valuing the earnings impact of changes in school completion (high school graduation rate or completed years of schooling). The methodology also values the benefits to government from higher taxes on the projected earnings gains, as discussed below in the section on valuing earnings impacts.

The projection of program impacts on future earnings based on achievement test scores is one strategy for valuing longer-term outcomes in the BCAs of social programs that otherwise begin with children and youth and do not follow them into adulthood. The approach, however, introduces model-based uncertainty in the estimates of program net benefits and the benefit-cost ratio. Aos et al. (2004) do not examine the sensitivity of results to key assumptions as part of their BCA methodology. Moreover, as discussed further below, the approach does not implement the appropriate theoretical construct for valuing benefits from increases in earnings, i.e., accounting for the value of lost leisure.

Special Education Use and Grade Retention

Three of the early childhood evaluations—Abecedarian, Chicago CPC, and Perry Preschool—find significant program effects on both special education use and grade retention, and each of the associated BCAs places a monetary value on these improved educational outcomes. The Aos et al. (2004) multiprogram evaluation also values these two outcomes, although the outcomes were not affected by any of the programs in Table 3.1 that Aos et al. analyzed. In general, the analysts for the specific program and multiprogram BCAs follow a similar methodology. For a one-year reduction in special education participation, each study values the savings to government as the incremental cost of a year of special education during the K–12 years over and above the cost of regular K–12 education. A reduction in one year of grade retention is likewise valued at the annual cost of a year of regular K–12 education. None of these studies attempts

to value any intangible benefits to program participants or the rest of society from improved educational outcomes.

In the case of the Abecedarian and Perry Preschool BCAs, the analysts had access to the education histories of the treatment and control group members, so yearly education costs could be attached to each individual based on his or her enrollment status and placement in various special education programs. In the absence of such schooling histories, when calculating the shadow price of grade retention, Aos et al. (2004) multiply the cost of an additional year of K–12 education by the baseline probability of high school completion (assumed to be 70 percent) in light of the expectation that repeating a grade will lengthen the years in K–12 education only if high school is completed. This approach implicitly assumes that those who drop out of school do so based on age rather than grade. In contrast, the Chicago BCA implicitly assumes that each grade repeated lengthens the time in K–12 education by a full year, regardless of whether high school is completed or not. This is more consistent with an assumption that students who drop out do so based on attaining a specific grade rather than reaching a target age.

Despite the similarity in methodology, as seen in Table 3.3, the specific shadow prices can vary with the year and geographic location for deriving the education cost parameters (specific shadow price figures were not reported for the Perry Preschool BCA). For example, Reynolds et al. (2002) use education cost figures for Chicago, while Aos et al. (2004) derive estimates for Washington state. After adjusting all cost figures to 2007 dollars (using the GDP personal consumption expenditure deflator generated by the Bureau of Economic Analysis (BEA)), the shadow price used for the annual cost of a year of K–12 education is quite similar across the studies. The Aos et al. (2004) study is an outlier, however, on the incremental cost of special education. Consistent and current data on special education expenditures by state are not readily available. However, the latest estimates by Parrish et al. (2004) indicate that the ratio of special education expenditures to regular K–12 spending is about 1.9. The Aos et al. (2004) figure is based on the state funding formula for special education, so the Parrish et al. (2004) estimate suggests that this figure is an underestimate of the true incremental cost of special education in Washington state.

Table 3.3—Shadow Prices for K–12 Education and Special Education in Social Program BCAs

BCA	Geographic Unit; Original Dollar Year	Annual Cost (2007 Dollars)	
		K–12 Education	Increment for Special Education
Abecedarian (A1) Masse and Barnett (2002)	National 1999 dollars	\$9,558	\$12,545
Chicago CPC (A2) Reynolds et al. (2002)	Chicago 1998 dollars	\$8,835	\$9,545
Perry Preschool (A7) Barnett, Belfield, and Nores (2005)	Ypsilanti 1992 dollars	n.s.	n.s.
Aos et al. (2004)	Washington State 2003 dollars	\$8,280	\$1,037

SOURCE: Author's tabulations based on sources cited in the first column.

NOTES: Dollar figures are converted to 2007 dollars using the GDP personal consumption expenditures deflator produced by the BEA (undated), Table 1.1.4. In this table, n.s. = not specified.

High School Completion

None of the BCA studies value the intangible benefits, either to participants or to the rest of society, of an increase in the rate of high school graduation. Like school achievement, high school graduation is primarily linked to the economic benefit associated with higher lifetime earnings in those studies that do not follow participants long enough to observe labor market outcomes. These benefits accrue to participants themselves, and the associated taxes add to government coffers (discussed below).

Aos et al. (2004) apply a similar methodology to the approach described above for achievement test score gains. Of the programs in Table 3.1, this approach applies to the Carrera APPP (F1), which showed an increase in high school completion rates. Among the single-program BCAs, lifetime earnings are projected for Abecedarian and Chicago CPC, based on the estimate of the program impact on the high school graduation rate. Other studies, such as Perry Preschool and Job Corps, also produced favorable effects on high school graduation rates, but since those studies observed earnings for program participants, projections of future earnings differentials are based on observed earnings patterns (as discussed below).²³

²³ As noted by an anonymous referee, the series of BCAs conducted for Perry Preschool at each follow-up age (i.e., the analysis based on age 19 data by Berrueta-Clement et al. (1984) and

For high school completion, the Aos et al. (2004) approach calculates the present value of the difference in earnings plus fringe benefits (25 percent rate) between high school graduates and non-high school graduates for ages 18 to 65, again based on the cross-section age-earnings profile in the CPS. The same parameters for annual real wage growth (0.5 percent), a decrement for the true causal relationship between education and earnings (25 percent), and an increment for nonmarket benefits to education (25 percent) are applied.

The Chicago CPC methodology deviates in several ways from this approach. First, rather than using the cross-section age-earnings profile, the relative wages by education are taken for 25- to 29-year-old full-time workers by sex in the base-year CPS data (for blacks only, given the demographics of the CPC population), and a 2 percent per year real wage growth is applied. The fringe rate is 20 percent, and there is no adjustment for the causal education effect on earnings or for any nonmarket benefits of education. A sensitivity analysis by Temple and Reynolds (2007) calculates the earnings gain based on earnings for all black male and female workers, not just full-time workers, which raises the benefit estimate.

There are still further differences between the approach of Aos et al. and the approach used to project future earnings based on educational attainment in the Abecedarian BCA. Again, CPS cross-sectional earnings profiles by education level are used by sex and race from ages 22 to 65. The Abecedarian BCA assumed that study subjects could increase their educational attainment beyond the level observed as of the last follow-up at age 21. Thus, transition probabilities based on longitudinal data were estimated, so an expected earnings profile could be calculated (by multiplying the probability of reaching each educational level by the present value of lifetime earnings at that level). Survival rates were also incorporated to account for mortality. Real earnings were assumed to grow at 1 percent per year, and a fringe-benefit rate of 20 percent was applied.

The Abecedarian BCA went one step further and projected future benefits in terms of earnings for the descendants of program participants, for a total of three subsequent generations. Assuming each study member has one child at age 25,

Barnett (1985); age 27 data by Barnett (1993a, 1993b, 1996); and age 40 data by Barnett, Belfield, and Nores (2005), Nores et al. (2005), and Belfield et al. (2006) suggest that the earnings differentials projected from differences in observed educational attainment may understate the true earnings differentials. In each successive Perry Preschool BCA, the actual earnings differences exceeded the earlier projections. This occurred because while there were modest differences in educational attainment between the treatment and control groups, especially for males, other differences in underlying cognitive abilities, attitudes, and behaviors also contributed to earnings gains.

estimates from the literature on the elasticity of the child's income with respect to the income of the mother or father are used to project earnings for each subsequent generation. Despite the fact that these benefits are far in the future and therefore heavily discounted, the cumulative effect is a nontrivial contribution to total benefits (Masse and Barnett, 2002).

Earnings projections based on high school completion may have less uncertainty than earnings projections based on achievement test scores. Nonetheless, there are typically no efforts in the various BCAs to examine the sensitivity of BCA results to model-based assumptions regarding the relationship between high school completion and earnings differentials. For example, the use of cross-sectional age-earnings profiles by education level assumes that the current education wage premium remains constant. An alternative assumption is a continuation of the recent trend toward greater wage disparity by education level, which would further expand the benefit from increased schooling.

College Attendance

Three of the early childhood programs—Abecedarian (A1), Chicago CPC (A2), and Perry Preschool (A7)—measure the impact of program participation on attendance at a postsecondary education institution. The earnings benefits (based on either projections using schooling attainment or measured earnings) are discussed elsewhere. However, the additional years of education result in added costs to the public sector (for those attending public institutions of higher education), as well as private costs associated with tuition, fees, and other education-related items. In all three cases, these costs were estimated on the basis of observed college participation; no future costs of college attendance were estimated.

The Perry Preschool BCA used figures for full-time-equivalent median student expenditures at local or national two- and four-year colleges, with an offset for tuition paid by the student. Expenditures for room and board were excluded. The Chicago CPC BCA appeared to use a measure of tuition for two-year colleges, apportioning a share to the student (one-third) and the rest to taxpayers. However, the tuition charges at most higher education institutions do not reflect the full cost of a college education. Thus, per-pupil expenditures, comparable to those used in the Perry approach, would be the more appropriate shadow price.

College attendance may also be associated with a difference in earnings compared with those of individuals who do not attend college. On the one hand, time spent in school may displace time available for work. On the other hand, for the disadvantaged populations served by programs like Abecedarian, Chicago CPC, and Perry Preschool, the high rates of youth idleness may mean that those who attend college actually work more to support their schooling than do their counterparts who are not in college. As noted below, in the Perry Preschool BCA, earnings were observed starting at age 15, so any earnings differences between the treatment and control groups, including those that occur when attending higher education, are accounted for. For the Abecedarian estimates, earnings differentials by educational attainment were counted only starting at age 22, so the differential earnings for postsecondary students prior to that age are not accounted for. This issue is not explicitly addressed in the Chicago CPC BCA.

Child/Youth Health Outcomes

With a few exceptions, the 22 social programs with BCAs did not have significant effects on measured health outcomes such as general health, health care utilization, or teen pregnancy. Thus, valuation of benefits in this domain has not been a major focus for these BCAs. The BCA for NFP (A10) accounted for the monetary savings to the public sector of the decrease in emergency room visits, valuing each visit at \$250 in 1996 dollars, equivalent to \$314 in 2007 dollars. This same outcome had a significant effect for the children in the MFIP evaluation (H3), but the outcome, like all the other child outcomes for that program, was not valued in the MFIP BCA.

The Carrera APP (F1), the only teen pregnancy prevention program with a BCA, is the only program with a BCA to have affected contraceptive use and teen pregnancy. The Aos et al. (2004) BCA methodology did not place a value on the change in contraceptive use. A complex set of assumptions was used, however, to account for the consequences of teen pregnancy for the mother and the child. Based on a meta-analysis, a teen pregnancy (a birth before the mother reaches age 18) was found to be associated with reductions in the mother's high school graduation rate (an effect confirmed in the Carrera evaluation) and an increase in child abuse and neglect and in the use of public assistance. For the child of a teen mother, the meta-analysis showed a reduction in the high school graduation rate and an increase in grade repetition and crime. Since none of these outcomes, with the exception of the high school graduation rate among the adolescent evaluation subjects, was directly observed in the Carrera evaluation, all of these outcomes

were projected on the basis of assumed effect sizes and valued at the shadow prices for each outcome (e.g., the earnings effect from a change in high school graduation rates, the school costs from a change in grade repetition, etc.). The combined shadow price for a decrease in one teen pregnancy resulting from these assumptions is not reported by Aos et al. (2004).

Youth and Adult Substance Abuse and Crime Outcomes

At least one program in each of the seven social policy areas has a BCA that places an economic value on impacts in the domains of youth and/or adult substance abuse and crime. Thus, these outcomes are affected by a wide range of social programs, and the valuation of improvements in these outcomes often constitutes a sizable component of measured benefits. This is especially true for outcomes in the crime domain, where various methods have been used to generate economic values.

Tobacco Use, Alcohol Abuse, and Illegal Drug Use

With one exception, of the social programs with BCAs, only the five substance abuse prevention programs (series E) have impacts on youth or adult substance use. The exception is the Abecedarian BCA (A1), which places a value on the reduction in the smoking rate for the treatment group, although the estimated impact is not statistically significant at conventional levels ($p = 0.106$). The other five programs are all included in the Aos et al. (2004) multiprogram BCA. In addition, a separate BCA is available for the Guiding Good Choices (E1) program (Spoth, Gyll, and Day, 2002).

With one exception, the BCAs are similar in that the approach used for economic valuation is not based on a willingness-to-pay concept. Instead, economic costs are based on a human capital framework that values the consequences of substance use-related morbidity and mortality for labor market outcomes (and the associated government taxes), public and private treatment and other medical costs, and other social costs (e.g., motor-vehicle accidents, fires, and crime). These potential costs are not observed in the program evaluations; only the treatment vs. control group differences in age of onset or current substance use are measured. Thus, these cost components must be projected, which typically involves a complex series of assumptions.

To begin, the BCA methodologies vary in the extent to which different economic cost components associated with substance use are accounted for, as shown in

Table 3.4. In valuing the economic costs of smoking, the method used by Masse and Barnett (2002) for the Abecedarian BCA differs from that employed by Aos et al. (2004) in that Masse and Barnett use a more-generic measure of the value of a year of life, compared with estimates specific to smoking-related health costs and earnings losses due to premature death. For disordered alcohol use, the method used by Aos et al. (2004) differs from that used by Spoth, Gyll, and Day (2002) for Guiding Good Choices in that it excludes crime-related costs, arguing that the evidence in support of a causal relationship between crime and alcohol abuse is weak. For the same reason, no crime-related costs are included in the Aos et al. (2004) methodology for disordered illicit drug use.

Masse and Barnett (2002) employ a few simple assumptions to derive an estimate of the costs of higher mortality among smokers, using data that incorporate willingness to pay for reduced mortality. Estimates from the literature indicate that smokers have a reduction in longevity equal to 6.5 years. Other estimates place the economic value of a year of life at \$100,000 to \$200,000 in 1999 dollars, so Masse and Barnett use the mid-point of \$150,000. The costs associated with the

Table 3.4—Cost Components Included in Economic Valuation of Costs of Substance Abuse in Social Program BCAs

Economic cost	Smoking		Disordered Alcohol Use		Disordered Illicit Drug Use
	Aos et al. (2004)	Masse and Barnett (2002)	Aos et al. (2004)	Spoth, Gyll, and Day (2002)	Aos et al. (2004)
Treatment and medical costs	✓		✓	✓	✓
Lost labor market productivity (and taxes) due to premature death	✓		✓	✓	✓
Premature death ^a		✓			
Lost labor market productivity (and taxes) due to morbidity			✓	✓	✓ ^b
Crime costs				✓	
Other (motor-vehicle crashes, fire, welfare program administration)			✓	✓	✓

^a General measure of the value of a year of life, incorporating willingness to pay, income loss, government savings on Medicaid, and other economic costs..

^b Applies to marijuana only through an effect on high school graduation rates.

SOURCE: Author's tabulations based on sources cited in the column headings.

reduction in longevity are added to the end of the average lifespan and are therefore heavily discounted. Nevertheless, the estimated savings from smoking reductions alone offset about one-quarter of the sizable Abecedarian program costs.

The Aos et al. (2004) approach involves separately estimating each of the row elements in Table 3.4, using a complex set of assumptions and model relationships, with a similar strategy for tobacco use, alcohol abuse, and illicit drug abuse. This includes assumptions about age-earnings profiles (adding in fringe benefits and subtracting taxes); the probability of death at each age associated with the three types of substance use; the relationship between disordered alcohol use and earnings; the relationship between marijuana use and high school graduation; annual treatment, medical, and other costs for each type of substance use converted to present-value life-cycle costs per person based on age at onset, age at cessation, lifetime and current-year prevalence of the substance use, and the relationship between age at onset and regular substance use. The Spoth, Gyll, and Day (2002) approach relies on an estimate from the literature of the aggregate annual costs of disordered alcohol use on all the row components in Table 3.4, which is then converted to present-value life-cycle costs per person, using an approach similar to that of Aos et al. (2004).

Unfortunately, none of the BCAs report the combined effect of the assumptions in terms of a common shadow price for any given domain of substance abuse, so it is difficult to ascertain the implications of the methodological differences for the resulting BCA estimates. Spoth, Gyll, and Day (2002) do include a sensitivity analysis and show that changes in key assumptions, generating upper- and lower-bound estimates, still result in positive net benefits and a benefit-cost ratio greater than 1. None of the alternative scenarios, however, replicate the approach taken by Aos et al. (2004).

Crime

The approaches to attaching an economic value to impacts of social programs on crime outcomes are arguably even more varied than those used for other outcomes. In addition to the Aos et al. (2004) methodology, which applies to six programs (NFP, FFT, Guiding Good Choices, Carrera APPP, MTFC, and MST), different approaches are adopted in the separate BCAs for Chicago CPC, Perry Preschool, NFP, and Job Corps. In most cases, at least some crime-related outcomes are observed as of the most recent follow-up. One exception is the Carrera APPP, where Aos et al. (2004) project crime-related benefit estimates

based on changes in teen pregnancy rates. In all cases, however, actual costs of crime to the criminal justice system or to victims of crime are not observed for program participants and must be estimated from other sources. The BCAs in Table 3.2 tend to rely on a series of studies that provide national estimates of crime costs—both for the criminal justice system and for victims and specific to different types of crime (earlier BCA analyses typically use Cohen (1988, 1993), among other studies; more-recent analyses rely on updates by Miller, Cohen and Wiersema (1996) and Miller, Fisher, and Cohen (2001)).

Table 3.5 summarizes the general approach to the economic valuation of crime costs for the four program-specific BCAs and the Aos et al. (2004) multiprogram BCA. Key differences include

- **The components of crime costs that are included.** All studies include a measure of costs to the criminal justice system for criminal processing, adjudication, and incarceration or other treatment. All studies also value tangible costs to victims, such as medical and mental health care expenses, property loss and damage, and earnings losses. Only two, however, include estimates of the intangible costs to victims, also referred to as quality-of-life costs (e.g., pain and suffering). The estimates of intangible costs are typically derived from jury awards for pain, suffering, or loss of life, or hedonic models of spending to reduce the risk of death. Such estimates can be considerably higher than the tangible victim costs and are excluded from some BCAs in order to be conservative.
- **The way cost components are calculated.** Depending on the nature of the underlying program evaluation data, cost estimates can be rough approximations or more-detailed computations. For example, the Chicago CPC and NFP BCAs use average figures across all crime categories for the criminal justice system costs associated with a juvenile petition or arrest. Both use an aggregate measure of the cost of a criminal career to project costs beyond the observation period. In contrast, the data on crime outcomes and costs used by the other three BCAs are disaggregated by the type of crime. The degree of disaggregation varies across studies, however, such that it is not possible to align crime-specific cost estimates—for either criminal justice system costs or victim costs—across studies.

Table 3.5—Approach to Economic Valuation of Crime Costs in Social Program BCAs

BCA	Criminal Justice System (CJS) Cost Components	2007 \$	Victim Cost Components	
			Tangible	Intangible
Chicago CPC (A2) Reynolds et al. (2002)	CJS costs per juvenile petition ^a Adult criminal career (19–44) ^b	23,217 84,582	1.0485 times criminal justice system costs	Not included ^c
NFP (A10) Karoly et al. (1998)	Police costs per arrest Adjudication costs per arrest Cost per jail day Adult criminal career (19–44) ^b	836 1,741 36 36,627	1.0485 times criminal justice system costs	Not included
Perry Preschool (A3) Barnett, Belfield, and Nores (2005)	Weighted average of CJS costs across 11 types of crime observed to age 40 and projected to age 65 based on incidence of arrest by age	n.s.	Combined victim costs estimated across 11 types of crime observed to age 40 and projected to age 65, based on Miller, Cohen, and Wiersema (1996)	
Job Corps (H1)) Schochet, Burghardt, and Glazerman. (2001)	Weighted average of CJS costs across 11 types of crime observed for four-year follow- up	n.s.	Tangible victim costs estimated across 11 types of crime observed for four-year follow- up using various sources	Not included
Aos et al. (2004)	Detailed estimate of marginal operating and capital costs for 12 CJS resource categories for 7 types of crime in Washington state, combined with estimates of the age profile of crime by type, to estimate the present- value cost of resources by type of crime	n.s.	Tangible victim costs estimated across 7 types of crime, based on Miller, Cohen, and Wiersema (1996), with similar life-cycle calculation as CJS costs	Intangible victim costs estimated across 7 types of crime, based on Miller, Cohen, and Wiersema (1996), with similar life-cycle calculation as CJS costs

^a Includes administrative costs for arrests and expected costs (i.e., weighted by distribution of cases with each outcome) for residential treatment, community treatment, or probation.

^b Includes costs associated with arrests, adjudication, and incarceration.

^c Incorporated in BCA by Temple and Reynolds (2007) as part of a comparative analysis.

SOURCE: Author's tabulations based on sources cited in the first column.

NOTES: Dollar figures are converted to 2007 dollars, using the GDP personal consumption expenditures deflator produced by the BEA (undated), Table 1.1.4. In this table, n.s. = not specified.

- **Length of the projection period.** The Job Corps evaluation makes no projection of crime-cost savings beyond the four-year follow-up period, in part because it found no evidence of sustained effects. All the other BCAs assume continued benefits, up to age 44 in the Chicago CPC and NFP BCAs and up to age 65 for the Perry and Aos et al. (2004) studies.

These differences mean that it is difficult to compare the shadow prices used to estimate the cost of crime across studies. When comparisons are possible, the approaches appear to vary considerably. For example, as shown in Table 3.5, the Chicago CPC BCA uses a cost estimate of \$23,217 (2007 dollars) per juvenile petition as the measure of criminal justice system costs. The NFP evaluation combines police and adjudication costs per arrest at almost one-tenth that amount. Adding in some estimate of jail days would increase the NFP figure, but average jail time for each arrest would have to reach nearly 600 days to match the CPC number. Different jurisdictions for the cost estimates may explain part of the difference: The CPC figure is specific to the state of Illinois, whereas the NFP estimate is based on national data. For the other three studies, costs are measured specific to each crime type, and no overall average is reported. With almost no alignment in how crime types are defined, it is not possible to compare crime-specific shadow prices.

Adult Family Functioning Outcomes

As noted earlier, none of the BCAs for programs with impacts on parenting behavior or marriage/divorce behavior attempted to place a dollar value on these outcomes. The only family functioning outcome that is monetized is the public-sector savings from reductions in substantiated cases of child abuse and neglect (CAN). The reduction in victim costs, a benefit to program participants, is accounted for as well, at least for tangible victim costs, and in some cases, for intangible costs as well. None of the BCAs attempt to monetize the value other members of society may place on the reduction in CAN by program participants.

The BCAs for Chicago CPC and NFP (Aos et al., 2004, version) place an economic value on the observed reductions in substantiated CAN cases. The Aos et al. (2004) methodology also projected benefits in this domain for the Carrera APPP associated with the reduction in teen pregnancy. The shadow price elements associated with the Chicago CPC methodology and the Aos et al. (2004) methodology are shown in Table 3.6. The two approaches monetize different elements, and even for the same elements, they derive quite different economic values. For public-sector costs, these differences are due, in part, to using costs for different geographic units (i.e., national versus state estimates). The Chicago CPC BCA calculates the expected public-sector cost of a substantiated CAN case, assuming 70 percent of cases receive in-home services, while the remaining 30 percent receive foster care. This produces an expected cost per case, based on national data, of \$13,425 in 2007 dollars, exclusive of investigation costs. Aos et

Table 3.6—Shadow Prices for Substantiated Cases of Child Abuse and Neglect in Social Program BCAs

BCA	Geographic Unit; Original Dollar Year	Cost per Substantiated CAN Case (2007 Dollars)			
		Public Services and Admin. Costs	Public Medical and Mental Health Costs	Tangible Victim Costs	Intangible Victim Costs
Chicago CPC (A2) Reynolds et al. (2002)	National 1998 dollars	\$13,425	\$8,473		—
Aos et al. (2004)	Washington State & National 1993 and 2002 dollars	\$3,987	\$1,274	\$1,274	\$30,732

SOURCE: Author's tabulations based on sources cited in the first column.

NOTES: Dollar figures are converted to 2007 dollars using the GDP personal consumption expenditures deflator produced by the BEA (undated), Table 1.1.4. In this table, — = not applicable.

al. (2004) undertook a more detailed analysis of the expected public-sector cost per case based on Washington state data, accounting for child protective services costs for investigations (including police and court costs), along with child welfare services costs (including foster care and other services). Their expected-cost figure is about one-third of that in the Chicago CPC study.

For the measures of tangible victim costs, although the BCAs rely on the same source for their estimates (namely Miller, Cohen, and Wiersema, 1996; Miller, Fisher, and Cohen, 2001), the dollar figures are quite different. The Chicago CPC BCA figure combines costs of medical care, mental health care, police/fire services, and lost productivity of victims and their families (e.g., forgone wages, missed school days, legal expenses) to estimate costs of child abuse cases. These combined costs, based on national data, amount to \$8,473 in 2007 dollars. Some portion of this should be treated as savings to the public sector, however, while the rest is tangible victim savings. Accordingly, the Aos et al. (2004) methodology apportions the medical and mental health care costs as 50-50 shares for the public sector and victims. The WSIPP approach does not include the dollar estimates from the original sources for lost productivity. However, it does include the estimates of intangible victim costs (also known as quality-of-life costs), estimates that the Chicago CPC BCA excludes in an effort to be conservative.

Aos et al. (2004) also derive from the literature estimates of the linkage between child abuse and neglect and the following future outcomes for abuse victims: K-12 test scores, K-12 grade repetition, high school graduation, alcohol use, illicit

drug use, and crime. These estimated relationships are then used to project outcomes in these domains, with their associated dollar costs or savings (using the associated methodology for each of the domains as described elsewhere in this chapter). The shadow price associated with these projections for a case of child abuse and neglect is not reported.

Adult Economic Outcomes

Adult economic outcomes—notably those related to earnings and means-tested programs and/or social insurance programs—are valued in the BCAs for the early childhood programs (with one exception), the one youth development program, the one pregnancy prevention program, and all of the employment and welfare programs. These outcomes are based on observed labor market and program participation outcomes for programs serving children or youth that have long-term follow-up or for programs serving adults. For other programs, they are based on projected adult economic outcomes, using measures of academic achievement, schooling attainment, teen pregnancy, or child abuse and neglect.

Earnings

As noted in Chapter 1, a complete economic analysis of changes in labor market outcomes for social program participants (e.g., hours worked, earnings, and the associated taxes) would need to account for the value of lost leisure, any displacement effects in the labor market among nonparticipants, and the deadweight loss associated with tax payments. In practice, such adjustments are not usually performed, although the issues may be acknowledged.²⁴ The BCAs we review value each dollar of earnings gained (or lost) equally, whether the value arises from higher wages or working longer; ignore possible displacement effects, usually because only smaller-scale programs are assessed; and do not account for deadweight loss in valuing tax changes. In all cases, program participants are assigned the dollar value of cash earnings gained plus the value of fringe benefits less taxes paid. The amount of tax contributions is allocated to the government. From the perspective of society as a whole, taxes are treated as a

²⁴ For example, in the BCAs for Perry Preschool, the increased tax revenue from higher earnings and lower tax outlays from reduced welfare payments could be used to reduce tax rates, *ceteris paribus*, so that deadweight loss could be reduced relative to the status quo (Barnett, 1985, 1993b, and 1996).

transfer with no net effects on social gains or losses. The entire amount of the post-tax earnings gains of participants is treated as a benefit to society as a whole. Beyond this similarity in approach, there are differences in the way dollar benefits associated with earnings gains are valued, particularly in accounting for the value of fringe benefits and taxes that are never observed and thus must be estimated. Likewise, many BCAs also estimate all or part of the earnings benefits included in the benefit calculations.

Table 3.7 shows key parameters employed in the calculation of economic benefits associated with earnings impacts for the nine program-specific BCAs and the one multiprogram BCA. First, it shows the length of the period covered by the earnings impacts (measured relative to the time of study entry) and the length of the period over which earnings are projected (not the period when they are observed). The first three early childhood programs listed in the table, as well as the Job Corps BCA and the Aos et al. (2004) multiprogram BCA, estimate earnings through age 65. Two evaluations observed earnings data over that period: The Job Corps BCA has access to survey and administrative data seven years after random assignment, and the Perry Preschool BCA has access to observed earnings data up to age 40 (37 years after random assignment). The NFP BCA (Karoly et al. ,1998) does not project earnings, in this case for the participating children's mothers, beyond the 15-year follow-up period. The BCAs for all the welfare programs value earnings over a five-year horizon. For most of those BCAs, earnings are projected over at least some of that period, usually one or two years. Portland JOBS is the exception, with no earnings projection beyond the five-year follow-up period.

For those BCAs that project future earnings, any assumptions about the rate of real wage growth are shown in Table 3.7, along with whether mortality is incorporated into the projections. These assumptions were discussed above for Abecedarian, Chicago CPC, and the Aos et al. (2004) BCAs.²⁵ In the case of the Perry Preschool BCA, earnings are measured at follow-ups at ages 16 to 19, 27, and 40, and some employment history information provides earnings at other points in time between the follow-up surveys. When earnings are not reported,

²⁵ When the mothers of the Abecedarian program participants were surveyed at ages 32, 35, and 41, their reported earnings were marginally significantly higher than those of the control group. These observed earnings differences were used to interpolate program effects on maternal earnings between ages 26 and 41; future earnings gains to age 60 were then projected assuming no growth in the earnings differential. A fringe-benefit rate of 20 percent was also applied.

Table 3.7—Key Parameters Used in Calculating Economic Benefits Associated with Earnings Impacts in Social Program BCAs

BCA	Earnings Period: Years Post Study Entry	Projection Period: Years Post Study Entry	Real Wage Growth ^a (%)	Account for Mortality	Fringe Rate (%)	Tax Rate (%)	EITC Take-Up Rate (%)
Abecedarian (A1) Masse and Barnett (2002)	22 – 65	22 – 65	1.0	Yes	20.0	–	–
Chicago CPC (A2) Reynolds et al. (2002)	15 – 62	15 – 62	2.0	No	20.0	33.3	–
Perry Preschool (A3) Barnett, Belfield, and Nores (2005)	15 – 62	38 – 62	–	Yes	10.7 29.2 37.6	31.0	–
NFP (A10) Karoly et al. (1998)	1 – 15	0	–	–	10.0	35.0	–
Job Corps (H1) Schochet, McConnell, and Burghardt (2003)	1 – 41/49	8 – 41/49	Straight-line decay over projection period	No	20.0	Use tax schedule	100.0
LA Jobs-1 st GAIN (H2) Freedman et al. (2000)	1 – 5	3 – 5	No decay, or straight-line decay over projection period	No	14.8	Use tax schedule	80.0
MFIP (H3) Miller et al. (2000)	1 – 5	3 – 5 ^b	Straight-line decay over projection period	No	15.4	Use tax schedule	100.0
Portland JOBS (H4) Hamilton et al. (2001)	1 – 5	0	–	–	13.7	Use tax schedule	80.0
Riverside GAIN (H5) Riccio, Friedlander, and Freedman (1994)	1 – 5	4 – 5 ^c	No growth over last 4 observed quarters	No	14.8	Use tax schedule	70.0
Aos et al. (2004)	Varies	100 % projection	0.5	No	25.0	20.0	–

^a Applies to earnings projections beyond the point of the most recent observation.

^b Maximum projection period. Study participants are observed from 2 to 4.5 years, so the projection period can be as short as 0.5 years.

^c Maximum projection period. Study participants are observed from 4 to 5 years, so the projection period can be as short as 0 years.

SOURCE: Author's tabulations based on sources cited in the first column.

NOTES: – = not applicable.

they are assumed to be zero if it is known from self-reports or administrative data that the individual is on welfare, unemployed, or incarcerated. Otherwise, earnings are interpolated between the measured data points. After age 40,

earnings are projected on the basis of observed earnings differences by sex and education level (for blacks only) in the CPS, accounting for labor force participation rates and the survival probability at each age.

Since most of the job training and welfare programs project earnings over a shorter horizon, they do not account for mortality. In each case, they either assume no growth in wages from the most recent observed data (typically one year ago) or assume a straight-line decay at a given rate, often set to reach zero (no difference with the control group) by the end of the projection window.

Table 3.7 also shows considerable variability in other relevant parameters across the BCAs. In particular, the fringe-benefit rate ranges from a low of 10 percent (in the NFP BCA) to a high of 38 percent (under one set of wage profiles used in the Perry Preschool BCA). A fringe-benefit rate of 15 to 20 percent is typical, although 25 percent is used for the Aos et al. (2004) BCAs.

The calculation of tax contributions from earnings also varies across the BCA studies listed in Table 3.7. At one extreme, the Abecedarian BCA does not calculate the additional tax revenue to government (or paid by participants), since it present results only for society as a whole, and at that level, taxes are just a transfer from participants to taxpayers (ignoring the deadweight loss). Four of the studies apply a flat tax rate ranging from 20 to 35 percent to all earnings, in order to capture Social Security payroll taxes paid by employers and employees, marginal federal and state income tax rates, and (in some cases) excise taxes. In the five job training and welfare program BCAs, the federal and any relevant state income-tax schedules are used to calculate the tax payments by individuals, combined with payroll taxes. All of these BCAs also calculate eligibility for the Earned Income Tax Credit (EITC) on the part of low-income working families. Two of the studies assume 100 percent take-up of this benefit, while others assume a more conservative take-up rate of 70 to 80 percent, based on estimates in the literature.

The bottom line is that there is considerable variation across the BCAs that account for the economic benefit associated with greater earnings, a benefit component that can be sizable in many social program BCAs and one that also contributes to government savings through tax payments. The variation across BCAs includes assumptions about projected wage profiles, fringe-benefit and tax rates, and whether future earnings are adjusted for mortality. At the same time, it is unusual to see any explicit calculation of the uncertainty associated with the estimated dollar benefits (or costs) or sensitivity analyses where key assumptions are varied. However, there are some exceptions. For example, the Perry

Preschool BCA considers alternative lifetime wage profiles, using different assumptions about wage patterns between observed data points after age 40 and different fringe-benefit rates (Belfield et al. (2006) and earlier BCAs, including Barnett (1985, 1993b, 1996)). The Riverside GAIN BCA reports sensitivity analyses for variation in the rate of decay of future earnings beyond the point of the last observation. And the Job Corps BCA examines differences in estimates when earnings are based on self-reported earnings from survey data versus administrative records on earnings, which then has implications for the assumed rate of future decay (Schochet, McConnell, and Burghardt, 2003).

Transfer Payments and Other Means-Tested Programs

Another area of economic impact that is commonly incorporated into social program BCAs is the effect on transfer payments or in-kind benefits from means-test programs (e.g., welfare benefits, food stamps) and social insurance programs (e.g., Social Security, unemployment insurance). As with tax payments, changes in transfers have equal and offsetting effects on program participants and government. The only benefits to society from a change in transfer payments are the associated increase or decrease in program administrative costs and the associated change in deadweight loss. The latter, however, is rarely accounted for.

In all of the BCAs in Table 3.2 that account for transfer payments, the basic approach is to value dollar for dollar any increase or decrease in transfer payments for program participants, the offsetting effect on government coffers, and the associated change in administrative costs. The BCAs differ in whether transfer payments are observed or projected and in the estimated administrative costs (usually measured as a share of the transfer component). The length of the period over which transfer payments are measured and the projection period match those that apply to earnings shown in Table 3.7. The exception is the Chicago CPC BCA, which did not find a significant effect on low-income program participation and therefore does not place a value on this domain. The impact of the Abecedarian program on welfare program use as of the age-21 follow-up also was not significant, but the associated BCA still incorporates it into the analysis because the treatment-control difference is sizable enough and the small sample sizes result in low power for detecting moderate program impacts.

For those BCAs that value welfare and other social program use, Table 3.8 shows which transfer payments are accounted for and the associated administrative

Table 3.8—Administrative Cost Parameters Used in Calculating Economic Benefits Associated with Welfare Use Impacts in Social Program BCAs

BCA	Program Administrative Costs as a Percentage of Transfer Payments						
	AFDC/ TANF	GA	Food Stamps	Medicaid	Housing	SSA/SSI	UI
Abecedarian (A1) Masse and Barnett (2002)	n.s.	—	n.s.	n.s.	n.s.	n.s.	—
Perry Preschool (A3) Barnett, Belfield, and Nores (2005)	38.0	38.0	38.0	38.0	—	38.0	—
NFP (A10) Karoly et al. (1998)	10.0	—	10.0	10.0	—	—	—
Job Corps (H1) Schochet, McConnell, and Burghardt (2003)	16.0	16.0	16.0	16.0	—	7.0	16.0
LA Jobs-1 st GAIN (H2) Freedman et al. (2000)	8.4	—	13.9	6.9	—	—	11.2
MFIP (H3) Miller et al. (2000)	†	—	†	†	—	—	†
Portland JOBS (H4) Hamilton et al. (2001)	†	—	†	†	—	—	†
Riverside GAIN (H5) Riccio, Friedlander, and Freedman (1994)	8.4	—	13.9	6.9	—	—	11.2
Aos et al. (2004)	10.0	—	10.0	10.0	—	—	—

SOURCE: Author's tabulations based on sources cited in the first column.

NOTES: † = rate is calculated from administrative data but not reported; n.s. = not specified.

cost rates (as a share of transfer payments) when they are reported. The BCAs uniformly account for welfare payments—from either the former Aid to Families with Dependent Children (AFDC) or its replacement, Temporary Assistance for Needy Families (TANF)—food stamps, and Medicaid. Some also include other means-tested cash and in-kind benefits received through General Assistance (GA), Supplemental Security Income (SSI), or housing subsidies, as well as social insurance received through Social Security disability, retirement, or survivor's benefits or unemployment insurance (UI).

In all the BCAs except the Aos et al. (2004) BCA of the Carrera APPP, at least some observed data exist on transfers during the period transfers are measured. The Abecedarian evaluation measured only AFDC usage, so other program participation is based on rates of participation in programs that are included in AFDC. The expected value of benefits is based on these participation rates combined with the average dollar value of benefits among participants. Likewise, the NFP BCA measures months on welfare, food stamps, and Medicaid

for mothers of the focal children, and average monthly benefits are assigned as the economic value of the transfer. The five job training and welfare programs all have access to administrative data on program participation and the dollars associated with each transfer up to the point of the most recent follow-up. Any projections are then based on assumptions about the future path of transfer payments, which in most cases mirror those made for earnings, shown in Table 3.7.²⁶

Detailed administrative costs for two of the welfare program BCAs (MFIP and Portland JOBS) are observed and calculated for the local jurisdiction. In the other BCAs, administrative costs are calculated as a share of the value of transfers, based on local or national administrative data. Again, there is wide variation in these estimated rates, which are typically assumed to be the same across government programs, although at least some variation is incorporated into the other three job training and welfare program BCAs. The rate for Perry Preschool is on the high end, in part because an error rate of 6.4 percent (either overpayments or payments to ineligible persons) is added to the 29.7 percent administrative-cost rate estimated for Michigan. However, excluding that component still leaves a rate two to three times the size assumed in the other BCAs.

As noted in Chapter 1, the economic costs of transfer payments should include the deadweight loss associated with raising the tax revenue to pay for the programs. With one exception, the deadweight loss is not accounted for in the BCAs listed in Table 3.1. The Perry Preschool BCA, as part of a sensitivity analysis, assumes a deadweight loss of 15 cents for every dollar of taxes raised, which is then applied to the costs for transfer payments (as well as the crime costs). The impact of this particular change on estimated net program benefits is not reported.

²⁶ There are three exceptions: The MFIP BCA assumed no decay in the measured effects on welfare program usage (in contrast to earnings, which are assumed to decay). The Riverside GAIN BCA welfare program effects were assumed to decay by 15 percent per year (in contrast to earnings, which were assumed to remain the same). The Job Corp BCA did not make any projection for future welfare program usage beyond the observation period in the baseline analysis. A sensitivity analysis allowed the modest effects to decay at 20 percent per year to age 65.

Other Shadow Prices

Beyond the shadow prices associated with the program impacts covered in Tables 3.2a, 3.2b, and 3.2c, some of the BCA methodologies account for other cost or benefit elements that also require estimation of shadow prices. Two in particular merit discussion.

The first is the value of the child care received in the early childhood programs that provide part-time or full-time nonparental care (because NFP provides home visiting, it is the only early childhood program in Table 3.1 where this is not an issue). In the absence of the program, parents who would want such care would need to pay for it out of pocket, or they might receive subsidized care through some other government program. Parents who did not have their children in some other form of care would still have their time freed up for other activities. Thus, the appropriate construct would be to measure the economic benefit of the care received for the treatment group relative to that for the control group. Since care-utilization data are usually not available for the control group, the total hours of care for the treatment group are typically valued at either the minimum wage (Chicago CPC) or a market-derived rate (Perry Preschool, Aos et al., 2004).

A counterpart to the value of the parental time made available as a result of programs providing child care is the opportunity cost of the time associated with program participation. For the most part, this cost element is rarely calculated, either as a component of program costs or as an offset to program benefits. One exception is the Chicago CPC BCA, which explicitly valued the parent participation time required as part of the program model, with each hour of participation valued at the minimum wage. In the case of the Perry Preschool BCA, it was argued that the parent home visits were a voluntary component, and parents received sufficient benefit that the opportunity cost could be treated as zero. A similar argument was made by Spoth, Gyll, and Day (2002) regarding the value of the parent-time input in the Guiding Good Choices BCA.

Summary

The BCAs associated with the 22 social programs examined in this chapter illustrate the state of the art of cost and outcome analysis as applied to programs that intervene in the lives of children, families, and adults throughout the life course. The BCAs associated with these programs typically do not attempt to monetize the full range of outcomes affected by a program. Certain benefits are

routinely left out of benefit-cost calculations for most types of social programs. Other outcomes are included in some BCAs but are excluded from others, largely because of judgments on the part of the analysts about what is feasible and credible. When the same outcome is monetized in different studies, the same general methodology may be applied, although the specific shadow price used may vary as a result of using different time frames, jurisdictions, or secondary data sources. Differences in how outcomes are measured across studies also can lead to variation in economic values.

When outcomes are monetized, the methods involved are often complex, especially for economic values that must be imputed or projected. Again, while the same general approach may be used in several studies, it is unlikely that the same assumptions or the same dollar values will be used, unless an explicit effort is made to be comparable, as was done in the case of the WSIPP multiprogram BCA. The complexity of the methods used also means that the implications of methodological differences across studies are not very transparent. Thus, for example, while analysts may detail the assumptions and methods they use, the implied shadow price for a given outcome is usually not reported; only the resulting present-value benefit (or cost) amount associated with the program impact on that outcome is reported.

We have cited several examples in which sensitivity analyses were incorporated in the BCA to see how robust results were to changes in underlying parameters. Such sensitivity analyses are far from universal, however. One of the more common sensitivity analyses looks at the effect of varying the discount rate, usually a range of rates centered on the preferred rate (see, for example, Karoly et al. (1998) for NFP; Masse and Barnett (2002) for Abecedarian; Spoth, Gyll, and Day (2002) for Guiding Good Choices; Schochet, McConnell, and Burghardt (2003) for Job Corps; and Temple and Reynolds (2007) for Chicago CPC). Less common are sensitivity analyses of changes in other key parameters, although again there are exceptions, noted in the discussion above. Even more rare is the calculation of error bands around estimates of present-value benefits, costs, or net benefits in recognition of model and statistical uncertainty (for example, Karoly et al. (1998) for NFP).

Finally, when calculating shadow prices, analysts may follow standard practices in the literature, but they often do not employ the appropriate economic construct. For expediency, for example, market prices may be used without consideration of whether those prices measure the relevant economic values. Outcomes denominated in dollars, such as earnings or transfer payments, are

assumed to measure the correct economic concept, when in fact, consideration should be given to labor-leisure tradeoffs, displacement effects, or deadweight loss. Abstracting from these theoretical constructs may have little consequence for the magnitude of net benefit estimates, but that will not always be the case.

4. Conclusions

This analysis provides insight into the current state of practice in the use of shadow prices in benefit-cost studies of social programs. In this chapter, we highlight key findings that emerged from our examination of the range of outcomes affected by social programs and the methods used to place an economic value on those outcomes. We also discuss the implications of our findings and point to the benefits of investing in further methodological advancements.

The State of Shadow Price Methodology

The use of the benefit-cost framework to evaluate social programs requires the ability to place a value on the outcomes affected by those programs. Ideally, such values would be attached to all outcomes and applied in a consistent manner across programs so that results could be compared. Our review of 39 social programs with rigorous evaluations that measure program impacts highlights the diverse array of outcomes affected by these programs. This heterogeneity in outcomes reflects, in part, the variation in the types of programs we examined, which provide specialized services to children, youth, and adults across the life course. However, even evaluations of programs that have a common objective (e.g., early childhood intervention) do not necessarily incorporate common measures. Thus, the application of benefit-cost methodology must contend with a multiplicity of outcome measures, each of which may require a different strategy for deriving an economic value.

Another challenge for the application of shadow prices to the kinds of outcomes associated with social programs is that many of the economic benefits are not only direct, but indirect as well. In other words, outcomes may have associated spillover costs or benefits, many of which may not be directly observed. A good example is teenage pregnancy, which has implications for school outcomes, crime and delinquency, employment, and welfare use—for both the teen mother and her child. If these secondary outcomes are not measured as part of the program evaluation, a full accounting of the economic consequences of teen pregnancy would require projection of those benefit domains.

With these challenges in mind, we highlight the key findings from our analysis of the use of shadow prices in BCAs of social programs.

Many Important Benefits from Effective Social Programs Are Rarely or Never Monetized

The 22 proven social programs with BCAs, as well as 17 programs without BCAs, reveal that not all benefits are monetized, and those that are valued are not necessarily monetized consistently across different studies. Table 4.1 classifies the outcomes affected by the 39 programs into three categories: outcomes that are never or rarely monetized; outcomes that are monetized but without a consensus as to the appropriate shadow prices; and outcomes for which a more-established methodology for monetization exists.

Table 4.1—Classification of Outcomes Affected by Social Programs, by Use of Shadow Prices

Use of Shadow Prices	Outcomes
Outcomes never or rarely monetized	<ul style="list-style-type: none"> • Child/youth behavioral/emotional outcomes (e.g., behavior problems, school suspensions/expulsions, mental health outcomes) • Child/youth cognitive outcomes (e.g., IQ scores) • K–12 grades, school attendance, school engagement • General health status of children/youth • Contraceptive use • Adult parenting measures • Marriage and divorce • Adult mental health • Adult reproductive health • Employment • Income and poverty status
Outcomes without clear consensus on monetization	<ul style="list-style-type: none"> • Achievement test scores • High school graduation • College attendance • Teen pregnancy • Tobacco use, alcohol abuse, illicit drug use • Crime and delinquency • Child abuse and neglect • Earnings
Outcomes with more-established methodology for monetization	<ul style="list-style-type: none"> • Special education use • Grade retention • Transfer payments and other means-tested programs

SOURCE: Author's tabulations based on analysis in Chapters 2 and 3.

We note that a common dollar amount is not necessarily used to value outcomes in the third category. In many cases, there is good justification for the variation in shadow prices across studies. The most common is the desire to use shadow prices that are particular to a given geographic area—say, a state or city—in line with the use of BCA for policymaking at a given level of government. However, even in such cases, it is desirable to apply the same economic concept in constructing the shadow prices, even if the specific shadow prices differ.

The pattern of outcomes listed in Table 4.1 takes the shape of an inverted pyramid, with many more outcomes listed in the first category (never monetized) than in the last category (consensus for monetization). The first category includes benefits that may have both tangible economic values and intangible benefits for both program participants and nonparticipants. In addition, the outcomes will often have spillover consequences for economic benefits in other areas—benefits that would accrue not only to participants but also to the public sector (and could therefore be an offset to program costs) and the rest of society. For example, various outcomes related to child or youth behavior problems and emotional status (e.g., mental health status) can have implications for the utilization of health care, for parental time costs (e.g., lost work time), for school performance and collateral effects on peers, for subsequent substance abuse, delinquency, and crime, and so on. As another example, marriage and divorce as outcomes can affect the economic status of the family, the mental health of children and adults in the family, and school and labor market productivity. Valuing the intangible benefits for the outcomes in the first category is complicated by the lack of markets from which to infer economic values. However, the application of methods used in other policy areas, such as the environment and health (e.g., contingent valuation or hedonic methods), may be feasible. Valuing the secondary effects is complicated by the need to derive estimates of the relationships between outcomes when they are all not directly observed.

The lack of monetization for the outcomes in the first category may be less problematic for application of BCA to some social programs, notably when these outcomes are a subset of those affected by the program, and other outcomes can be more readily monetized. In those cases, the lack of shadow prices for outcomes in the first category means that the BCA will not be comprehensive in valuing all benefits. However, for some social programs, the outcomes in the first category are the primary, if not the only, ones affected by the program (or at least that have been measured). In the absence of shadow prices for these outcomes, BCA is not feasible for those programs. Indeed, an examination of the 17 programs without BCAs (see Table 2.5) shows that most of the outcomes the programs affect are in the first category. This includes the early childhood

programs (series A), education programs (series B), and mental health supports and behavior modification programs (series D).

Shadow Prices for Outcomes Valued in Social Program BCAs Do Not Consistently Capture the Full Range of Societal Benefits and Costs

The benefit-cost methodology is grounded in economic principles that should guide the implementation of BCA for social programs, including the use of shadow prices. In order for shadow prices to measure the scarcity value of resources utilized or resources freed up, adjustment to market prices may be required, or appropriate methods may be needed to value resources when markets do not exist. However, in reality, researchers tend to adopt more-expedient methods that do not fully capture the relevant economic constructs. For example, costs or benefits to the public sector that would be financed through taxes would ideally account for deadweight loss. Programs implemented on a large scale need to account for general equilibrium effects, such as labor market displacement of other workers. And the value of lost leisure resulting from participation in a program or a program that affects hours of work would ideally be accounted for as well.

With few exceptions, these conceptual issues are not incorporated into BCAs for social programs. Market prices are routinely used to value resources, changes in earnings are taken dollar for dollar as a measure of benefit to participants, displacement effects are not calculated, and deadweight loss is not factored in. For some BCAs, considering these factors may have only a marginal impact on estimates of net benefits. Indeed, in many cases, analysts have concluded, implicitly or explicitly, that the incremental effort required to align theory and measurement exceeds the benefit to be gained from more-rigorous benefit-cost estimates. But for other programs, these considerations may be meaningful. Whatever the case, the lack of alignment between theory and practice potentially diminishes the credibility of social program BCAs in the eyes of decisionmakers who may compare results in other policy domains where these issues are addressed.

Even Where Methods for Deriving Shadow Prices Are Well-Established, the Application of Shadow Prices Is Not Consistent Across Studies

The outcomes listed in the second and third categories in Table 4.1 are more often monetized, but for some there is less agreement on shadow prices (second category) and for others, there is more agreement (third category). The dividing line between these two categories is somewhat fuzzy as, in practice, it is rare to find the same shadow prices used across studies for any given outcome. For

example, we place special education use and grade retention in the third category. As discussed in Chapter 3, the BCAs that value these outcomes use shadow prices that are conceptually similar, but the actual shadow prices may vary depending on whether local or national cost estimates are used, on the point in time at which costs are measured, or on whether different sources of data on prices are used.

The outcomes in the second category have even more variability in the approaches used to calculate shadow prices. For most of those outcomes, there is no market from which to value the outcome or any spillover effects. Thus, the calculation of appropriate shadow prices requires a series of assumptions and even complex models to account for all the direct and indirect effects that are expected to occur through time across various stakeholders. This is true for the education outcomes, which are usually not valued in their own right but only for their projected effects on future economic outcomes. Likewise, capturing the full range of dollar benefits and costs of teen pregnancy, substance use, crime, and child abuse and neglect for all stakeholders through time has involved a variety of methods, and researchers have not coalesced around a single approach. Analysts typically do not report the implied shadow price that results from their assumptions (e.g., the undiscounted or discounted lifetime earnings gain from high school graduation or the cost of a teen pregnancy) so that the implications of methodological differences can be ascertained. Greater transparency on this front would facilitate comparisons across BCA methods. Likewise, the use of sensitivity analysis would support a better understanding of the importance of key assumptions for the resulting estimates of net benefits or benefit-cost ratios.

Often the judgment of the analyst determines which assumptions can best be defended. Almost uniformly, in making such judgment calls, analysts tend to err on the side of being conservative. Rather than aiming to be comprehensive in measuring benefits and costs or to ensure comparability with other such analyses, the general strategy in applying BCA to social programs is to focus on one program at a time and use conservative assumptions but value enough outcomes to generate benefits that exceed costs by a sufficient margin so as to ensure positive net benefits under alternative assumptions. In other words, the BCA for a given program is designed to prove that the program can generate returns that exceed costs, but the analysis is not designed to inform a decisionmaker who wants to choose between programs on the basis of which has the highest net benefits.

One exception to this approach is the multiprogram BCAs of Aos et al. (2004). By applying a common methodology to multiple social programs, they have built in consistency, which is extremely useful for allowing cross-program comparisons of costs, benefits, and net benefits, using similar methods. However, even that

approach is limited by the fact that programs do not measure a common set of outcomes (so some areas of impact are not observed and are therefore left unmeasured in some programs), and there is not a common follow-up period across all programs or even programs in the same policy area. This is problematic because the BCAs for programs with long-term follow-up will be based on observed outcomes, while those for other programs with shorter follow-up intervals will either leave potential benefits unmonetized or will have to make assumptions to project outcomes into the future. Such assumptions may be quite strong or arbitrary, yet the sensitivity to them is typically not examined.

Program Benefits That Extend into the Future May Be Monetized, but the Added Uncertainty Needs to Be Recognized

For many of the social programs considered in this study, especially those that serve younger children and their families, the most significant program effects with large economic implications may not occur until many years after the programs have ended. In the absence of long-term follow-up, BCAs are limited to valuing outcomes with early impacts or attempting to project longer-term outcomes based on shorter-term impacts. Of the 10 early childhood programs reviewed in this study, four do not have an associated BCA. All four of those evaluations followed participants only two years past program entry, and most program impacts fall in the first category in Table 4.1. Five of the other six programs have follow-up periods of 15 to 37 years past study entry, which potentially permits valuation of longer-term benefits on the basis of observed outcomes. The remaining childhood program with a BCA has a follow-up interval of three years, but most of the program impacts fall in the first category. In the IHDP BCA included in Aos et al. (2004), there are no outcomes from the program for which an economic benefit is assigned based on the follow-up eight years after study entry.

In the absence of longer-term follow-up, future outcomes may be projected on the basis of observed outcomes during the follow-up period. This approach has been applied in a number of the BCAs reviewed in Chapter 3, notably as part of the Aos et al. (2004) methodology, as well as in methods used in BCAs for several of the early childhood programs. The projection methods often require various assumptions and complex modeling, approaches that have yet to be standardized. The projection of future benefits also introduces additional uncertainty into estimates of net benefits or benefit-cost ratios, and most studies do not examine how robust results are to variation in assumptions.

The limits of forecasting future outcomes can be illustrated with two examples taken from the BCAs for Perry Preschool and Job Corps. As of the age-27 follow-

up, a BCA for Perry Preschool that included projections for program impacts on earnings, welfare use, and crime from age 27 to 65 estimated net present-value benefits of \$115,000 in 2003 dollars and a benefit-cost ratio of 8.74. When the BCA was updated with the additional data from the age-40 follow-up, with future impacts now projected only from age 40 to 65, the estimated net present-value benefits more than doubled, to \$238,000 in 2003 dollars, and the return increased by nearly the same ratio, reaching \$17.07 in benefits for every dollar invested (Barnett, 1993; Barnett, Belfield, and Nores, 2005; Karoly, Kilburn, and Cannon, 2005). This is because the actual earnings gain for program participants and reductions in crime between ages 27 and 40 were even larger than researchers had predicted on the basis of outcomes observed at age 27.

A counterexample is found in the Job Corps evaluation. An initial BCA based on four-year follow-up data on self-reported earnings assumed that the earnings gains of the treatment group over those of the control group observed through that point in time would be sustained for the remainder of program participants' working lives. This assumption was supported by the persistence of the earnings benefit over the first four years after randomization, as well as similar findings for related interventions. However, the addition of three more years of earnings data from administrative records, bringing the total period of observed outcomes to seven years, revealed evidence that self-reported earnings measures were biased and that the earnings gains had faded by the end of the longer follow-up period. Thus, the initial assumption of sustained long-term effects was not supported by the data (Schochet, Burghardt, and Glazerman, 2001; Schochet, McConnell, and Burghardt, 2003).

These two examples point to the importance of sensitivity analysis when projecting future benefits to determine how robust estimates of net benefits or benefit-cost ratios are to alternative assumptions. The examples also call attention to the value of continued follow-up when programs are expected to have longer-term effects. Such follow-up is essential for determining whether effects are sustained or even amplified or whether they eventually decay.

Benefits of Further Methodological Investments

In light of these findings, as well as those in the related analyses of Maskery and Whittington (2007) and Weimer and Vining (2007), we contend that there are positive benefits to be gained from making further methodological investments in the design and implementation of BCA for social programs. The goal of these investments would be to support the use of BCA for all social programs with rigorous evaluations that have evidence of effectiveness, where the associated BCAs would be comprehensive and comparable, more aligned with economic

theory, and more transparent in the sensitivity of findings to the methodological approach.

In particular, the following areas of focus are likely to generate benefits to the field:

- ***Building a consensus among experts on the best practices for the application of BCA to social programs and publishing guidelines for BCA analysts.*** As the use of cost and outcomes analysis methods in various policy areas has grown, the use of more-standardized methods has often been guided by the establishment of recommendations on best practices from experts in the field, with specific guidance tailored to the policy area. For example, the recommendations of the Panel on Cost-Effectiveness in Health and Medicine have guided the growing application of CEA and BCA in the health policy arena (Weinstein et al., 1996). Likewise, the OMB guidelines established standardized practices in the use of BCA within the federal government (OMB, 1992). Even if experts are not able to come to a consensus regarding specific shadow prices to use, it may be possible to reach agreement on the range of potential shadow prices that can be used and the need to perform sensitivity analyses.
- ***Developing shadow prices for outcomes that are rarely monetized but that are significant in social program evaluations and likely to have important economic impacts.*** Of the list of outcomes in the first category in Table 4.1, the most promising candidates for methodological investment are child and adult mental health outcomes and school performance measures such as suspensions, expulsions, attendance, and engagement. These outcomes are significantly affected by mental health and behavior modification interventions and K–12 education programs, but the programs have seldom been examined in a benefit-cost framework. As illustrated in Table 4.2, these are outcomes that are likely to generate economic benefits across the usual group of stakeholders: government, participants, and nonparticipants. In some cases, the areas of benefit may be tangible, while others may be more intangible. Outcomes that are intangible may call for the use of contingent valuation or hedonic methods to develop shadow prices.
- ***Refining current methods for valuing the long-term benefits of improved outcomes improved in early childhood or the school-age years.*** While existing BCAs for social programs have used methods for projecting future outcomes from early outcomes, the methods may be compromised

Table 4.2—Illustrative Benefits to Stakeholders from Improvements in Outcomes for Which Shadow Prices Are Not Calculated

Outcome	Stakeholder Potential Benefits (Costs) from Improved Outcomes	
Behavioral/emotional outcomes (e.g., behavior problems, depression, PTSD)	G	<ul style="list-style-type: none"> • Lower education costs to meet special needs of children with behavior problems or mental health diagnoses • Lower public health outlays to treat children with behavior problems and mental health diagnoses • Lower costs for foster care • Higher tax revenues from improved labor market productivity • Reduction in public expenditures related to risky or antisocial behavior (e.g., delinquency, crime, substance use)
	P	<ul style="list-style-type: none"> • Increased productivity in school and improved educational outcomes • Reduction in harm from risky or antisocial behavior • Improved lifetime labor market productivity • Lower out-of-pocket medical costs for mental health treatment • Reduction in lost work time for parents • Intangible value of improved well-being from improvements in mental health and behavior
	NP	<ul style="list-style-type: none"> • Increased classroom productivity (peer effects)
K–12 school performance measures (e.g., suspensions, expulsions, attendance, engagement)	G	<ul style="list-style-type: none"> • Lower costs to education system for administrative and adjudication of students facing suspension or expulsions • Higher tax revenues from improved labor market productivity
	P	<ul style="list-style-type: none"> • Increased productivity in school and improved educational outcomes • Improved lifetime labor market productivity • Reduction in lost work time for parents • Intangible value of improved school performance
	NP	<ul style="list-style-type: none"> • Increased classroom productivity (peer effects)

SOURCE: Author's tabulations.

NOTES: G=government; NP=nonparticipants; P=participants.

by estimating relationships that are not causal or do not apply to the populations served by specific programs. As new longitudinal data, including experimental data, become available, advancements over current methodologies should be possible.

Of course, there are costs involved in supporting these methodological advancements, costs that have not been fully assessed as part of this analysis and that may be too large for any one analyst to bear in the context of producing a given BCA. However, given the growing importance of BCA in evaluating social programs in the United States, for decisionmakers in both the public and private sectors, the multiplier effect in the payoff that could result from improving the methodology used to estimate benefits and costs across a multiplicity of social programs could more than outweigh the associated costs.

Appendix. References for Programs and Benefit-Cost Analyses Included in This Study

This appendix provides references for each of the programs listed in Table 2.1, including studies that evaluate program effects and any related BCAs specific to each program, as well as associated CEAs. Benefit-cost studies of multiple programs are listed in the References.

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