Quantum Opportunities Program
Public Health & Prevention: Community-based
Benefit-cost estimates updated December 2023. Literature review updated January 2019.

Current estimates replace old estimates. Numbers will change over time as a result of model inputs and monetization methods.

The WSIPP benefit-cost analysis examines, on an apples-to-apples basis, the monetary value of programs or policies to determine whether the benefits from the program exceed its costs. WSIPP's research approach to identifying evidence-based programs and policies has three main steps. First, we determine "what works" (and what does not work) to improve outcomes using a statistical technique called meta-analysis. Second, we calculate whether the benefits of a program exceed its costs. Third, we estimate the risk of investing in a program by testing the sensitivity of our results. For more detail on our methods, see our Technical Documentation.

Program Description: The Quantum Opportunities Program (QOP) provides year-round services for disadvantaged high school students. The program's main goal is to improve academic deficiencies among high school-aged youth with low grades who are at risk of dropping out of school. Students enroll as they enter high school; are mentored by program coordinators; and engage in 250 hours of activity in each of three areas every year—education, community service and development activities meant to reduce risky behavior, and promote cultural awareness and/or promote recreation. Students are also provided financial incentives, through stipends and bonuses, for participating in QOP activities and remaining in school.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$11,342	Benefit to cost ratio	$0.53
Participants	$12,818	Benefits minus costs	($17,361)
Others	$11,209	Chance the program will produce	
Indirect	($16,037)	benefits greater than the costs	32%
Total benefits	$19,332		
Net program cost	($36,693)		
Benefits minus cost	($17,361)		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2022). The chance the benefits exceed the costs are derived from a Monte Carlo risk analysis. The details on this, as well as the economic discount rates and other relevant parameters are described in our Technical Documentation.

Meta-Analysis of Program Effects

Outcomes measured	Treatment age	Primary or secondary participant	No. of effect sizes	Treatment N	Adjusted effect sizes and standard errors used in the benefit-cost analysis						Unadjusted effect size (random effects model)	
					First time ES is estimated			Second time ES is estimated				
					ES	SE	Age	ES	SE	Age	ES	p-value
Public assistance	14	Primary	2	636	-0.261	0.343	23	-0.261	0.343	23	-0.261	0.446
Teen births under age 18	14	Primary	2	659	-0.221	0.231	18	-0.221	0.231	18	-0.221	0.338
Food assistance	14	Primary	2	636	-0.203	0.322	23	-0.203	0.322	23	-0.203	0.529
Crime	14	Primary	2	636	-0.139	0.350	23	-0.139	0.350	33	-0.139	0.692
Regular smoking	14	Primary	1	580	-0.068	0.284	23	-0.068	0.284	33	-0.068	0.810
Employment^^	14	Primary	2	636	0.099	0.250	23	0.000	0.000	24	0.099	0.694
Test scores	14	Primary	1	580	0.041	0.213	18	0.041	0.213	18	0.041	0.847
Persistence into 3rd year^^	14	Primary	1	580	0.064	0.391	23	0.064	0.391	23	0.064	0.869
Persistence into 2nd year^^	14	Primary	1	580	0.107	0.357	23	0.107	0.357	23	0.107	0.764
Graduate with 4-year degree	14	Primary	1	580	0.108	0.263	23	0.108	0.263	23	0.108	0.683
Enroll in 4-year college	14	Primary	2	636	0.149	0.272	23	0.149	0.272	23	0.149	0.584
High school graduation	14	Primary	2	662	0.293	0.204	18	0.293	0.204	18	0.293	0.151
Teen births (second generation)	1	Secondary	2	659	-0.221	0.231	18	-0.221	0.231	18	-0.221	0.338
Teen pregnancy (under age 18)^	14	Primary	1	580	0.000	0.274	18	n/a	n/a	n/a	0.000	1.000
GED attainment^	14	Primary	2	636	0.203	0.363	18	n/a	n/a	n/a	0.203	0.576
Grade point average^	14	Primary	1	580	-0.041	0.213	18	n/a	n/a	n/a	-0.041	0.847
Suspensions/expulsions^	14	Primary	1	580	-0.100	0.249	18	n/a	n/a	n/a	-0.100	0.688
Substance use^	14	Primary	1	580	-0.055	0.361	23	n/a	n/a	n/a	-0.055	0.878
Enroll in any college^	14	Primary	2	636	0.404	0.357	23	n/a	n/a	n/a	0.404	0.257
Graduate with any degree^	14	Primary	1	580	-0.054	0.263	23	n/a	n/a	n/a	-0.054	0.836

^WSIPP's benefit-cost model does not monetize this outcome.
^^WSIPP does not include this outcome when conducting benefit-cost analysis for this program.

Meta-analysis is a statistical method to combine the results from separate studies on a program, policy, or topic in order to estimate its effect on an outcome. WSIPP systematically evaluates all credible evaluations we can locate on each topic. The outcomes measured are the types of program impacts that were measured in the research literature (for example, crime or educational attainment). Treatment N represents the total number of individuals or units in the treatment group across the included studies.

An effect size (ES) is a standard metric that summarizes the degree to which a program or policy affects a measured outcome. If the effect size is positive, the outcome increases. If the effect size is negative, the outcome decreases.

Adjusted effect sizes are used to calculate the benefits from our benefit cost model. WSIPP may adjust effect sizes based on methodological characteristics of the study. For example, we may adjust effect sizes when a study has a weak research design or when the program developer is involved in the research. The magnitude of these adjustments varies depending on the topic area.

WSIPP may also adjust the second ES measurement. Research shows the magnitude of some effect sizes decrease over time. For those effect sizes, we estimate outcome-based adjustments which we apply between the first time ES is estimated and the second time ES is estimated. We also report the unadjusted effect size to show the effect sizes before any adjustments have been made. More details about these adjustments can be found in our Technical Documentation.

Detailed Monetary Benefit Estimates Per Participant

Affected outcome:	Resulting benefits:[1]	Benefits accrue to:				
		Taxpayers	Participants	Others[2]	Indirect[3]	Total
Crime	Criminal justice system	$1,009	$0	$2,500	$505	$4,014
High school graduation	Labor market earnings associated with high school graduation	$6,913	$16,286	$8,863	$0	$32,062
Regular smoking	Health care associated with smoking	$299	$85	$309	$149	$842
Public assistance	Public assistance	$3,225	($1,177)	$0	$1,613	$3,661
Food assistance	Food assistance	$928	($821)	$0	$464	$571
High school graduation	Costs of higher education	($1,045)	($1,582)	($474)	($522)	($3,624)
Regular smoking	Mortality associated with smoking	$3	$6	$0	$102	$110
	Subtotals	*$11,333*	*$12,796*	*$11,197*	*$2,310*	*$37,635*
From secondary participant						
Teen births (second generation)	Labor market earnings associated with high school graduation	$10	$24	$13	$0	$47
Teen births (second generation)	K-12 grade repetition	$1	$0	$0	$0	$1
Teen births (second generation)	Health care associated with smoking	$0	$0	$0	$0	$1
Teen births (second generation)	Costs of higher education	($1)	($2)	($1)	($1)	($5)
Teen births (second generation)	Mortality associated with smoking	$0	$0	$0	$0	$0
	Subtotals	*$10*	*$22*	*$13*	*$0*	*$44*
Program cost	Adjustment for deadweight cost of program	$0	$0	$0	($18,347)	($18,347)
Totals		$11,342	$12,818	$11,209	($16,037)	$19,332

[1]In addition to the outcomes measured in the meta-analysis table, WSIPP measures benefits and costs estimated from other outcomes associated with those reported in the evaluation literature. For example, empirical research demonstrates that high school graduation leads to reduced crime. These associated measures provide a more complete picture of the detailed costs and benefits of the program.

[2]"Others" includes benefits to people other than taxpayers and participants. Depending on the program, it could include reductions in crime victimization, the economic benefits from a more educated workforce, and the benefits from employer-paid health insurance.

[3]"Indirect benefits" includes estimates of the net changes in the value of a statistical life and net changes in the deadweight costs of taxation.

Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$5,000	2000	Present value of net program costs (in 2022 dollars)	($36,693)
Comparison costs	$0	2018	Cost range (+ or -)	30%

Average cost per youth is $25,000 for five years. We used a 30% uncertainty estimate around this figure because the average costs vary widely by site, as reported by Maxfield, M., Schirm, A., & Rodriguez-Planas, N. (2003). The Quantum Opportunity Program demonstration: Implementation and short-term impacts (Document No. PR03-18). Princeton, NJ: Mathematica Policy Research, p. 12.

The figures shown are estimates of the costs to implement programs in Washington. The comparison group costs reflect either no treatment or treatment as usual, depending on how effect sizes were calculated in the meta-analysis. The cost range reported above reflects potential variation or uncertainty in the cost estimate; more detail can be found in our Technical Documentation.

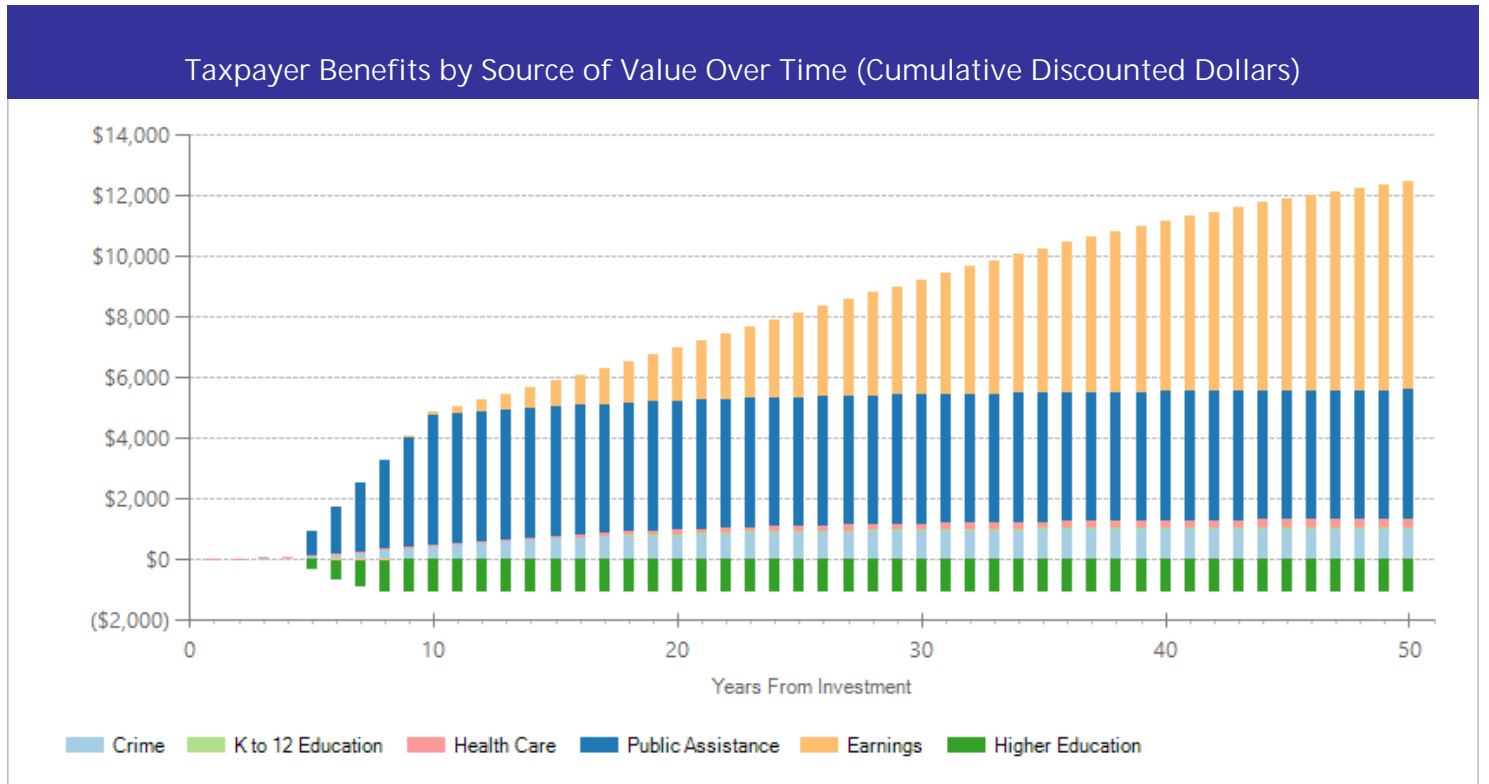**Benefits Minus Costs Over Time (Cumulative Discounted Dollars)**
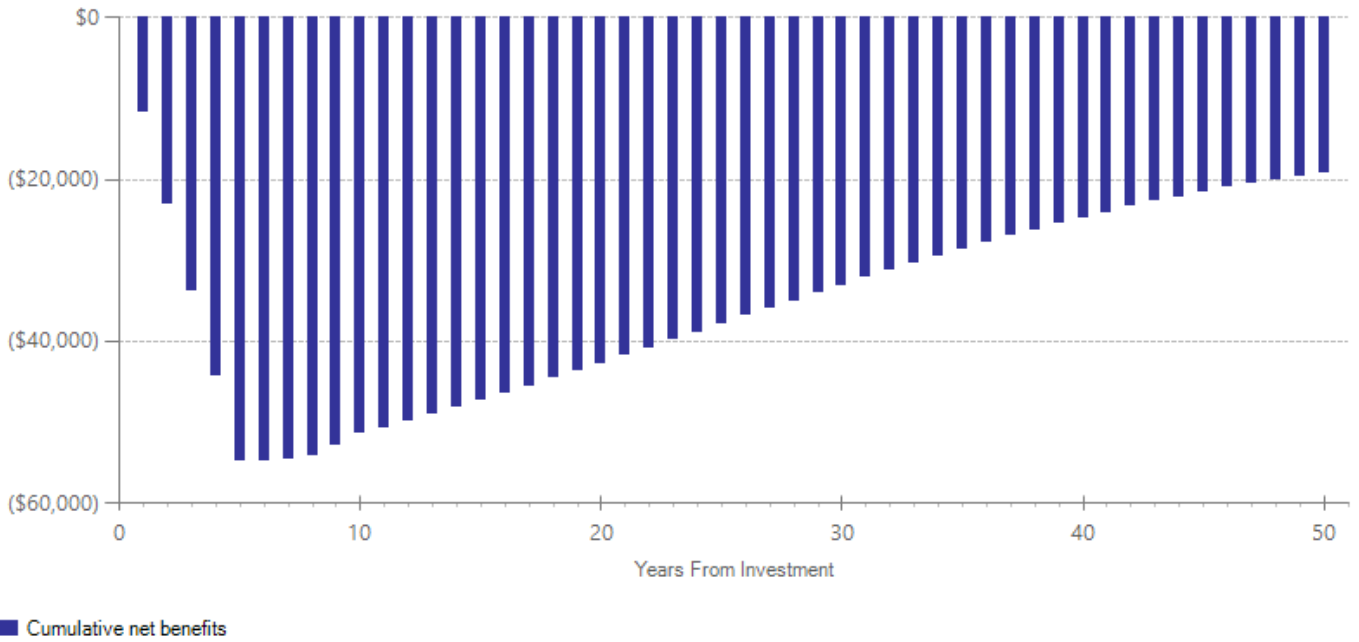
The graph above illustrates the estimated cumulative net benefits per-participant for the first fifty years beyond the initial investment in the program. We present these cash flows in discounted dollars. If the dollars are negative (bars below $0 line), the cumulative benefits do not outweigh the cost of the program up to that point in time. The program breaks even when the dollars reach $0. At this point, the total benefits to participants, taxpayers, and others, are equal to the cost of the program. If the dollars are above $0, the benefits of the program exceed the initial investment.

Benefits by Perspective Over Time (Cumulative Discounted Dollars)
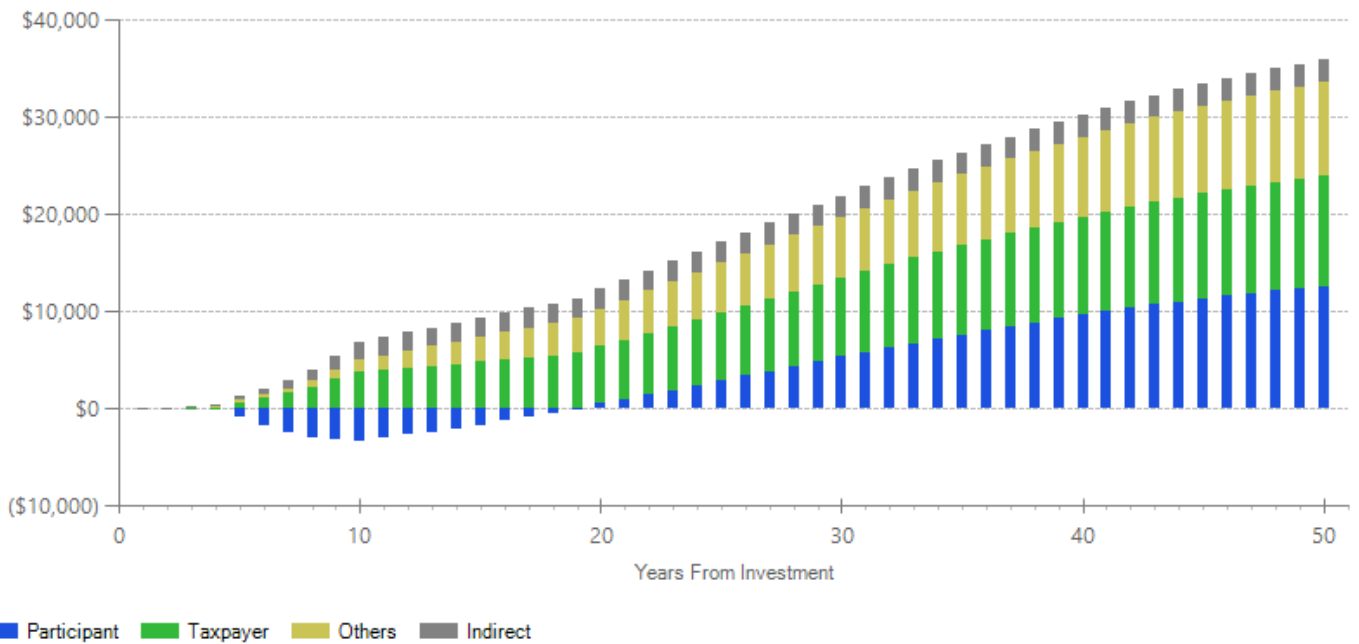
The graph above illustrates the breakdown of the estimated cumulative benefits (not including program costs) per-participant for the first fifty years beyond the initial investment in the program. These cash flows provide a breakdown of the classification of dollars over time into four perspectives: taxpayer, participant, others, and indirect. "Taxpayers" includes expected savings to government and expected increases in tax revenue. "Participants" includes expected increases in earnings and expenditures for items such as health care and college tuition. "Others" includes benefits to people other than taxpayers and participants. Depending on the program, it could include reductions in crime victimization, the economic benefits from a more educated workforce, and the benefits from employer-paid health insurance. "Indirect benefits" includes estimates of the changes in the value of a statistical life and changes in the deadweight costs of taxation. If a section of the bar is below the $0 line, the program is creating a negative benefit, meaning a loss of value from that perspective.

Taxpayer Benefits by Source of Value Over Time (Cumulative Discounted Dollars)

Legend: Crime, K to 12 Education, Health Care, Public Assistance, Earnings, Higher Education

The graph above focuses on the subset of estimated cumulative benefits that accrue to taxpayers. The cash flows are divided into the source of the value.

Citations Used in the Meta-Analysis

Hahn, A., Leavitt, T., & Aaron, P. (1994). *Evaluation of the Quantum Opportunities Program (QOP): Did the program work? A report on the post secondary outcomes and cost effectiveness of the QOP program (1989-1993).* Waltham, MA: Brandeis University, Center for Human Resources.

Lattimore, C.B., Mihalic, S.F., Grotpeter, J.K., & Taggart, R. (1998). *Blueprints for violence prevention, book four: The Quantum Opportunities Program* (Document No. NCJ 174197). Boulder: University of Colorado, Boulder; Center for the Study and Prevention of Violence.

Maxfield, M., Schirm, A., & Rodriguez-Planas, N. (2003). *The Quantum Opportunity Program demonstration: Implementation and short-term impacts* (Document No. PR03-18). Princeton, NJ: Mathematica Policy Research.

Schirm, A., Stuart, E., & McKie, A. (2006). *The Quantum Opportunity Program Demonstration: Final impacts* (Document No. PR06- 70). Princeton, NJ: Mathematica Policy Research.