Washington State Institute for Public Policy

Benefit-Cost Results

Individual exercise programs (high-risk population)

Health Care: Falls Prevention for Older Adults

Benefit-cost estimates updated December 2023. Literature review updated February 2018.

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: Individual exercise programs for falls prevention consist of a standardized program of exercise or an individually tailored plan. This analysis includes interventions delivered to participants with a high risk of falling due to falls risk factors or recruitment from an inpatient setting. Among the included interventions, a physiotherapist or other provider assigns exercises and follows up with home visits and phone calls to monitor progress. Most programs prescribed home-based exercises for nearly all exercise sessions. Program length ranged from 6 weeks to 1.3 years, with an average of ten months. Expected exercise frequency ranged from twice weekly to three times daily, with a mean of once daily.

This meta-analysis includes only interventions delivered to community-dwelling older adults with a high risk of falling. We classify participants as high-risk if they were selected for falls risk factors or if they were recruited from an inpatient setting. We analyze individual exercise interventions for a general population of community-dwelling older adults separately.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$413
Participants	$52
Others	$65
Indirect	$2,658
Total benefits	$3,188
Net program cost	($684)
Benefits minus cost	$2,504

Benefit to cost ratio	$4.66
Benefits minus costs	$2,504
Chance the program will produce benefits greater than the costs	75%

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	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
Falls‡	81	6	602	0.907	0.094	81	1.000	0.000	82	0.907	0.343

‡The effect size for this outcome indicates an incidence rate ratio (IRR), not a standardized mean difference effect size. An IRR less than one indicates a lower rate of the outcome in the treatment group relative to the comparison group; an IRR greater than one indicates a higher rate of the outcome. The treatment n for this outcome represents person-years.

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
Falls	Health care associated with falls	$413	$52	$65	$207	$737
Falls	Mortality associated with falls	$0	$0	$0	$2,794	$2,794
Program cost	Adjustment for deadweight cost of program	$0	$0	$0	($342)	($342)
Totals		$413	$52	$65	$2,658	$3,188

[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.

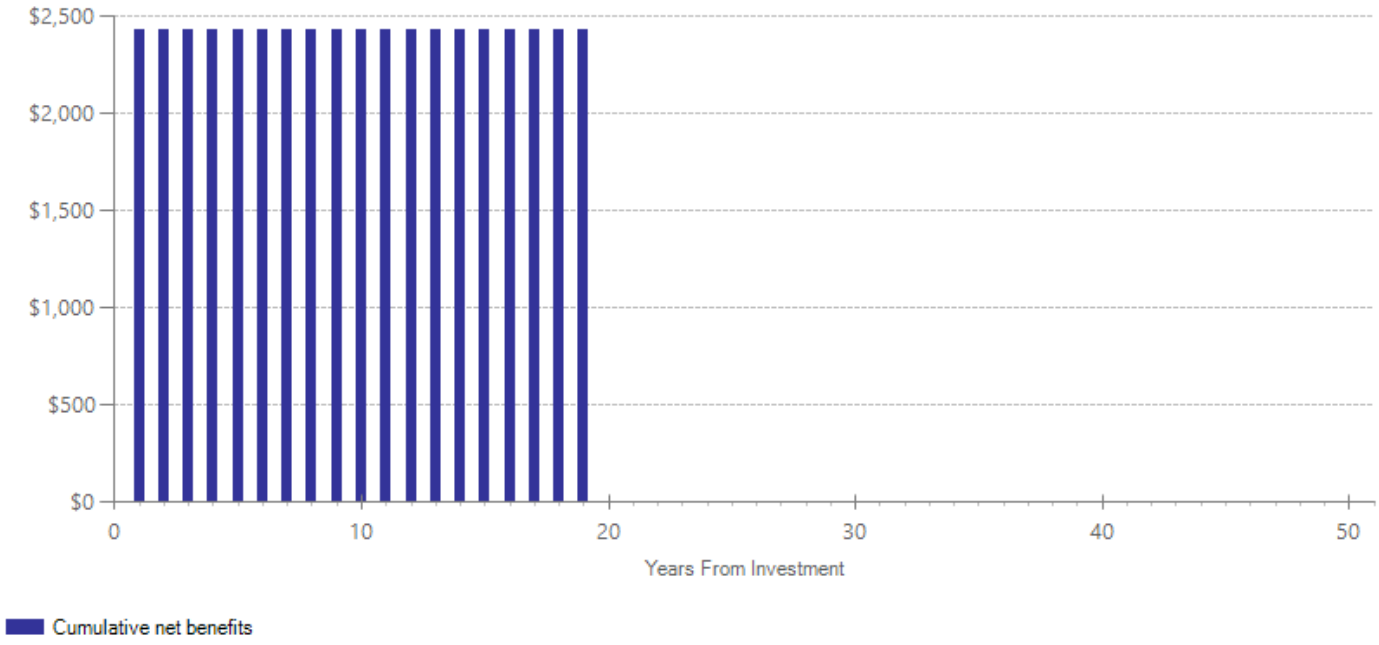
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$580	2016	Present value of net program costs (in 2022 dollars)	($684)
Comparison costs	$0	2016	Cost range (+ or -)	30%

Per-participant cost estimates are based on weighted average costs in the included studies. We estimate staff hours including home visits, transportation, telephone contacts, and training. We assume initial home visits lasted one hour; additional home visits lasted 20 or 30 minutes; and home visits required 30 minutes of travel time. We assume follow-up phone calls lasted 20 minutes on average. For studies that include training (Boongird et al., 2017), we include the cost of a three-hour training, including provider time spent in attendance and the course fee. We also include the cost of exercise equipment and audiovisual equipment provided for home use. We use 2016 U.S. Bureau of Labor Statistics information (retrieved March 2018) to estimate Washington State mean wages in the home health care sector for occupational therapists, registered nurses, physical therapists, and general practitioner physicians. We increase wages by a factor of 1.441 to account for the cost of employee benefits.

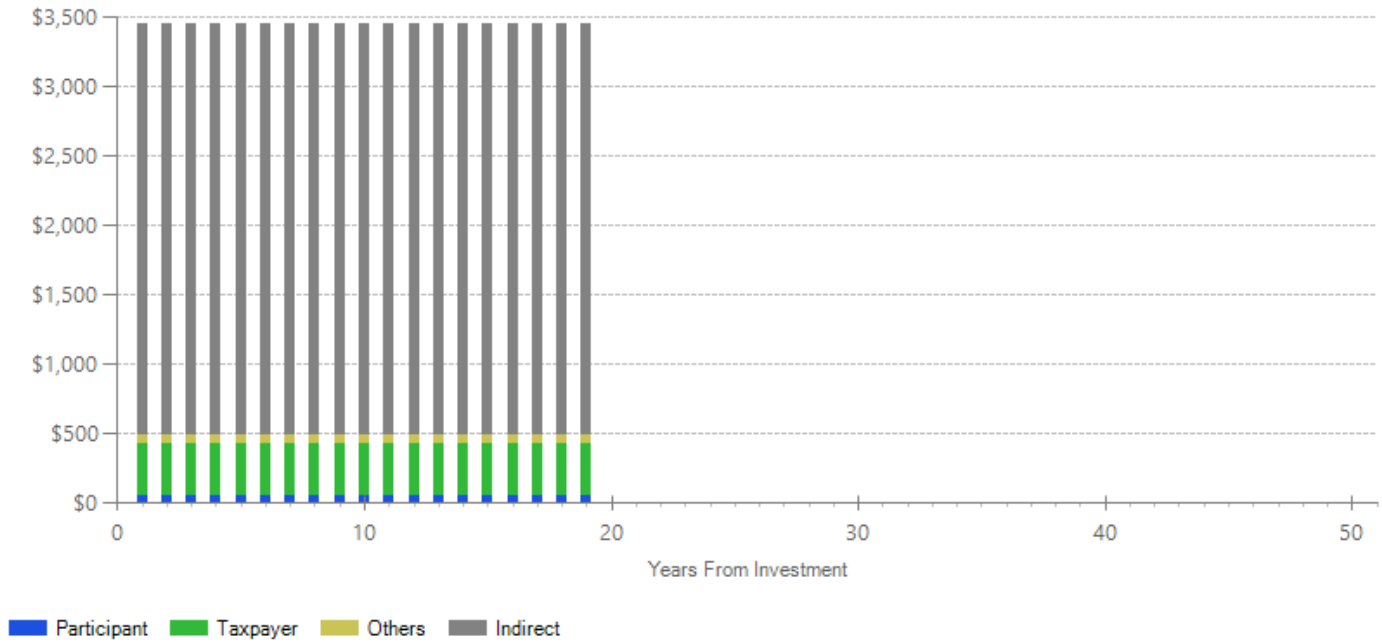
The figures shown are estimates of the costs to implement programs in Washington. The comparison group costs reflect either no treatment or treatment as usual, depending on how effect sizes were calculated in the meta-analysis. The cost range reported above reflects potential variation or uncertainty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

Benefits Minus Costs Over Time (Cumulative Discounted Dollars)



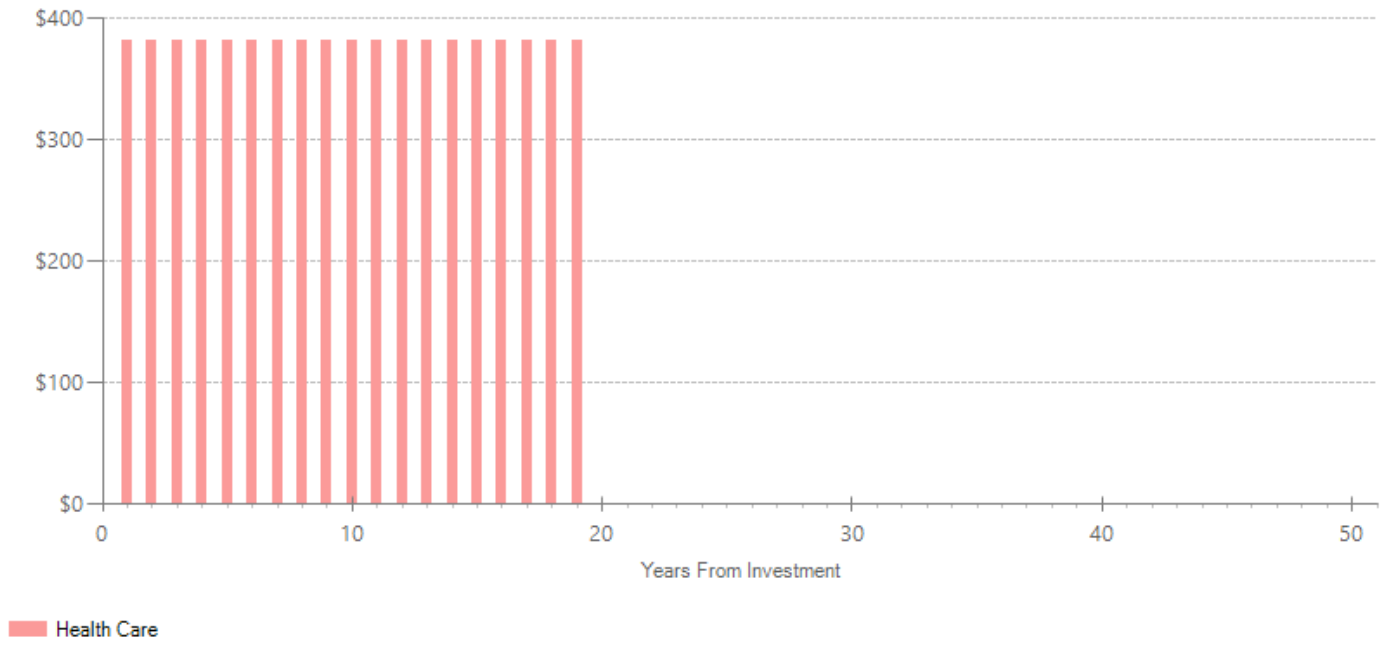
The graph above illustrates the estimated cumulative net benefits per-participant for the first fifty years beyond the initial investment in the program. We present these cash flows in discounted dollars. If the dollars are negative (bars below $0 line), the cumulative benefits do not outweigh the cost 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)



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

Boongird, C., Keesukphan, P., Phiphadthakusolkul, S., Rattanasiri, S., & Thakkinstian, A. (2017). Effects of a simple home-based exercise program on fall prevention in older adults: A 12-month primary care setting, randomized controlled trial. *Geriatrics & Gerontology International, 17,* 2157-2163.

Duque, G., Boersma, D., Loza-Diaz, G., Hassan, S., Suarez, H., Geisinger, D., . . . Demontiero, O. (2013). Effects of balance training using a virtual-reality system in older fallers. *Clinical Interventions in Aging, 8,* 257.

Latham, N.K., Anderson, C.S., Lee, A., Bennett, D.A., Moseley, A., & Cameron, I.D. (2003). A randomized, controlled trial of quadriceps resistance exercise and vitamin D in frail older people: the Frailty Intervention Trial in Elderly Subjects (FITNESS). *Journal of the American Geriatrics Society, 51*(3), 291–299.

Luukinen, H., Lehtola, S., Jokelainen, J., Väänänen-Sainio, R., Lotvonen, S., & Koistinen, P. (2007). Pragmatic exercise-oriented prevention of falls among the elderly: a population-based, randomized, controlled trial. *Preventive medicine, 44*(3), 265-271.

Vogler, C.M., Sherrington, C., Ogle, S.J., & Lord, S.R. (2009). Reducing risk of falling in older people discharged from hospital: a randomized controlled trial comparing seated exercises, weight-bearing exercises, and social visits. *Archives of Physical Medicine and Rehabilitation, 90*(8), 1317-1324.

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