Group exercise classes for osteoporosis/osteopenia

Health Care: Falls Prevention for Older Adults

Benefit-cost estimates updated December 2023. Literature review updated January 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: Group exercise programs for falls prevention for individuals with osteoporosis or osteopenia aim to prevent falls and fractures by addressing risk factors such as bone loss, poor balance, and muscle weakness. Among studies included in this analysis, physiotherapists or fitness instructors taught one or two classes weekly at an athletic club or community center and in some cases assigned home-based exercises as well. Participants were women with osteoporosis or osteopenia. Program length ranged from five months to 2.5 years, with a mean of 1.5 years.

This meta-analysis includes only interventions delivered to community-dwelling older adults with osteoporosis or osteopenia. It excludes exercise interventions that assigned only individual home-based exercises. We analyze these interventions for community-dwelling older adults with osteoporosis or osteopenia separately.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$177
Participants	$22
Others	$28
Indirect	$556
Total benefits	$783
Net program cost	($350)
Benefits minus cost	$433

Benefit to cost ratio	$2.23
Benefits minus costs	$433
Chance the program will produce benefits greater than the costs	79%

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‡	72	3	237	0.757	0.118	73	1.000	0.000	74	0.757	0.071

‡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	$177	$22	$28	$89	$316
Falls	Mortality associated with falls	$0	$0	$0	$642	$642
Program cost	Adjustment for deadweight cost of program	$0	$0	$0	($175)	($175)
Totals		$177	$22	$28	$556	$783

[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.

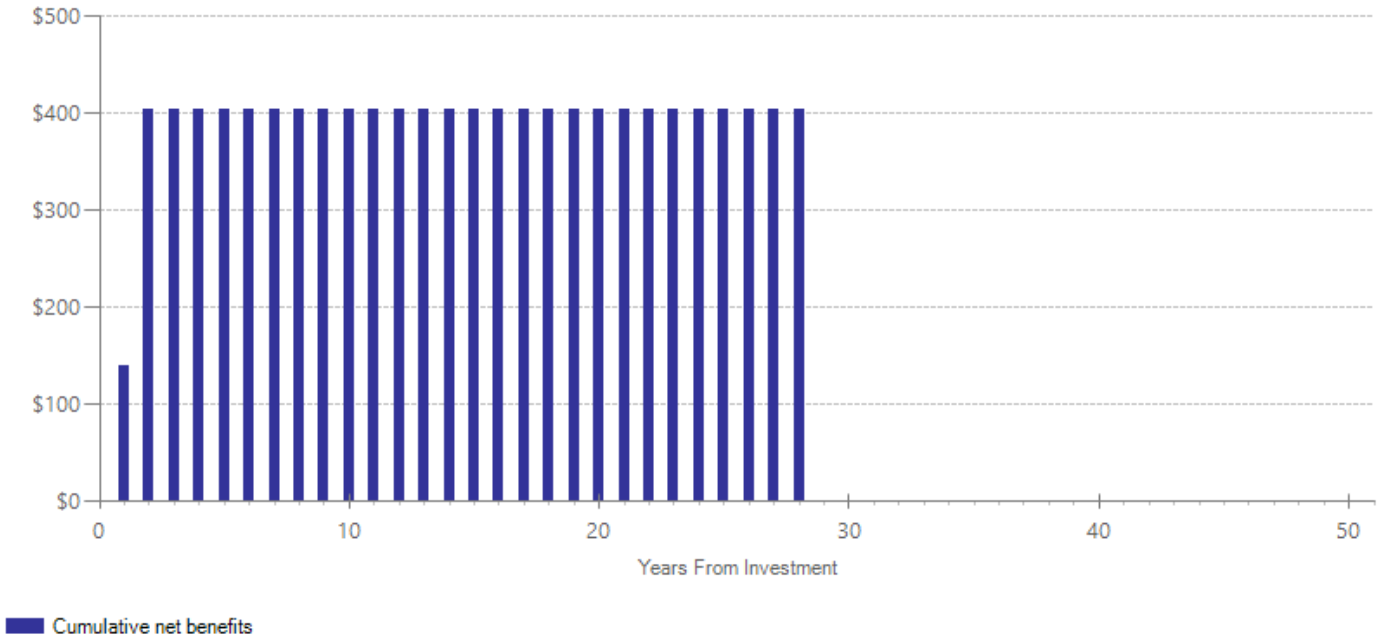
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$188	2016	Present value of net program costs (in 2022 dollars)	($350)
Comparison costs	$0	2016	Cost range (+ or -)	45%

Per-participant cost estimates are based on weighted average costs in the included studies. We estimate staff hours including training. We assume each class lasted one hour and had an average class size of ten students. We assume follow-up phone calls lasted 20 minutes, on average. For the study that included training (Carter et al., 2002), we include the cost of a 15-hour training, provider time spent in attendance, and the course fee. We also include the cost of course manuals distributed to participants. We use 2016 U.S. Bureau of Labor Statistics information (retrieved March 2018) to estimate Washington State mean wages for exercise instructors and physical therapists. We increase wages by a factor of 1.441 to account for the cost of employee benefits.

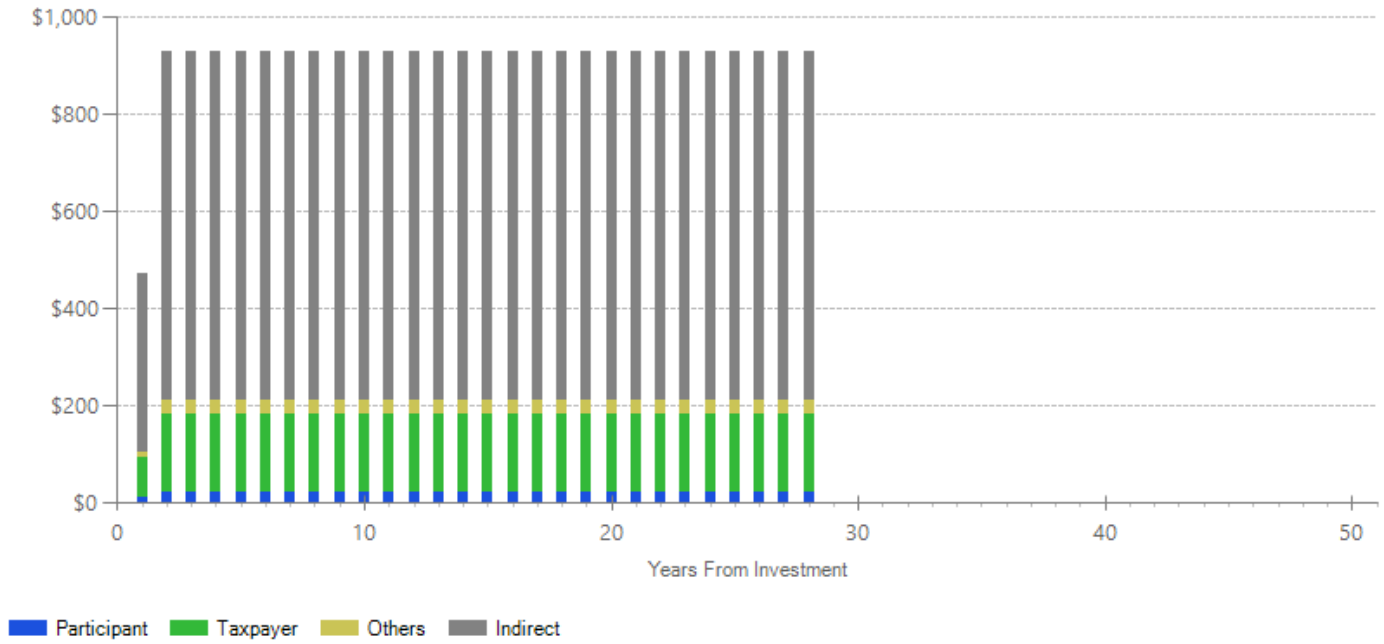
The figures shown are estimates of the costs to implement programs in Washington. The comparison group costs reflect either no treatment or treatment as usual, depending on how effect sizes were calculated in the meta-analysis. The cost range reported above reflects potential variation or uncertainty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

Benefits Minus Costs Over Time (Cumulative Discounted Dollars)



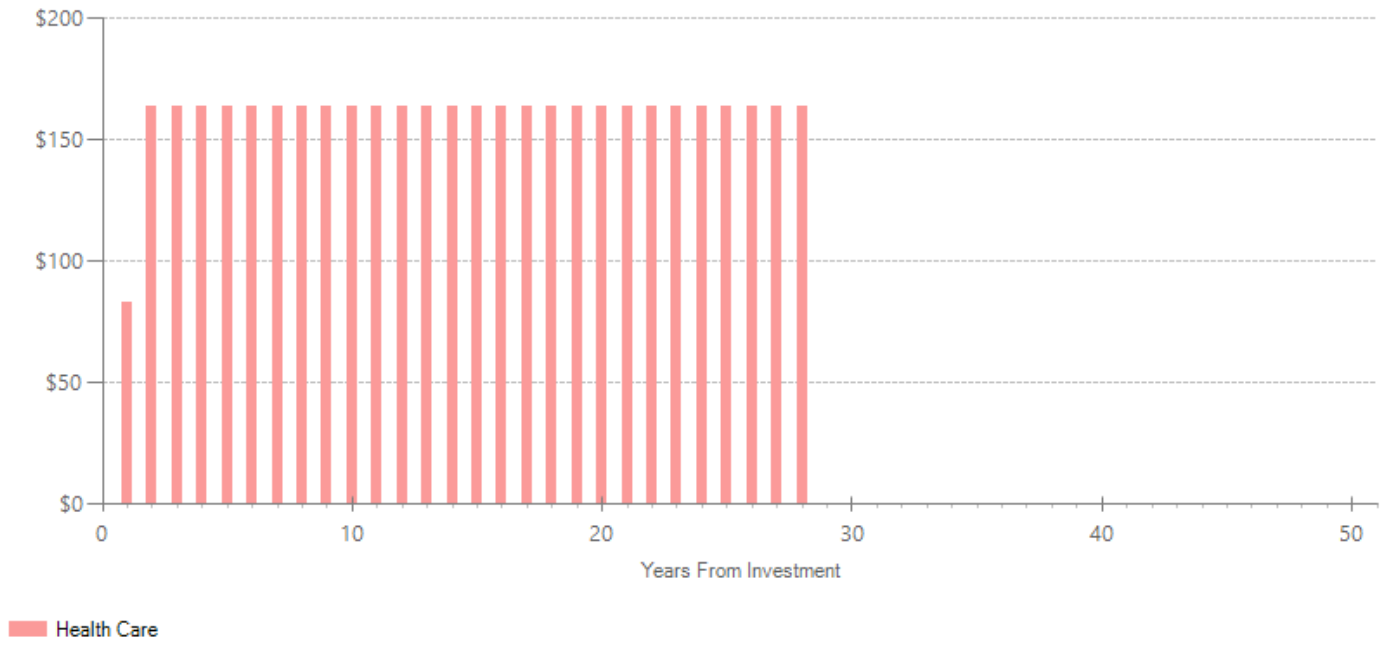
The graph above illustrates the estimated cumulative net benefits per-participant for the first fifty years beyond the initial investment in the program. We present these cash flows in discounted dollars. If the dollars are negative (bars below $0 line), the cumulative benefits do not outweigh the cost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

Carter, N.D., Khan, K.M., McKay, H.A., Petit, M.A., Waterman, C., Heinonen, A., . . . Flicker, L. (2002). Community-based exercise program reduces risk factors for falls in 65-to 75-year-old women with osteoporosis: randomized controlled trial. *Canadian Medical Association Journal, 167*(9), 997-1004.

Korpelainen, R., Keinänen-Kiukaanniemi, S., Heikkinen, J., Väänänen, K., & Korpelainen, J. (2006). Effect of impact exercise on bone mineral density in elderly women with low BMD: a population-based randomized controlled 30-month intervention. *Osteoporosis International, 17*(1), 109-118.

Madureira, M.M., Takayama, L., Gallinaro, A.L., Caparbo, V.F., Costa, R.A., & Pereira, R.M.R. (2007). Balance training program is highly effective in improving functional status and reducing the risk of falls in elderly women with osteoporosis: a randomized controlled trial. *Osteoporosis International, 18,* 419-425.

For further information, contact:
(360) 664-9800, institute@wsipp.wa.gov

Printed on 03-23-2024