Multicomponent interventions including group exercise and vitamin D supplementation (high-risk population)

Health Care: Falls Prevention for Older Adults

Benefit-cost estimates updated December 2019. 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 aim to prevent falls by providing exercise classes that address risk factors. Vitamin D interventions for falls prevention prescribe daily supplements of vitamin D, aiming to improve bone density. Group exercise and vitamin D programs include both of these interventions.

In the included study, physiotherapists taught one or two classes weekly at an exercise hall or a gym. For the rest of each week, participants were assigned home-based exercises for 5 to 15 minutes daily. A variety of exercise types were offered, including balance-challenging, strengthening, and agility exercises. Participants also received one daily pill containing 800 IU of vitamin D3. The program was provided to community-dwelling older women with a history of falls and lasted two years.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$11
Participants	$1
Others	$2
Indirect	($580)
Total benefits	($565)
Net program cost	($1,230)
Benefits minus cost	($1,796)

Benefit to cost ratio	($0.46)
Benefits minus costs	($1,796)
Chance the program will produce benefits greater than the costs	23 %

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2018). 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‡	74	1	194	1.006	0.094	75	1.000	0.000	76	1.006	0.949

‡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	$11	$1	$2	$6	$20
Falls	Mortality associated with falls	$0	$0	$0	$30	$30
Program cost	Adjustment for deadweight cost of program	$0	$0	$0	($615)	($615)
Totals		$11	$1	$2	($580)	($565)

[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.

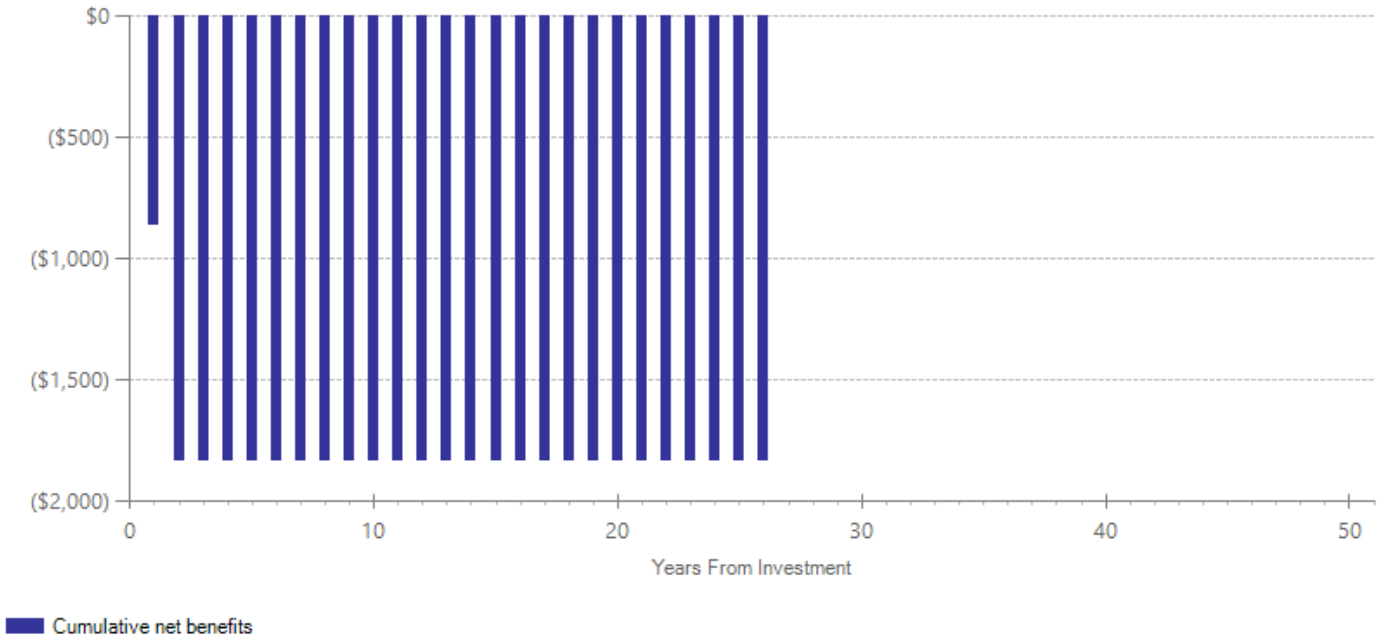
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$594	2016	Present value of net program costs (in 2018 dollars)	($1,230)
Comparison costs	$0	2016	Cost range (+ or -)	30 %

Per-participant cost estimates are based on the program costs in the included study and are spread over two years to reflect the duration of this program. We estimate provider hours; apply the 2016 mean hourly wage estimate for Washington State reported by the Bureau of Labor Statistics (retrieved March 2018) for physical therapists; and increase wages by a factor of 1.441 to account for the cost of employee benefits. The intervention in the included study provided 156 hours of exercise class, with one or two physical therapists leading each session and 15 participants on average. For each participant, we include the cost of ankle cuff weights, vest weights, and a step-board. We assume daily vitamin D pills cost $119 per participant over two years.

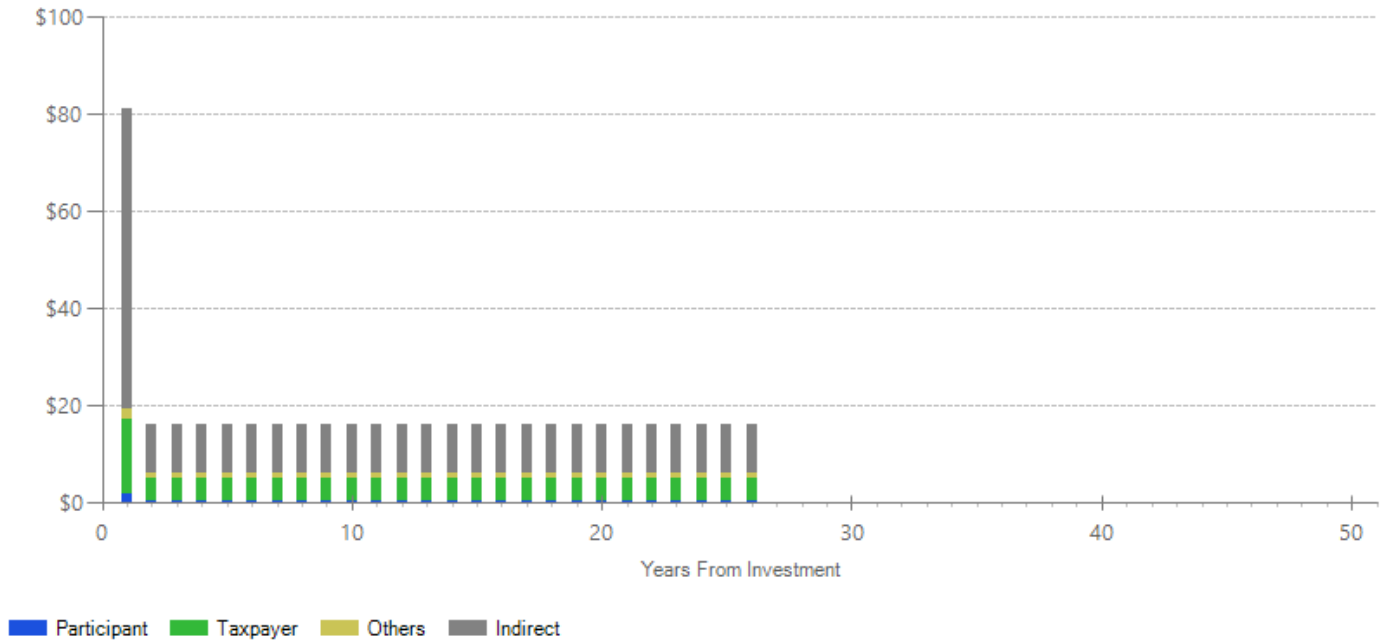
The figures shown are estimates of the costs to implement programs in Washington. The comparison group costs reflect either no treatment or treatment as usual, depending on how effect sizes were calculated in the meta-analysis. The cost range reported above reflects potential variation or uncertainty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

Benefits Minus Costs Over Time (Cumulative Discounted Dollars)



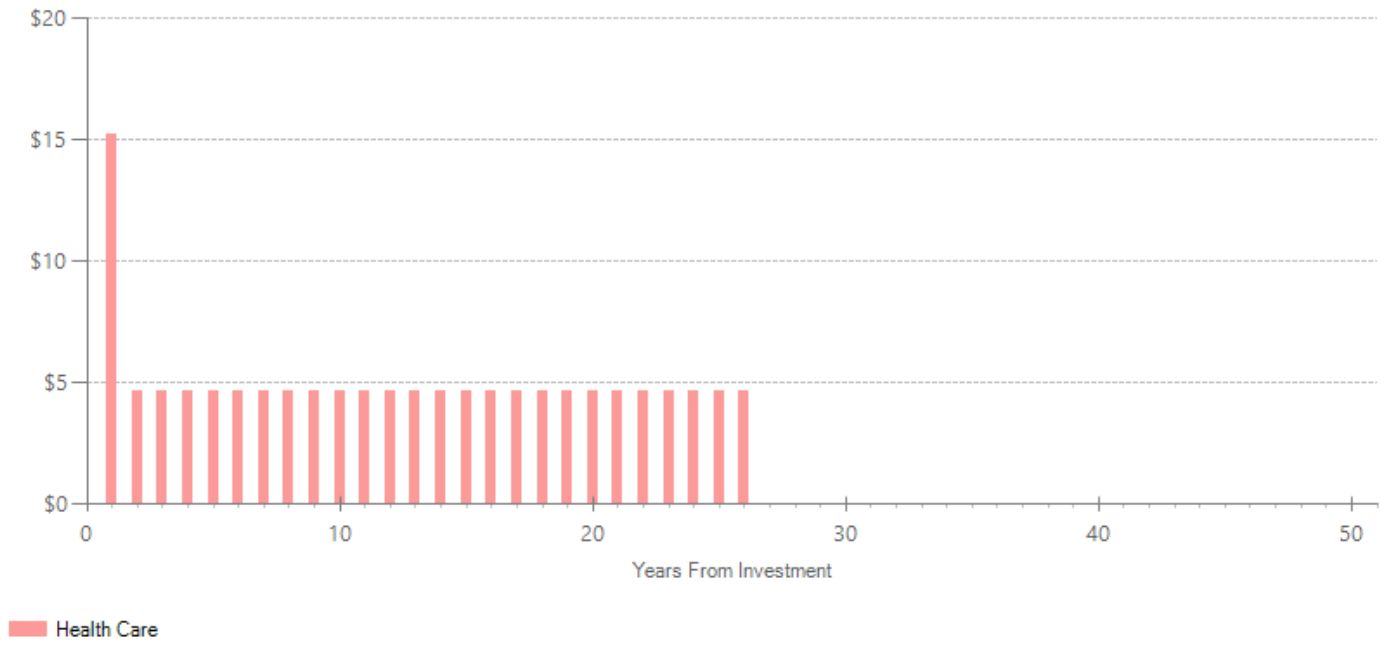
The graph above illustrates the estimated cumulative net benefits per-participant for the first fifty years beyond the initial investment in the program. We present these cash flows in discounted dollars. If the dollars are negative (bars below $0 line), the cumulative benefits do not outweigh the cost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

Uusi-Rasi, K., Patil, R., Karinkanta, S., Kannus, P., Tokola, K., Lamberg-Allardt, C., & Sievänen, H. (2015). Exercise and vitamin D in fall prevention among older women: a randomized clinical trial. *JAMA Internal Medicine, 175*(5), 703-711.

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