

School-based programs to increase physical activity

Public Health & Prevention: School-based

Benefit-cost estimates updated December 2019. Literature review updated November 2015.

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: These programs added additional physical activity to the elementary or middle school day through guided activities led by the classroom teacher or physical education teacher. They did not replace standard physical education classes or recess. The format of these interventions varied but most programs incorporated physical activity into the standard classroom curriculum. Some programs included instruction on the importance of physical activity and/or nutrition in addition to the time that students were engaged physical activity time. The intervention length ranged from two months to six school years.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	\$3,746	Benefit to cost ratio	\$34.81
Participants	\$8,798	Benefits minus costs	\$16,456
Others	\$4,642	Chance the program will produce	
Indirect	(\$243)	benefits greater than the costs	67 %
Total benefits	\$16,942		
Net program cost	(\$487)		
Benefits minus cost	\$16,456		

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](#).

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to: ¹	Benefits to:				
	Participants	Taxpayers	Others ²	Indirect ³	Total
Labor market earnings associated with test scores	\$8,798	\$3,745	\$4,641	\$0	\$17,184
Health care associated with obesity	\$0	\$0	\$1	\$0	\$1
Mortality associated with obesity	\$0	\$0	\$0	\$0	\$0
Adjustment for deadweight cost of program	\$0	\$0	\$0	(\$243)	(\$243)
Totals	\$8,798	\$3,746	\$4,642	(\$243)	\$16,942

¹In 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.

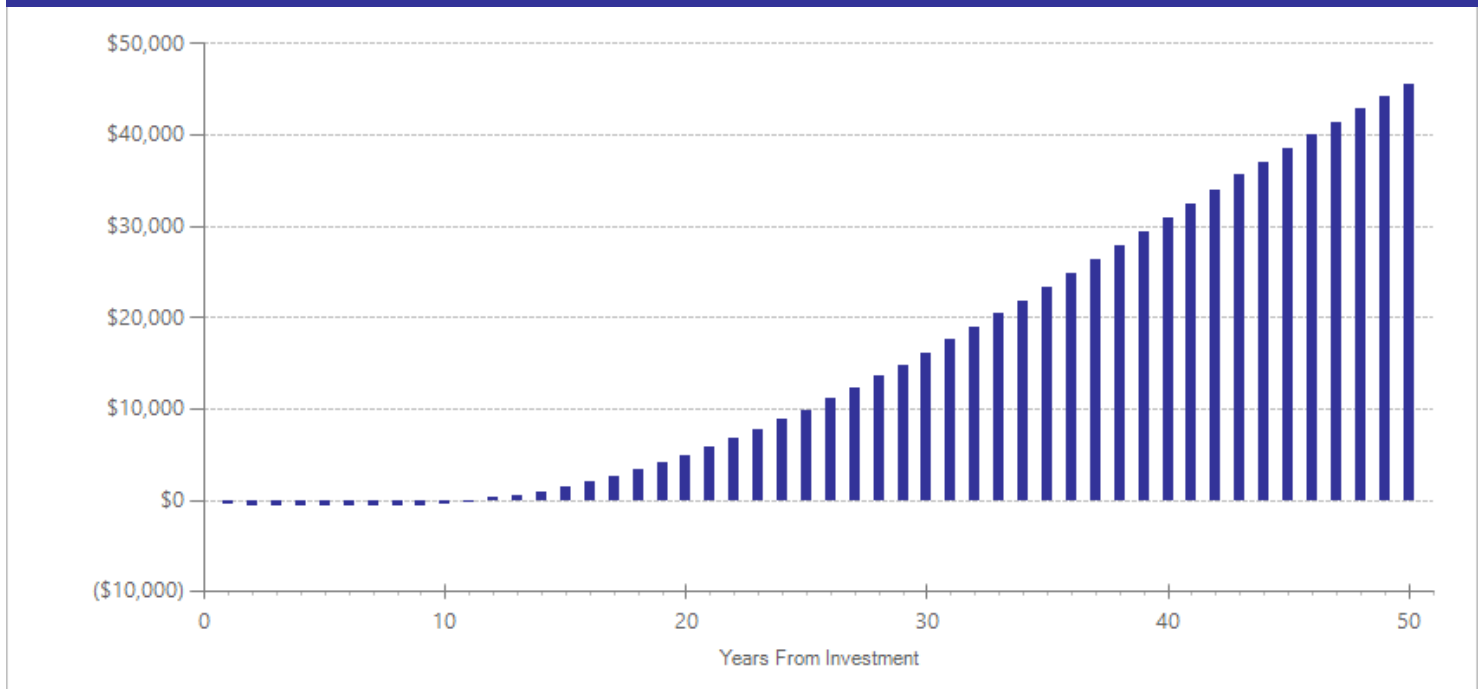
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	\$235	2014	Present value of net program costs (in 2018 dollars)	(\$487)
Comparison costs	\$0	2014	Cost range (+ or -)	20 %

The programs in this analysis added 146 additional hours of physical activity and required an average of seven hours of professional development per teacher. We assume that these costs are spread over two years. The annual per-student cost of the intervention was calculated by adding the teacher time required to incorporate this additional physical activity into the school day and the average number of hours of teacher training required and dividing this sum by the average K-8th grade class size in Washington State (26.55 students). The per-student staff hours were multiplied by the average hourly salary and benefits for elementary school teachers in Washington State.

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](#).

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

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	p-value
				ES	SE	Age	ES	SE	Age		
Obesity	10	17	5767	-0.020	0.024	12	0.000	0.101	14	-0.020	0.859
Test scores	10	3	528	0.123	0.187	12	0.095	0.205	17	0.123	0.510

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](#).

Citations Used in the Meta-Analysis

- Ahamed, Y., Macdonald, H., Reed, K., Naylor, P. J., Liu-Ambrose, T., & McKay, H. (2007). School-based physical activity does not compromise children's academic performance. *Medicine and Science in Sports and Exercise*, 39(2), 371-376.
- Burke, V., Milligan, R.A., Thompson, C., Taggart, A.C., Dunbar, D.L., Spencer, M.J., . . . Beilin, L.J. (1998). A controlled trial of health promotion programs in 11-year-olds using physical activity 'enrichment' for higher risk children. *The Journal of Pediatrics*, 132(5), 840-848.
- Donnelly, J.E., Greene, J.L., Gibson, C.A., Smith, B.K., Washburn, R.A., Sullivan, D.K., . . . Williams, S.L. (2009). Physical Activity Across the Curriculum (PAAC): A randomized controlled trial to promote physical activity and diminish overweight and obesity in elementary school children. *Preventive Medicine*, 49(4), 336-41.
- Flores, R. (1995). Dance for health: improving fitness in African American and Hispanic adolescents. *Public Health Reports*, 110(2), 189-193.
- Graf, C., Koch, B., Falkowski, G., Jouck, S., Christ, H., Staudenmaier, K., . . . Dordel, S. (2008). School-based prevention: Effects on obesity and physical performance after 4 years. *Journal of Sports Sciences*, 26(10), 987-994.
- Grydeland, M., Bjelland, M., Anderssen, S.A., Klepp, K.I., Bergh, I.H., Andersen, L.F., Ommundsen, Y., . . . Lien, N. (2014). Effects of a 20-month cluster randomised controlled school-based intervention trial on BMI of school-aged boys and girls: the HEIA study. *British Journal of Sports Medicine*, 48(9), 768-773.
- Harrell, J.S., McMurray, R.G., Bangdiwala, S.I., Frauman, A.C., Gansky, S.A., & Bradley, C.B. (1996). Effects of a school-based intervention to reduce cardiovascular disease risk factors in elementary-school children: the Cardiovascular Health in Children (CHIC) study. *The Journal of Pediatrics*, 128(6), 797-805.
- Harrell, J.S., McMurray, R.G., Gansky, S.A., Bangdiwala, S.I., & Bradley, C.B. (1999). A public health vs a risk-based intervention to improve cardiovascular health in elementary school children: the Cardiovascular Health in Children Study. *American Journal of Public Health*, 89(10), 1529-1535.
- Hopper, C.A., Munoz, K.D., Gruber, M.B., & Nguyen, K.P. (2005). The effects of a family fitness program on the physical activity and nutrition behaviors of third-grade children. *Research Quarterly for Exercise and Sport*, 76(2), 130-139.
- Katz, D.L., Cushman, D., Reynolds, J., Njike, V., Treu, J.A., Walker, J., . . . Katz, C. (2010). Putting physical activity where it fits in the school day: Preliminary results of the ABC (Activity Bursts in the Classroom) for fitness program. *Preventing Chronic Disease*, 7(4). Retrieved June 15, 2011 from http://www.cdc.gov/pcd/issues/2010/Jul/pdf/09_0176.pdf
- Kriemler, S., Zahner, L., Schindler, C., Meyer, U., Hartmann, T., Hebestreit, H., . . . Puder, J.J. (2010). Effect of school based physical activity programme (KISS) on fitness and adiposity in primary schoolchildren: Cluster randomised controlled trial. *BMJ*, 340(c785). doi: 10.1136/bmj.c785

- Lubans, D.R., Morgan, P.J., Okely, A.D., Dewar, D., Collins, C.E., Batterham, M., . . . Plotnikoff, R.C. (2012). Preventing obesity among adolescent girls: One-year outcomes of the Nutrition and Enjoyable Activity for Teen Girls (NEAT Girls) cluster randomized controlled trial. *Archives of Pediatrics & Adolescent Medicine*, 166(9), 821-7.
- Manios, Y., Moschandreas, J., Hatzis, C., & Kafatos, A. (2002). Health and nutrition education in primary schools of Crete: changes in chronic disease risk factors following a 6-year intervention programme. *The British Journal of Nutrition*, 88(3), 315-24.
- Pate, R.R., Ward, D.S., Saunders, R.P., Felton, G., Dishman, R.K., & Dowda, M. (2005). Promotion of physical activity among high-school girls: a randomized controlled trial. *American Journal of Public Health*, 95(9), 1582-1587.
- Reed, K. E., Warburton, D. E., Macdonald, H. M., Naylor, P. J., & McKay, H. A. (2008). Action Schools! BC: A school-based physical activity intervention designed to decrease cardiovascular disease risk factors in children. *Preventive Medicine*, 46(6), 525-531.
- Salmon, J., Ball, K., Hume, C., Booth, M., & Crawford, D. (2008). Outcomes of a group-randomized trial to prevent excess weight gain, reduce screen behaviours and promote physical activity in 10-year-old children: Switch-play. *International Journal of Obesity*, 32(4), 601-612.
- Simon, C., Schweitzer, B., Oujaa, M., Wagner, A., Arveiler, D., Triby, E., . . . Platat, C. (2008). Successful overweight prevention in adolescents by increasing physical activity: A 4-year randomized controlled intervention. *International Journal of Obesity*, 32(10), 1489-1498.
- Sollerhed, A.-C., & Ejlertsson, G. (2008). Physical benefits of expanded physical education in primary school: findings from a 3-year intervention study in Sweden. *Scandinavian Journal of Medicine & Science in Sports*, 18(1), 102-107.

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

Printed on 06-03-2020



Washington State Institute for Public Policy

The Washington State Legislature created the Washington State Institute for Public Policy in 1983. A Board of Directors—representing the legislature, the governor, and public universities—governs WSIPP and guides the development of all activities. WSIPP's mission is to carry out practical research, at legislative direction, on issues of importance to Washington State.