

Health economic evaluations of interventions to increase physical activity and decrease sedentary behavior at the workplace: a systematic review¹

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1. *Supplementary material*
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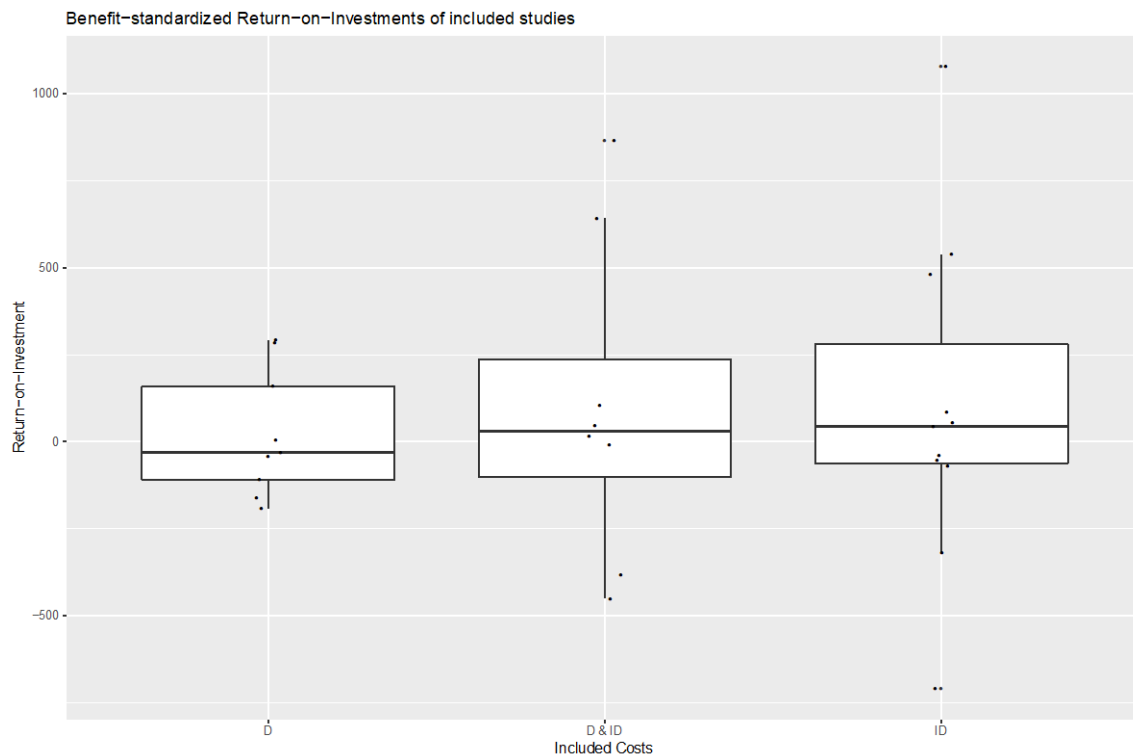


Figure S1: The Return-on-Investment was not sensitive to included cost categories. The median Return-on-Investment was close to zero, regardless if only direct costs (D), only indirect costs (ID) or all costs (D & ID) were included.

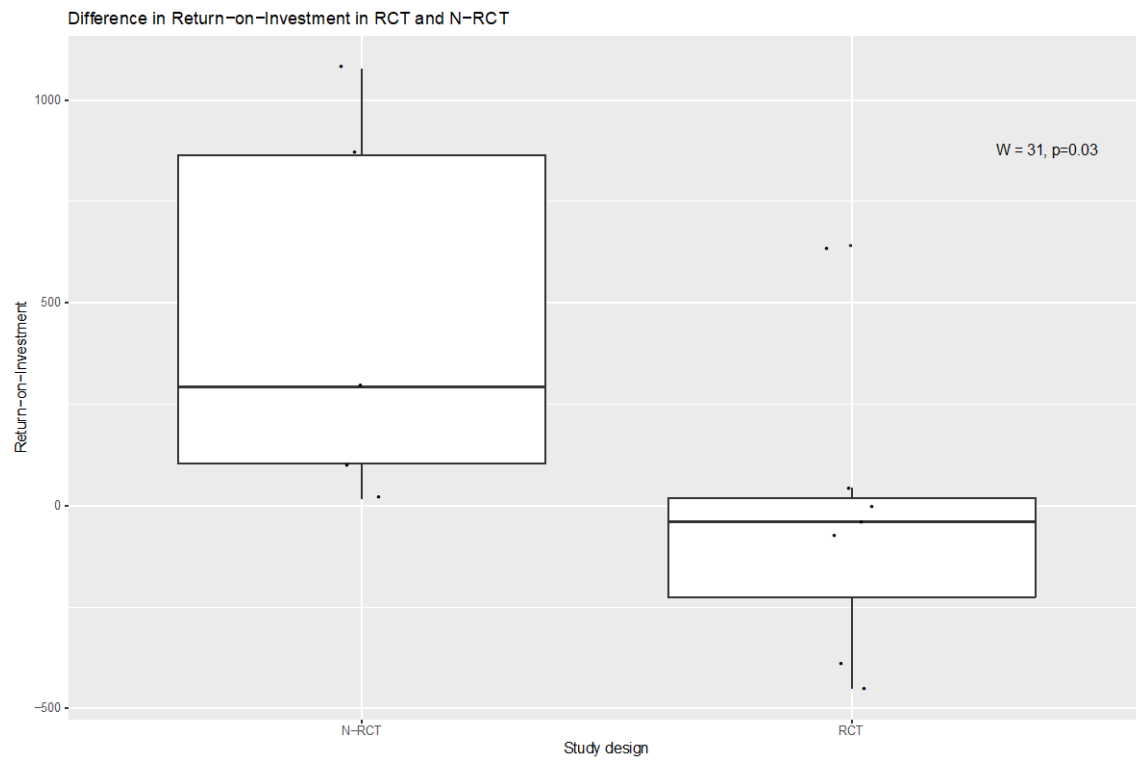


Figure S2: The Return-on-Investment was significantly different in randomized controlled trials and in non-randomized controlled trials. The Return-on-Investment used for this analysis was the one reported in the original study (not benefit-standardized).

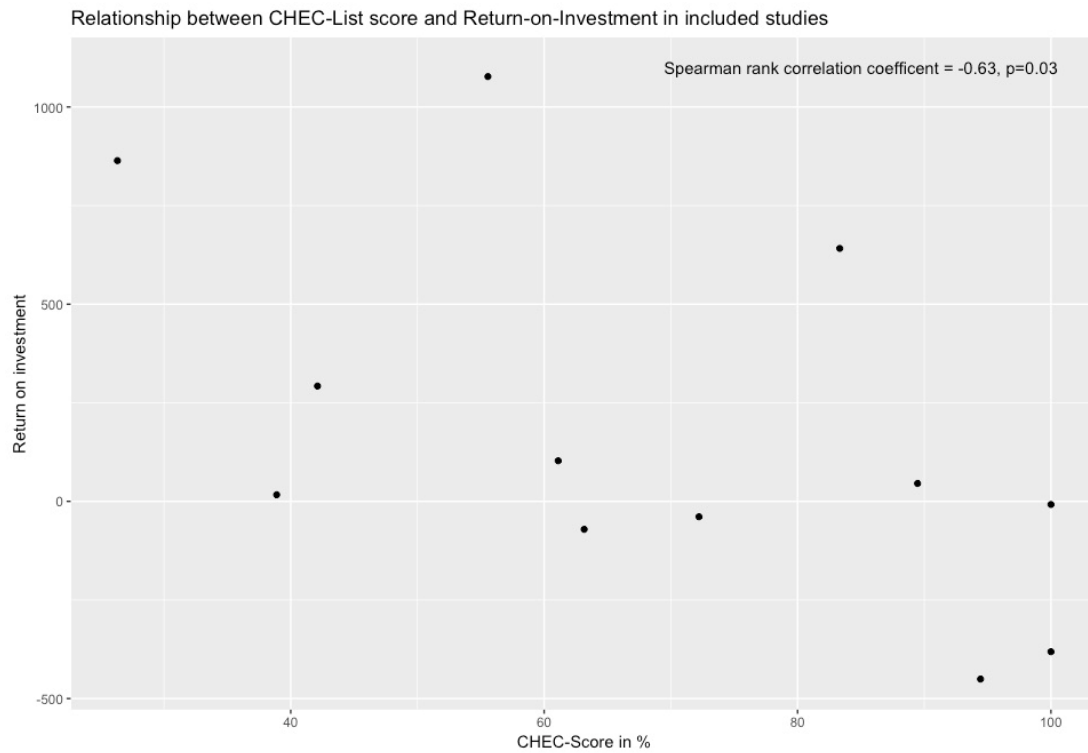


Figure S3: The scatterplot indicates a significant negative relationship between the CHEC-list rating and the Return-on-Investment. The Return-on-Investment used for this analysis was the one reported in the original study (not benefit-standardized).

Table S1: Search strategy in PubMed. This search strategy was adapted to all other databases using the same keywords.

PICO	Keywords
Population	Workplace[Mesh] OR Occupational Health[Mesh] OR employee*[Title/Abstract] OR worker*[Title/Abstract] OR employer[Title/Abstract] OR work*[Title] OR staff[Title] OR occupation*[Title] OR labour[Title] OR labor[Title] OR organisat*[Title] OR organizat*[Title] OR industr*[Title] OR business[Title] OR white collar[Title] OR blue collar[Title] OR personnel[Title] OR job[Title]
AND	
Intervention	(Exercise[Mesh] OR yoga[Title/Abstract] OR fitness[Title/Abstract] OR gymnastic*[Title/Abstract] OR strength*[Title/Abstract] OR aerobic[Title/Abstract] OR swim*[Title/Abstract] OR running[Title/Abstract] OR cycling[Title/Abstract] OR bicycling[Title/Abstract] OR walking[Title/Abstract] OR workout[Title/Abstract] OR bike[Title/Abstract] OR biking [Title/Abstract] OR exercis*[Title/Abstract] OR physical activit*[Title/Abstract] OR training[Title/Abstract] OR sport[Title/Abstract] OR sports[Title/Abstract] OR physical inactivity[Title/Abstract] OR sedentary[Title/Abstract] OR sedentarism[Title/Abstract] OR sedentariness[Title/Abstract] OR sitting time[Title/Abstract] OR sitting behavior[Title/Abstract] OR sitting behaviour[Title/Abstract] OR "Sedentary Behavior"[Mesh]) OR ((wellbeing[Title/Abstract] OR well-being[Title/Abstract] OR wellness[Title/Abstract] OR prevent*[Title/Abstract] OR program*[Title/Abstract] OR intervent*[Title/Abstract] OR promot*[Title/Abstract] OR lifestyle[Title/Abstract] OR life- style[Title/Abstract]) AND (Exercise[Mesh] OR "yoga" OR "fitness" OR "gymnastic*" OR "strength*" OR "swim*" OR "running" OR "cycling" OR "bicycling" OR "walking" OR "workout" OR "bike" OR "biking" OR exercis* OR physical activit* OR "training" OR "sport" OR "sports" OR "physical inactivity" OR "sedentary" OR "sedentariness" OR "sedentarism" OR "sitting time" OR "sitting behavior" OR "sitting behaviour" OR Sedentary Behavior[Mesh]))
Control	-
AND	

Outcome	<p>"Cost-Benefit Analysis"[Mesh] OR "Costs and Cost Analysis"[Mesh] OR "Economics/analysis"[Mesh] OR "Economics, Medical"[Mesh] OR "Cost Savings"[Mesh] OR economic analys*[Title/Abstract] OR economic evaluation[Title/Abstract] OR health economic*[Title/Abstract] OR cost-effective*[Title/Abstract] OR cost-benefi*[Title/Abstract] OR cost-saving*[Title/Abstract] OR cost saving*[Title/Abstract] OR benefit-to-cost[Title/Abstract] OR savings-to-cost[Title/Abstract] OR cost-utility[Title/Abstract] OR return on investment[Title/Abstract] OR return-on-investment[Title/Abstract] OR ROI[Title/Abstract] OR ICER[Title/Abstract] OR ICUR[Title/Abstract] OR benefits and costs[Title/Abstract] OR costs and benefits[Title/Abstract] OR value for money[Title/Abstract] OR budget impact analysis[Title/Abstract] OR cost-minimization analysis[Title/Abstract] OR cost-minimisation analysis[Title/Abstract]</p>
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Table S2.1: CHEC-scores of included studies

Study	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	Item 15	Item 16	Item 17	Item 18	Item 19	Total yes	Total no	Total NA	Score [%]
Allen et. Al., 2012	yes	no	yes	yes	yes	no	no	no	no	no	yes	yes	yes	NA	no	no	yes	no	no	8	10	1	44.44
Baker et al., 2008	yes	no	yes	no	no	no	yes	no	no	yes	no	no	yes	NA	no	yes	no	yes	no	7	11	1	38.89
Dallat et al., 2013	yes	yes	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes	NA	no	yes	yes	yes	yes	14	4	1	77.78
Gao et al., 2018	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	18	1	0	94.74
Gao et al., 2019	no	no	yes	no	yes	no	no	no	no	yes	no	no	yes	yes	yes	no	yes	yes	NA	8	10	1	44.44
Goetzel et al., 2014	yes	yes	yes	no	yes	no	yes	no	no	yes	no	no	yes	NA	no	yes	yes	yes	yes	11	7	1	61.11
Henke et al., 2011	yes	yes	yes	no	yes	no	no	no	no	yes	no	yes	yes	no	no	yes	no	no	no	8	11	0	42.11
Hunter et al, 2018	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	yes	yes	NA	no	no	yes	yes	yes	15	3	1	83.33
McEachan et al., 2011	yes	yes	yes	no	yes	yes	no	yes	no	yes	yes	yes	no	NA	no	no	yes	yes	yes	12	6	1	66.67
Mills et al., 2007	yes	yes	yes	yes	yes	no	no	no	no	yes	no	yes	no	NA	no	yes	yes	no	yes	10	8	1	55.56
Proper et al., 2004	yes	yes	yes	yes	yes	no	no	no	no	yes	yes	yes	yes	no	yes	yes	no	no	yes	12	7	0	63.16
Rasu et al., 2010	yes	yes	yes	yes	yes	no	no	yes	no	yes	yes	yes	yes	NA	no	no	no	yes	no	11	7	1	61.11
Robroek et al., 2012	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	no	no	no	yes	yes	yes	15	4	0	78.95
van Dongen et al., 2013	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NA	yes	yes	yes	yes	yes	18	0	1	100.00
van Dongen et al., 2017	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NA	yes	yes	yes	yes	yes	17	1	1	94.44
van Wier et al., 2012	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	19	0	0	100.00
van Wier et al., 2013	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	no	yes	yes	17	2	0	89.47
White et al., 2018	yes	no	yes	no	yes	no	no	no	no	no	no	yes	no	no	no	no	no	yes	no	5	14	0	26.32
Total	17	13	18	12	17	9	8	8	7	16	12	15	14	3	7	11	12	14	12				67.92

Table S2.2: CHEC-list items by Evers, Goossens, de Vet, van Tulder, & Ament (2005)

	CHEC-list	YES	NO
1.	Is the study population clearly described?		
2.	Are competing alternatives clearly described?		
3.	Is a well-defined research question posed in answerable form?		
4.	Is the economic study design appropriate to the stated objective?		
5.	Is the chosen time horizon appropriate in order to include relevant costs and consequences?		
6.	Is the actual perspective chosen appropriate?		
7.	Are all important and relevant costs for each alternative identified?		
8.	Are all costs measured appropriately in physical units?		
9.	Are costs valued appropriately?		
10.	Are all important and relevant outcomes for each alternative identified?		
11.	Are all outcomes measured appropriately?		
12.	Are outcomes valued appropriately?		
13.	Is an incremental analysis of costs and outcomes of alternatives performed?		
14.	Are all future costs and outcomes discounted appropriately?		
15.	Are all important variables, whose values are uncertain, appropriately subjected to sensitivity analysis?		
16.	Do the conclusions follow from the data reported?		
17.	Does the study discuss the generalizability of the results to other settings and patient/client groups?		
18.	Does the article indicate that there is no potential conflict of interest of study researcher(s) and funder(s)?		
19.	Are ethical and distributional issues discussed appropriately?		

Table S3: Available average total, intervention, direct and indirect costs in 2017 Euros.

Study	Total costs IG	Total costs CG	Delta total costs	Direct costs IG	Direct costs CG	Delta direct costs	Intervention costs IG	Intervention costs CG	Delta intervention costs	Indirect costs IG	Indirect costs CG	Delta indirect costs
Allen et. Al., 2012	128.35	0.00	128.35				128.35	0.00	128.35			
Baker et al., 2008			-46.03	4207.03 ^a	4396.85 ^a	-189.82 ^a	274.57	0.00	274.57			-130.78 ^b
Dallat et al., 2013	192.66	159.79	32.87				192.66	159.79	32.87			
Gao et al., 2018	268.25	0.00	268.25				268.25	0.00	268.25			
Gao et al., 2019	3762.31 ^c	3599.02 ^c	163.29 ^c									
Goetzel et al., 2014			-73.77	3705.91 ^a	3747.67 ^a	-41.76 ^a	71.69	0.00	71.69			-103.69 ^d
Henke et al., 2011			-373.03			-500.62 ^a	127.59	0.00	127.59			
Hunter et al, 2018			-413.88	220.36 ^a	287.07 ^a	-66.71 ^a	64.53	0.00	64.53			-411.70 ^d
McEachan et al., 2011			31.44			6.55 ^e	75.98	0.00	75.98			-51.09 ^f
Mills et al., 2007			-1089.95				101.19	0.00	101.19			-1191.14 ^d
Proper et al., 2004	2786.82	2424.36	362.47				511.02	0.00	511.02	2275.80	2424.36	-148.55 ^f
Rasu et al., 2010	43.13	0.00	43.13				43.13	0.00	43.13			

Robroek et al., 2012	10433.72	12051.44	-1617.72	388.47 ^a	434.69 ^a	-46.22 ^a	466.61	453.40	13.21	9578.64 ^d	11163.35 ^d	-1584.71 ^d
van Dongen et al., 2013	17297.56	16679.06	618.50	1520.92 ^g	1419.89 ^g	101.03 ^g	162.23	0.00	162.23	15614.41 ^d	15259.17 ^d	355.24 ^d
van Dongen et al., 2017	26073.61	24007.53	2066.08	948.38 ^g	2132.53 ^g	-1184.14 ^g	458.65	0.00	458.65	24666.57	21875.00	2791.57
van Wier et al., 2012	2963.89	2947.26	16.64	973.31 ^a	779.60 ^a	193.71 ^a	210.35	0.00	210.35	1780.24 ^f	2167.66 ^f	-387.42 ^f
van Wier et al., 2013	28133.97	28242.92	-108.95	1509.87 ^g	1486.76 ^g	23.11 ^g	239.91	0.00	239.91	26384.19 ^d	26756.16 ^d	-371.97 ^d
White et al., 2018												

Empty cells indicate that the data was not available. IG: intervention group, CG: control group

^a Direct costs include health care costs

^b Indirect costs include presenteeism only

^c Total costs include intervention costs and health care costs, but they were not reported separately

^d Indirect costs include absenteeism and presenteeism

^e Direct costs include out-of-pocket expenses for physical activity only

^f Indirect costs include absenteeism only

^g Direct costs include health care costs and out-of-pocket expenses for physical activity