## Additional File 1.

Individual and Organizational Interventions to Reduce Burnout in Resident Physicians: A Systematic Review and Meta-analysis

- **1. Supplementary Appendix 1.** Searching syntax from (A) PubMed, (B) Embase, (C) Cochrane Library, (D) Scopus, (E) Sciencedirect
- **2. Supplementary Appendix 2.1.** Subgroup meta-analysis of post-intervention standardized mean difference of EE score in individual intervention studies
- **3. Supplementary Appendix 2.2.** Subgroup meta-analysis of post-intervention standardized mean difference of DP score in individual intervention studies
- **4. Supplementary Appendix 2.3.** Subgroup meta-analysis of post-intervention standardized mean difference of PA score in individual intervention studies
- **5. Supplementary Appendix 2.4.** Subgroup meta-analysis of post-intervention standardized mean difference of EE score in organizational intervention studies
- **6. Supplementary Appendix 2.5.** Subgroup meta-analysis of post-intervention standardized mean difference of DP score in organizational intervention studies
- **7. Supplementary Appendix 2.6.** Subgroup meta-analysis of post-intervention standardized mean difference of PA score in organizational intervention studies
- **8. Supplementary Appendix 3.1.** Sensitivity analyses by leave-one-out method for standardized mean difference of EE score in individual intervention studies
- **9. Supplementary Appendix 3.2.** Sensitivity analyses by leave-one-out method for standardized mean difference of DP score in individual intervention studies
- **10. Supplementary Appendix 3.3.** Sensitivity analyses by leave-one-out method for standardized mean difference of PA score in individual intervention studies
- **11. Supplementary Appendix 3.4.** Sensitivity analyses by leave-one-out method for standardized mean difference of EE score in organizational intervention studies
- **12. Supplementary Appendix 3.5.** Sensitivity analyses by leave-one-out method for standardized mean difference of DP score in organizational intervention studies
- **13. Supplementary Appendix 3.6.** Sensitivity analyses by leave-one-out method for standardized mean difference of PA score in organizational intervention studies
- **14. Supplementary Appendix 4.1.** Funnel plot of standardized mean difference of EE score in individual intervention studies
- **15. Supplementary Appendix 4.2.** Funnel plot of standardized mean difference of DP score in individual intervention studies
- **16. Supplementary Appendix 4.3.** Funnel plot of standardized mean difference of PA score in individual intervention studies
- **17. Supplementary Appendix 4.4.** Funnel plot of standardized mean difference of EE score in organizational intervention studies
- **18. Supplementary Appendix 4.5.** Funnel plot of standardized mean difference of DP score in organizational intervention studies
- **19. Supplementary Appendix 4.6.** Funnel plot of standardized mean difference of PA score in organizational intervention studies
- **20. Supplementary Appendix 5.1.** Summary of the risk of bias assessment by Cochrane's RoB2 across 11 randomized controlled concurrent studies
- **21. Supplementary Appendix 5.2.** Summary of the risk of bias assessment by Cochrane's ROBINS-I across 20 non-randomized studies

## **Supplementary Appendix 1.** Searching syntax from (A) PubMed, (B) Embase, (C) Cochrane Library, (D) Scopus, (E) Sciencedirect

Database	Step	Search algorithm	Items found (August 26, 2024)
(A) Pubmed			
Population	#1	(residen* OR (residen* AND train*)) AND physician*	47603
Outcome	#2	burnout*	30030
	#3	psycho* AND burnout*	21659
	#4	#1 AND (#2 OR #3)	1385
	#5	mbi	5051
	#6	maslach burnout inventor*	3750
	#7	#5 OR #6	7368
	#8	#4 AND #7	312
(B) Embase			
Population	#1	(residen* OR (residen* AND train*)) AND physician*	65555
Outcome	#2	burnout*	39909
	#3	psycho* AND burnout*	20516
	#4	#1 AND (#2 OR #3)	2132
	#5	mbi*	31681
	#6	Maslach AND burnout AND inventor*	5416
	#7	#5 OR #6	39909
	#8	#4 AND #7	717
Type of studies	#9	#8 AND ('cohort analysis'/de OR 'comparative study'/de OR 'controlled study'/de OR 'human experiment'/de OR 'prospective study'/de OR 'randomized controlled trial'/de)	236
Intervention and control	#10	#9	
(C) Cochrane Library			
Population	#1	((residen* OR (residen* AND train*)) AND physician*)	2495
Outcome	#2	Burnout*	1862
	#3	Mbi*	1502
	#4	Maslach AND burnout AND inventor*	336
	#5	(#3 OR #4)	1694
	#6	(#1 AND #5) AND trials	32

Database	Step	Search algorithm Items for	
(D) Scopus	<b>-</b>		
	#1	(residen* OR (residen* AND train*)) AND physician*	48582
	#2	burnout*	56756
	#3	psycho*	26501
	#4	#2 OR #3	26501
	#5	mbi*	18967
	#6	Maslach burnout inventor*	5997
	#7	#5 OR #6	6036
	#8	#1 AND (#4 OR #7)	361
	#9	#8 AND "Limited to Article"	325
(E) Sciencedirect			,
	#1	resident	786408
	#2	burnout	55959
	#3	MBI	18117
	#4	Maslach burnout inventory	3929
	#5	#1 AND #2 AND (#3 OR #4)	1184
	#6	#5 AND research articles	700
	#7	#6 AND medicine and dentistry	589
	#8	#7 AND intervention	378

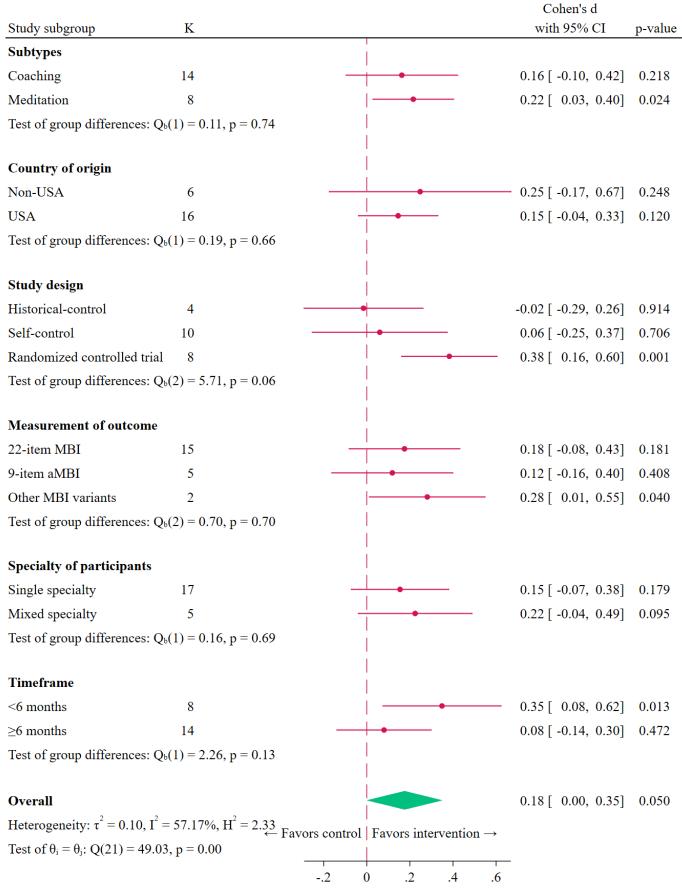
**Supplementary Appendix 2.1.** Subgroup meta-analysis of post-intervention standardized mean difference of EE score in individual intervention studies

			Cohen's d	
Study subgroup	K		with 95% CI	p-value
Subtypes		<u> </u>		
Coaching	16		-0.24 [ -0.40, -0.07]	0.005
Meditation	9	-	-0.30 [ -0.61, 0.02]	0.063
Test of group difference	ees: $Q_b(1) = 0.11$ , $p = 0.74$			
Country of origin		į		
Non-USA	6		-0.25 [ -0.55, 0.05]	0.098
USA	19	<b>—</b>	-0.26 [ -0.43, -0.08]	
	ees: $Q_b(1) = 0.00, p = 0.98$			
Study design				
Historical-control	5		-0.26 [ -0.59, 0.07]	0.126
Self-control	11		-0.16 [ -0.35, 0.03]	
Randomized controlled			-0.38 [ -0.68, -0.08]	
	es: $Q_b(2) = 1.45$ , $p = 0.48$		0.50 [ 0.00, 0.00]	0.011
Measurement of outc	ome	i		
22-item MBI	18	<del></del>	-0.34 [ -0.53, -0.16]	0.000
9-item aMBI	5		-0.08 [ -0.32, 0.17]	0.534
Other MBI variants	2	-	<b>-</b> -0.02 [ -0.49, 0.44]	0.924
Test of group difference	ees: $Q_b(2) = 3.70$ , $p = 0.16$			
Specialty of participa	nts	į		
Single specialty	19	<b>——</b>	-0.25 [ -0.41, -0.09]	0.002
Mixed specialty	6		-0.26 [ -0.63, 0.10]	0.161
Test of group difference	ees: $Q_b(1) = 0.00$ , $p = 0.96$			
Timeframe				
<6 months	9		-0.32 [ -0.61, -0.03]	0.030
≥6 months	16	<u> </u>	-0.23 [ -0.40, -0.05]	
	ees: $Q_b(1) = 0.29$ , $p = 0.59$	İ		
0 "			0.055	0.001
Overall 2 2 2 2	2 40 200 -2		-0.25 [ -0.40, -0.11]	0.001
Heterogeneity: $\tau^2 = 0.06$ , $I^2 = 49.29\%$ , $H^2 = 1.97$ Test of $\theta_i = \theta_j$ : $Q(24) = 47.33$ , $p = 0.00$		← Favors intervention   Favors c	ontrol →	
	· 1	-15 0		
		-13 0		

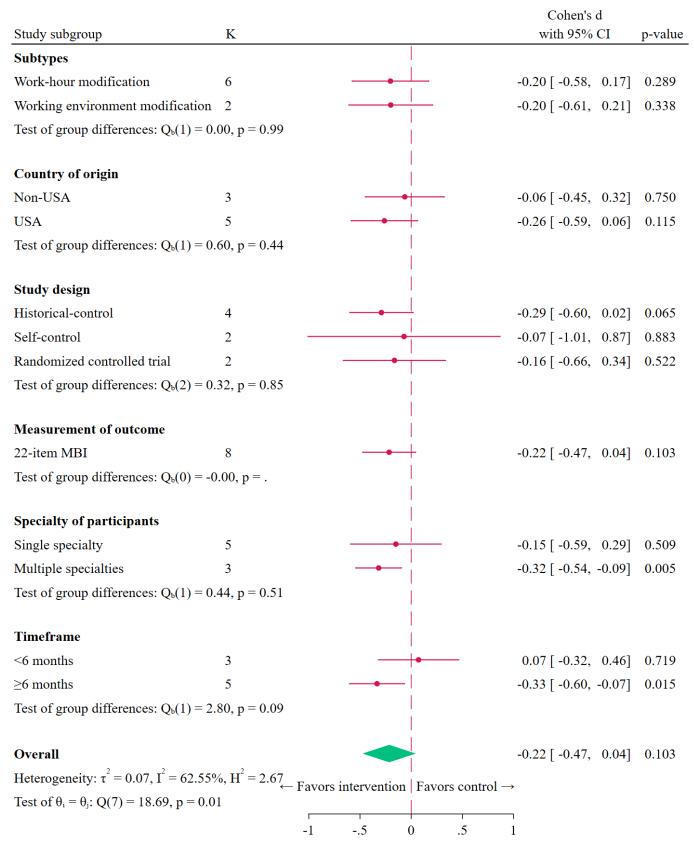
**Supplementary Appendix 2.2.** Subgroup meta-analysis of post-intervention standardized mean difference of DP score in individual intervention studies

		Cohen's d	
Study subgroup	K	with 95% CI	p-value
Subtypes			
Coaching	16	-0.20 [ -0.41, 0.01	] 0.058
Meditation	9	-0.10 [ -0.28, 0.07	] 0.251
Test of group difference	s: $Q_b(1) = 0.47$ , $p = 0.49$		
Country of origin			
Non-USA	6	-0.35 [ -0.70, 0.01	] 0.055
USA	19	-0.12 [ -0.28, 0.04	] 0.141
Test of group difference	s: $Q_b(1) = 1.28$ , $p = 0.26$		
Study design			
Historical-control	5	-0.40 [ -0.67, -0.14	] 0.003
Self-control	11	-0.10 [ -0.28, 0.08	] 0.290
Randomized controlled	trial 9	-0.12 [ -0.42, 0.19	] 0.449
Test of group difference	s: $Q_b(2) = 3.62$ , $p = 0.16$		
Measurement of outco	me		
22-item MBI	18	-0.22 [ -0.43, -0.02	] 0.028
9-item aMBI	5	-0.18 [ -0.42, 0.06	] 0.144
Other MBI variants	2	0.14 [ -0.13, 0.40	] 0.320
Test of group difference	s: $Q_b(2) = 4.80$ , $p = 0.09$		
Specialty of participan	ts		
Single specialty	19	-0.16 [ -0.34, 0.02	] 0.076
Mixed specialty	6	-0.21 [ -0.51, 0.08	] 0.149
Test of group difference	s: $Q_b(1) = 0.09$ , $p = 0.76$		
Timeframe			
<6 months	9	-0.12 [ -0.40, 0.15	] 0.381
≥6 months	16	-0.20 [ -0.38, -0.02	] 0.033
Test of group difference	s: $Q_b(1) = 0.18$ , $p = 0.67$		
Overall		-0.17 [ -0.32, -0.03	] 0.021
Heterogeneity: $\tau^2 = 0.07$	$I, I^2 = 49.97\%, H^2 = 2.00$	← Favors intervention   Favors control →	
Test of $\theta_i = \theta_j$ : Q(24) = 47.97, p = 0.00		← ravors intervention   ravors control →	
		-15 0 .5	

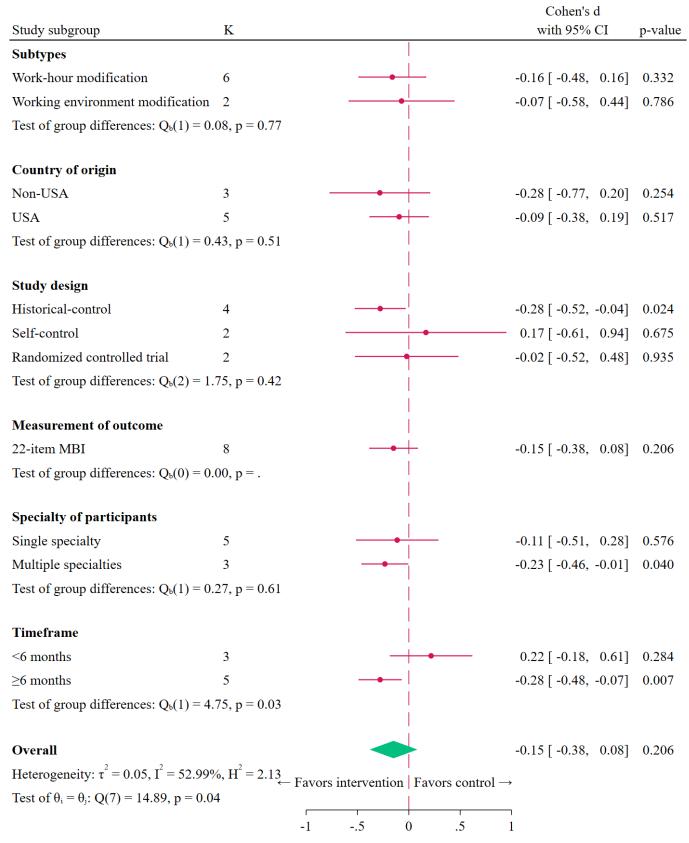
**Supplementary Appendix 2.3.** Subgroup meta-analysis of post-intervention standardized mean difference of PA score in individual intervention studies



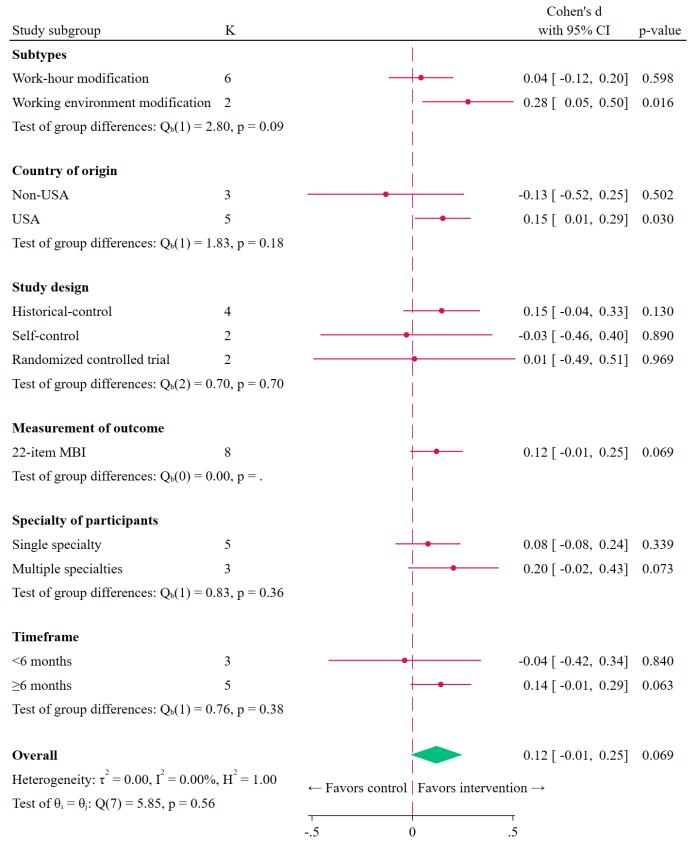
**Supplementary Appendix 2.4.** Subgroup meta-analysis of post-intervention standardized mean difference of EE score in organizational intervention studies



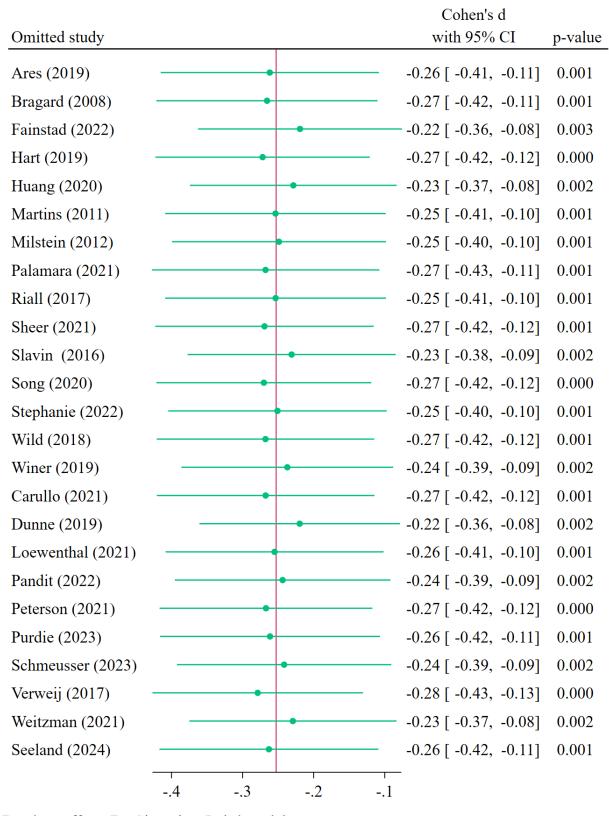
**Supplementary Appendix 2.5.** Subgroup meta-analysis of post-intervention standardized mean difference of DP score in organizational intervention studies



**Supplementary Appendix 2.6.** Subgroup meta-analysis of post-intervention standardized mean difference of PA score in organizational intervention studies



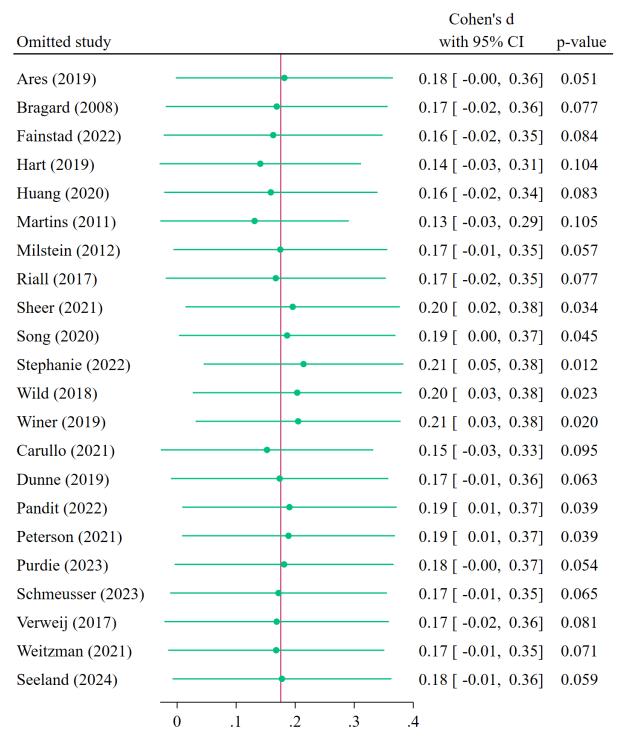
**Supplementary Appendix 3.1.** Sensitivity analyses by leave-one-out method for standardized mean difference of EE score in individual intervention studies



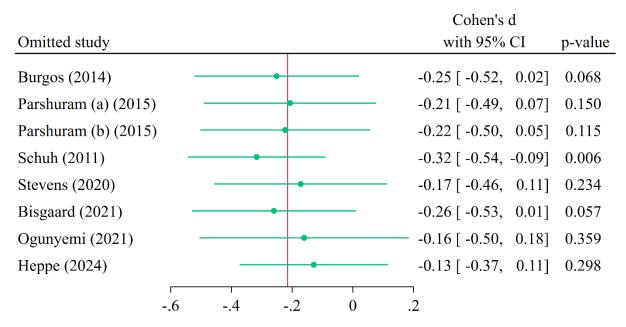
**Supplementary Appendix 3.2.** Sensitivity analyses by leave-one-out method for standardized mean difference of DP score in individual intervention studies

Omitted study	Cohen's d with 95% CI	p-value
Ares (2019)	-0.18 [ -0.33, -0.02]	0.025
Bragard (2008)	-0.19 [ -0.34, -0.04]	0.015
Fainstad (2022)	-0.17 [ -0.32, -0.02]	0.031
Hart (2019)	-0.19 [ -0.34, -0.04]	0.012
Huang (2020)	-0.15 [ -0.29, -0.00]	0.043
Martins (2011)	-0.15 [ -0.30, -0.00]	0.046
Milstein (2012)	-0.19 [ -0.33, -0.06]	0.006
Palamara (2021)	-0.19 [ -0.35, -0.03]	0.018
Riall (2017)	-0.19 [ -0.35, -0.04]	0.012
Sheer (2021)	-0.19 [ -0.34, -0.03]	0.019
Slavin (2016)	-0.15 [ -0.29, -0.01]	0.041
Song (2020)	-0.18 [ -0.33, -0.03]	0.021
Stephanie (2022)	-0.16 [ -0.31, -0.01]	0.036
Wild (2018)	-0.16 [ -0.32, -0.01]	0.035
Winer (2019)	-0.15 [ -0.30, -0.01]	0.039
Carullo (2021)	-0.17 [ -0.33, -0.02]	0.028
Dunne (2019)	-0.19 [ -0.34, -0.04]	0.016
Loewenthal (2021)	-0.18 [ -0.33, -0.02]	0.024
Pandit (2022)	-0.17 [ -0.32, -0.01]	0.032
Peterson (2021)	-0.19 [ -0.34, -0.04]	0.014
Purdie (2023)	-0.18 [ -0.33, -0.02]	0.023
Schmeusser (2023)	-0.16 [ -0.31, -0.01]	0.035
Verweij (2017)	-0.19 [ -0.35, -0.04]	0.015
Weitzman (2021)	-0.17 [ -0.32, -0.02]	0.031
Seeland (2024)	-0.18 [ -0.33, -0.02]	0.025
4	321 0	

**Supplementary Appendix 3.3.** Sensitivity analyses by leave-one-out method for standardized mean difference of PA score in individual intervention studies

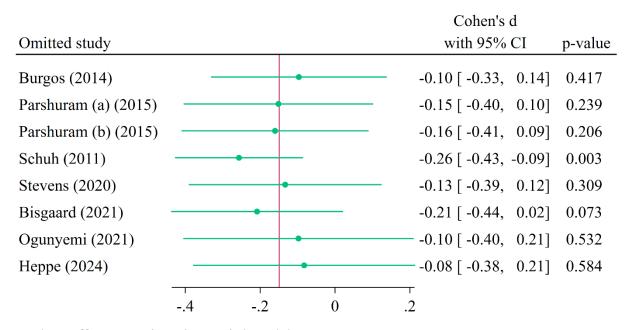


**Supplementary Appendix 3.4.** Sensitivity analyses by leave-one-out method for standardized mean difference of EE score in organizational intervention studies

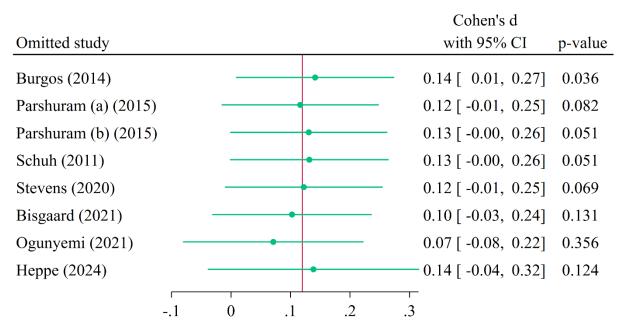


Random-effects DerSimonian-Laird model

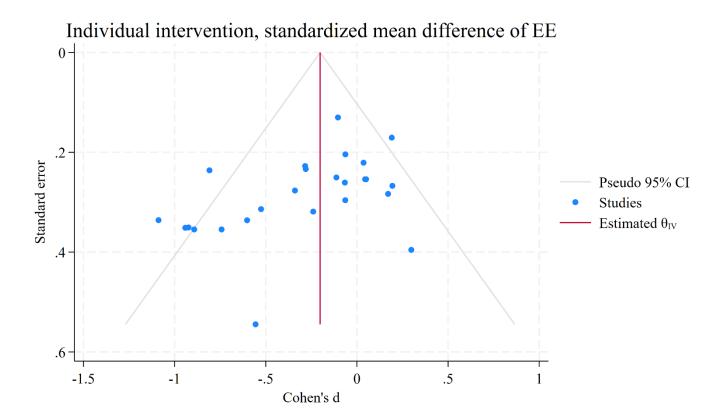
**Supplementary Appendix 3.5.** Sensitivity analyses by leave-one-out method for standardized mean difference of DP score in organizational intervention studies



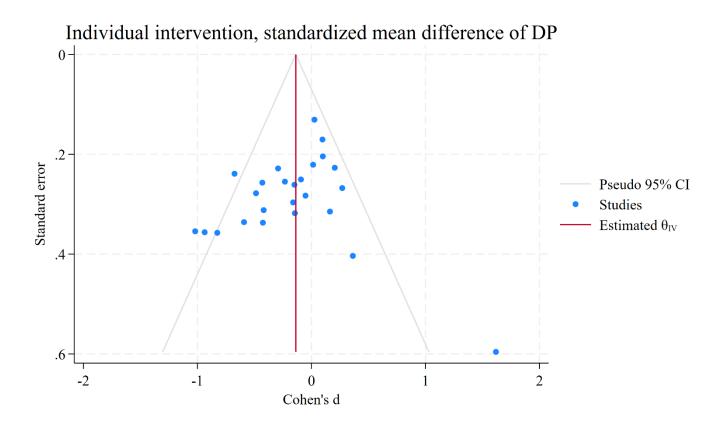
**Supplementary Appendix 3.6.** Sensitivity analyses by leave-one-out method for standardized mean difference of PA score in organizational intervention studies



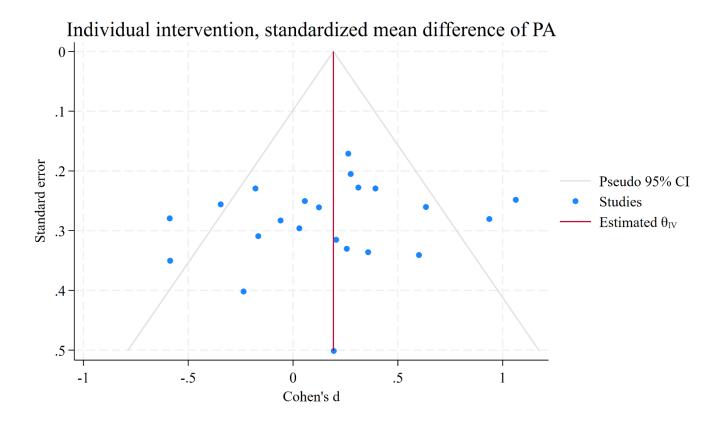
**Supplementary Appendix 4.1.** Funnel plot of standardized mean difference of EE score in individual intervention studies



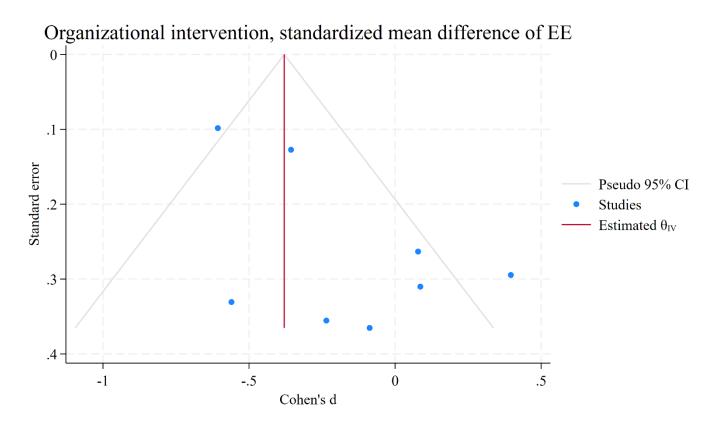
**Supplementary Appendix 4.2.** Funnel plot of standardized mean difference of DP score in individual intervention studies



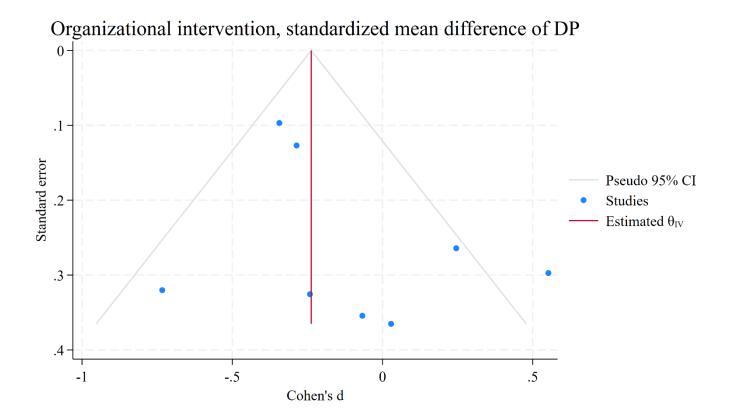
**Supplementary Appendix 4.3.** Funnel plot of standardized mean difference of PA score in individual intervention studies



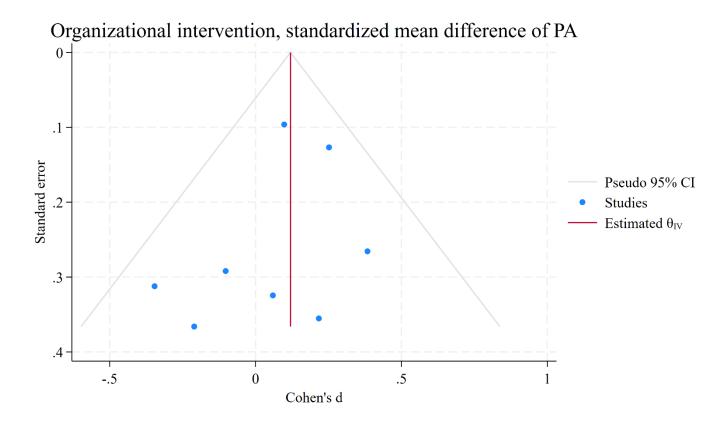
**Supplementary Appendix 4.4.** Funnel plot of standardized mean difference of EE score in organizational intervention studies



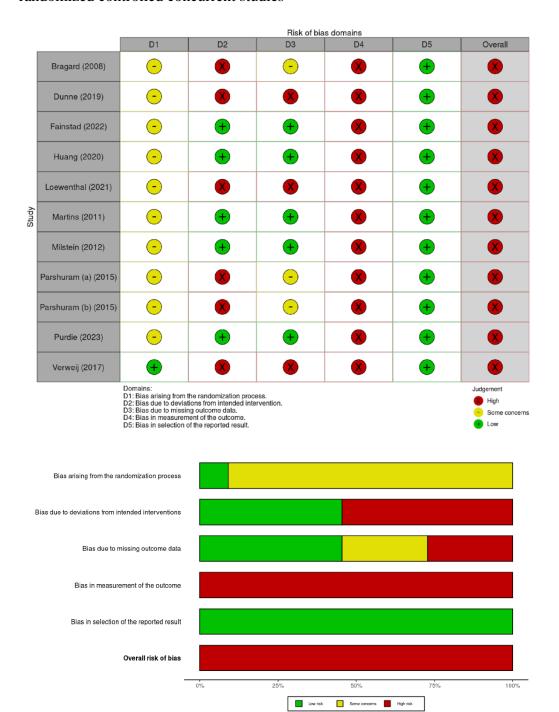
**Supplementary Appendix 4.5.** Funnel plot of standardized mean difference of DP score in organizational intervention studies



**Supplementary Appendix 4.6.** Funnel plot of standardized mean difference of PA score in organizational intervention studies



## **Supplementary Appendix 5.1.** Summary of the risk of bias assessment by Cochrane's RoB2 across 11 randomized controlled concurrent studies



**Supplementary Appendix 5.2.** Summary of the risk of bias assessment by Cochrane's ROBINS-I across 22 non-randomized studies



