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Mechanisms of physical activity behavior change in an incentive-based intervention: mediation analysis

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Additional file 2: Example Stata program for single mediator model results, correlation matrices and diagrammatic representations of single mediator model results.

Example Stata program for single mediator model results

```
program indireff, rclass
    sem (m6habit <- group habit meanstep strata season2) (m6msteps <- m6habit group habit
    meanstep strata season2), vce(cluster cluster)
    estat teffects
    mat bi=r(indirect)
    mat bd=r(direct)
    mat bt=r(total)
    return scalar indirect=el(bi, 1, 7)
    return scalar direct=el(bd, 1, 7)
    return scalar total=el(bt, 1, 7)
end

sem (m6habit <- group habit meanstep strata season2) (m6msteps <- m6habit group habit meanstep
strata season2), vce(cluster cluster)
estat teffects
matrix list r(indirect)
matrix list r(direct)
matrix list r(total)
estat teffects, stand
estat gof, stats(all)

bootstrap r(indirect) r(direct) r(total), reps(10000) nodots: indireff
estat bootstrap, percentile bc
```

Variable names

m6habit: six-month habit; **group**: group assignment (1=intervention, 0=control); **habit**: baseline habit; **meanstep**: baseline pedometer steps/day; **strata**: randomisation stratum (Large >50, Medium 20-50, Small <20 or Schools/Colleges); **season2**: season (1=December 2015-April 2016, 2=July-August 2016); **m6msteps**: six-month pedometer steps/day; **cluster**: cluster.

Commands

program indireff: write program named indireff;
rclass: program being defined returns results in r();
sem: fit structural equation model;
vce(cluster cluster): specified that the standard errors should allow for intragroup correlation (i.e. within clusters) and relax the usual assumption that the observations should be independent;
estat teffects: report direct, indirect and total effects for each path;
mat bi: define matrix named bi;
return scalar indirect=el(bi, 1, 7): lookup the value of the element in the first row and seventh column of the matrix "bi" and store the result in the scalar return(indirect);

matrix list: list matrix;

estat teffects, stand: report standardised coefficients for teffects;

estat gof, stats(all): report all goodness of fit statistics (NB. with SEM models adjusting *SEs* for clustering, *CD* and *SRMR* are reported only);

bootstrap: perform bootstrap estimation;

nodots: suppress display of replication dots;

reps(10000): perform 10,000 bootstrap replications;

estat bootstrap, percentile bc: report percentile and bias-corrected bootstrap *CIs*.

Correlation matrix for baseline mediators and pedometer steps/day

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Physical activity self-efficacy	Intentions	Outcome Expectations	Financial motivation	Planning	Social norms	Identified regulation	Integrated regulation	Intrinsic motivation	Habit	Workplace norms	Recovery self-efficacy	Maintenance self-efficacy	Outcome satisfaction	Pedometer steps/day
(1)	1.00														
(2)	0.35**	1.00													
(3)	0.25**	0.25**	1.00												
(4)	0.01	-0.00	-0.08*	1.00											
(5)	0.28**	0.21**	0.27**	0.01	1.00										
(6)	0.17**	0.15**	0.12**	0.07*	0.21**	1.00									
(7)	0.46**	0.29**	0.42**	-0.02	0.31**	0.18**	1.00								
(8)	0.50**	0.29**	0.38**	0.01	0.40**	0.21**	0.81**	1.00							
(9)	0.51**	0.29**	0.39**	0.01	0.34**	0.18**	0.81**	0.84**	1.00						
(10)	0.56**	0.42**	0.20**	-0.004	0.30**	0.18**	0.44**	0.52**	0.49**	1.00					
(11)	0.07	0.12**	0.07	-0.03	0.06	0.17**	0.09*	0.08*	0.09*	0.13**	1.00				
(12)	0.12**	0.06	0.07	0.03	0.04	0.03	0.11**	0.05	0.06	-0.003	-0.01	1.00			
(13)	0.31**	0.13**	0.14**	-0.01	0.10**	0.05	0.21**	0.16**	0.20**	0.16**	0.06	0.38**	1.00		
(14)	0.29**	0.22**	0.39**	0.02	0.39**	0.14**	0.34**	0.37**	0.37**	0.23**	0.07*	-0.01	0.17**	1.00	
(15)	0.28**	0.14*	0.05	-0.01	0.11**	0.13**	0.24**	0.29**	0.25**	0.32**	0.03	0.03	0.06	0.13**	1.00

**p<0.01, *p<0.05

Correlation matrix for four-week mediators

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Physical activity self-efficacy	Intentions	Outcome Expectations	Financial motivation	Planning	Social norms	Identified regulation	Integrated regulation	Intrinsic motivation
(1)	1.00								
(2)	0.42**	1.00							
(3)	0.25**	0.38**	1.00						
(4)	-0.01	-0.05	0.02	1.00					
(5)	0.43**	0.30**	0.31**	0.14**	1.00				
(6)	0.17**	0.19**	0.21**	0.06	0.22**	1.00			
(7)	0.44**	0.34**	0.43**	-0.01	0.42**	0.23**	1.00		
(8)	0.48**	0.33**	0.40**	0.07	0.48**	0.23**	0.81**	1.00	
(9)	0.46**	0.32**	0.42**	0.04	0.44**	0.17**	0.80**	0.83**	1.00

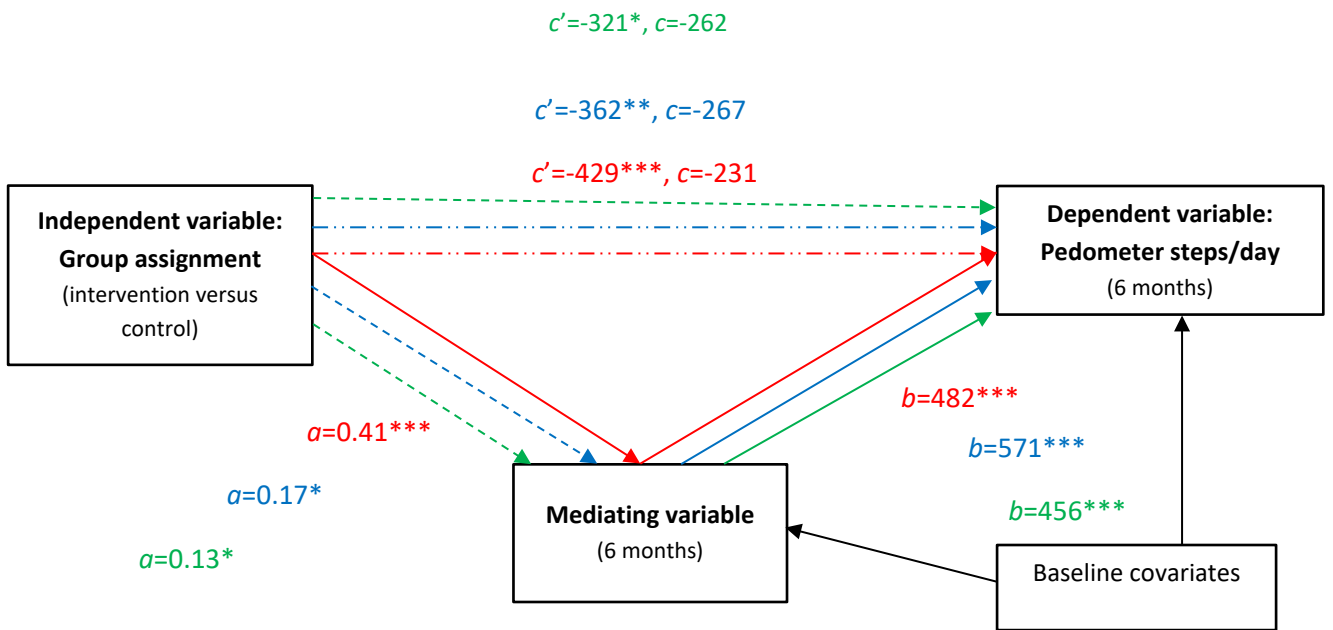
**p<0.01, *p<0.05

Correlation matrix for six-month mediators and pedometer steps/day

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Planning	Social norms	Identified regulation	Integrated regulation	Intrinsic motivation	Habit	Workplace norms	Recovery self-efficacy	Maintenance self-efficacy	Outcome satisfaction	Pedometer steps/day
(1)	1.00										
(2)	0.22**	1.00									
(3)	0.39**	0.21**	1.00								
(4)	0.46**	0.25**	0.82**	1.00							
(5)	0.39**	0.20**	0.82**	0.82**	1.00						
(6)	0.33**	0.23**	0.47**	0.52**	0.49**	1.00					
(7)	0.02	0.02	0.08	0.03	0.09	0.10*	1.00				
(8)	0.11*	0.05	0.22**	0.18**	0.16**	0.03	0.004	1.00			
(9)	0.20**	0.16**	0.29**	0.29**	0.28**	0.31**	0.07	0.32**	1.00		
(10)	0.38**	0.16**	0.43**	0.39**	0.39**	0.29**	0.04	0.12**	0.21**	1.00	
(11)	0.22**	0.18**	0.34**	0.33**	0.31**	0.38**	-0.08	0.04	0.25**	0.12*	1.00

**p<0.01, *p<0.05

Figure 2.1. Summary diagram showing the results of single mediator models with significant indirect effects and six-month pedometer steps/day as the outcome

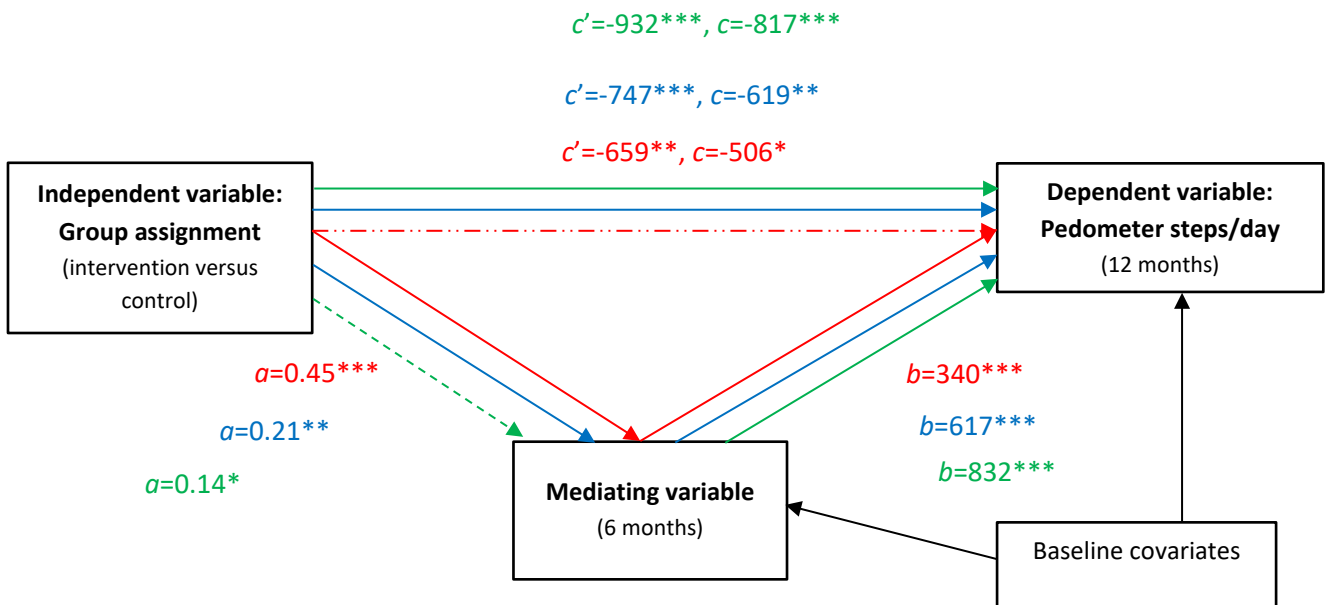


Habit: Indirect effect = 199 (95% CI: 84, 370) steps/day, -86% of total effect

Integrated regulation: Indirect effect = 95 (95% CI: 19, 204) steps/day, -35% of total effect

Intrinsic motivation: Indirect effect = 59 (95% CI: 3, 155) steps/day, -23% of total effect

Figure 2.2. Summary diagram showing the results of single mediator models with significant indirect effects and 12-month pedometer steps/day as the outcome



Habit: Indirect effect = 153 (95% CI: 39, 333) steps/day, -30% of total effect

Integrated regulation: Indirect effect = 128 (95% CI: 27, 313) steps/day, -21% of total effect

Planning: Indirect effect = 115 (95% CI: 4, 286) steps/day, -14% of total effect

Figure 2.3. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through four-week physical activity self-efficacy

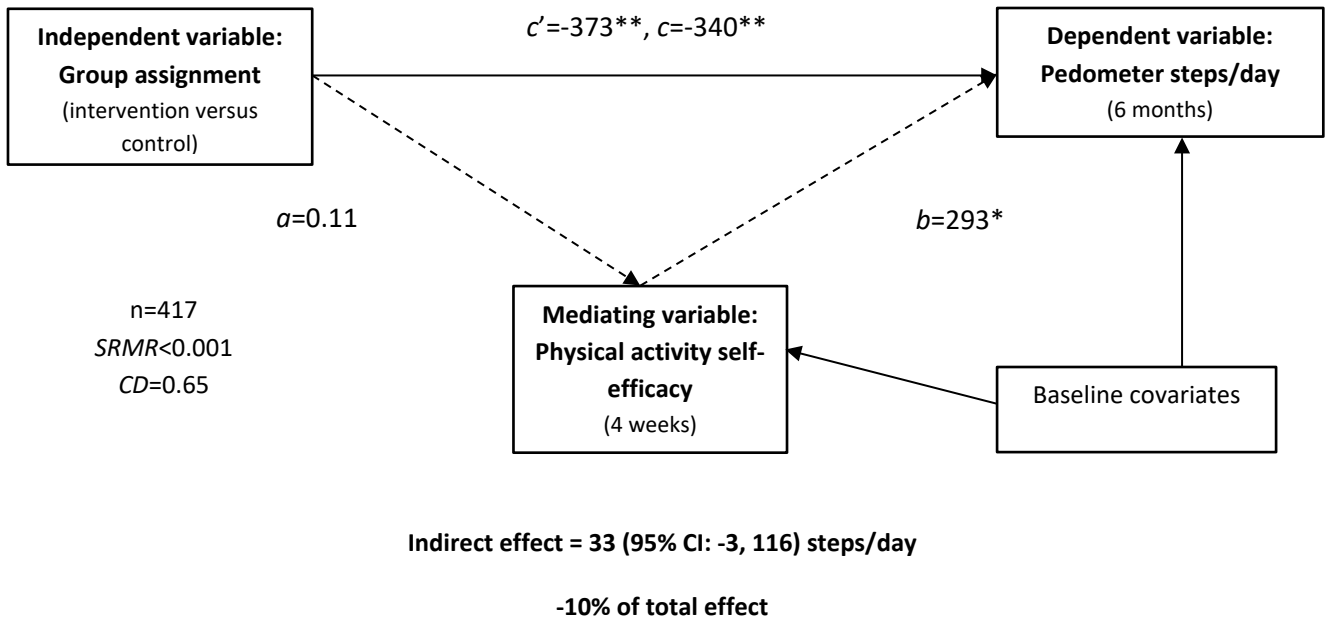


Figure 2.4. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through four-week intentions

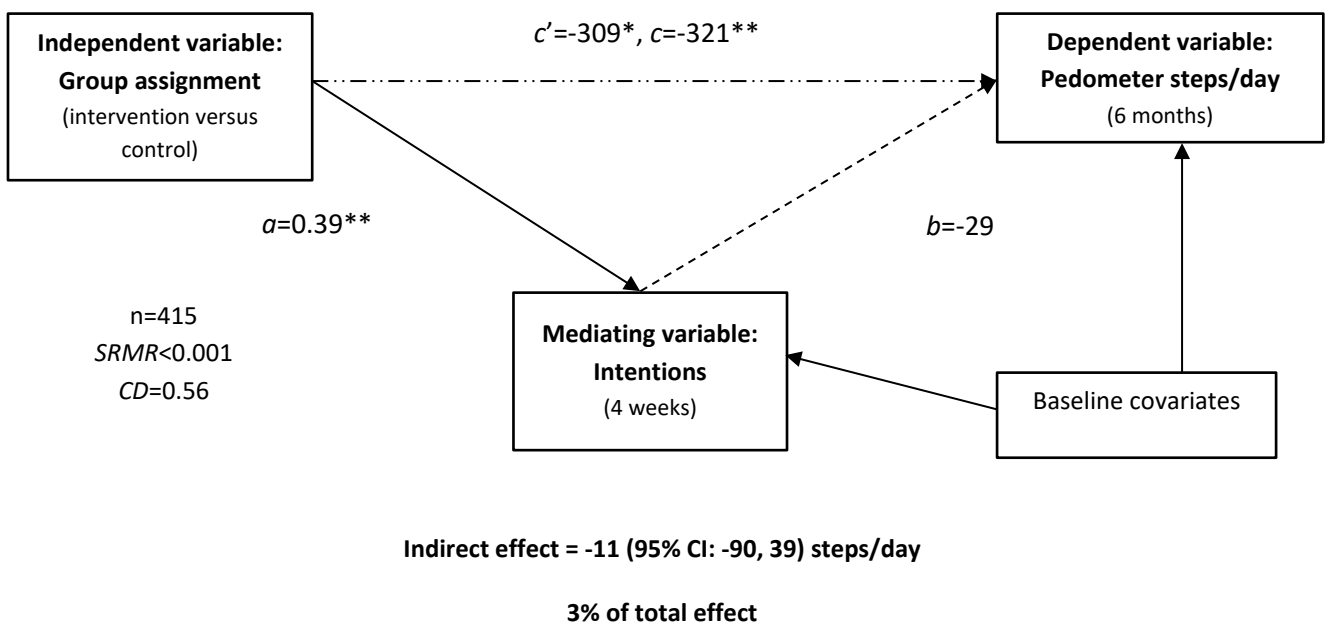


Figure 2.5. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through four-week outcome expectations

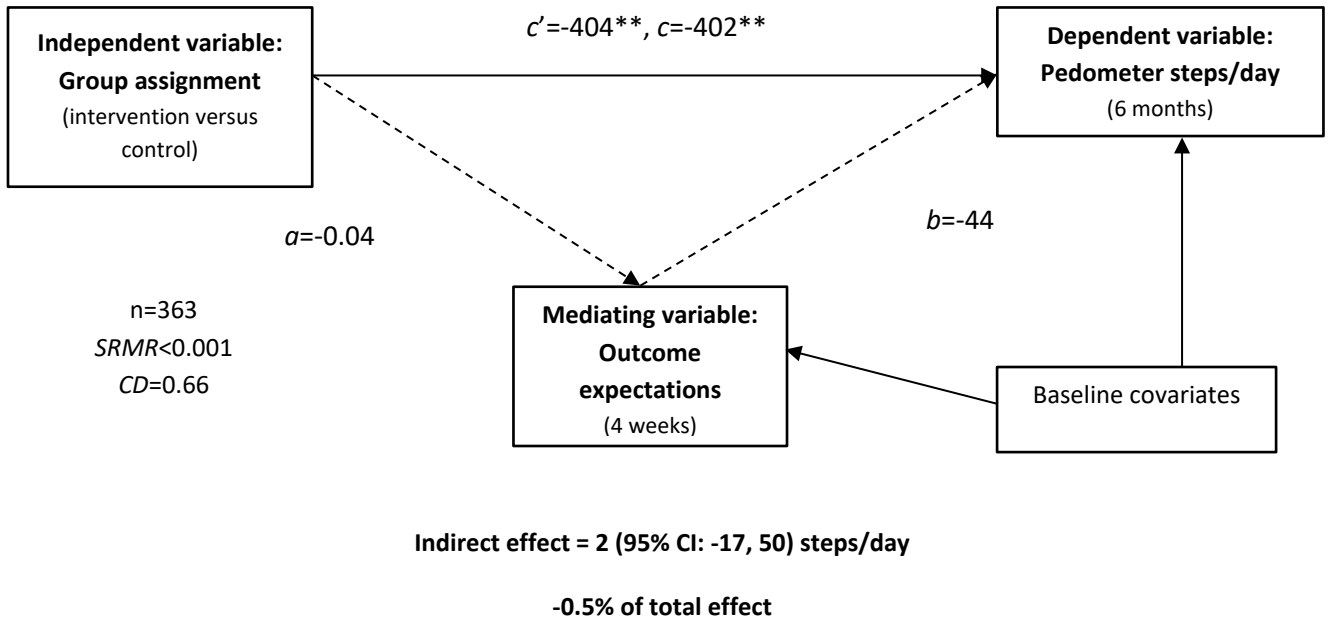


Figure 2.6. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through four-week financial motivation

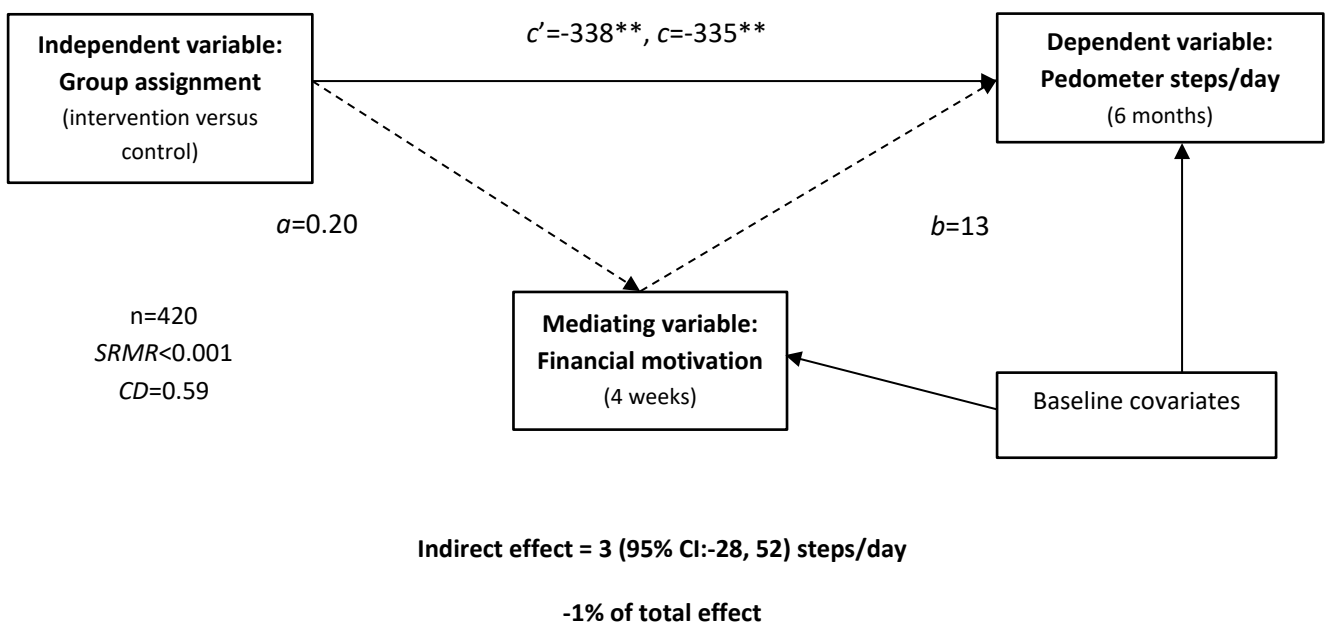


Figure 2.7. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through four-week planning

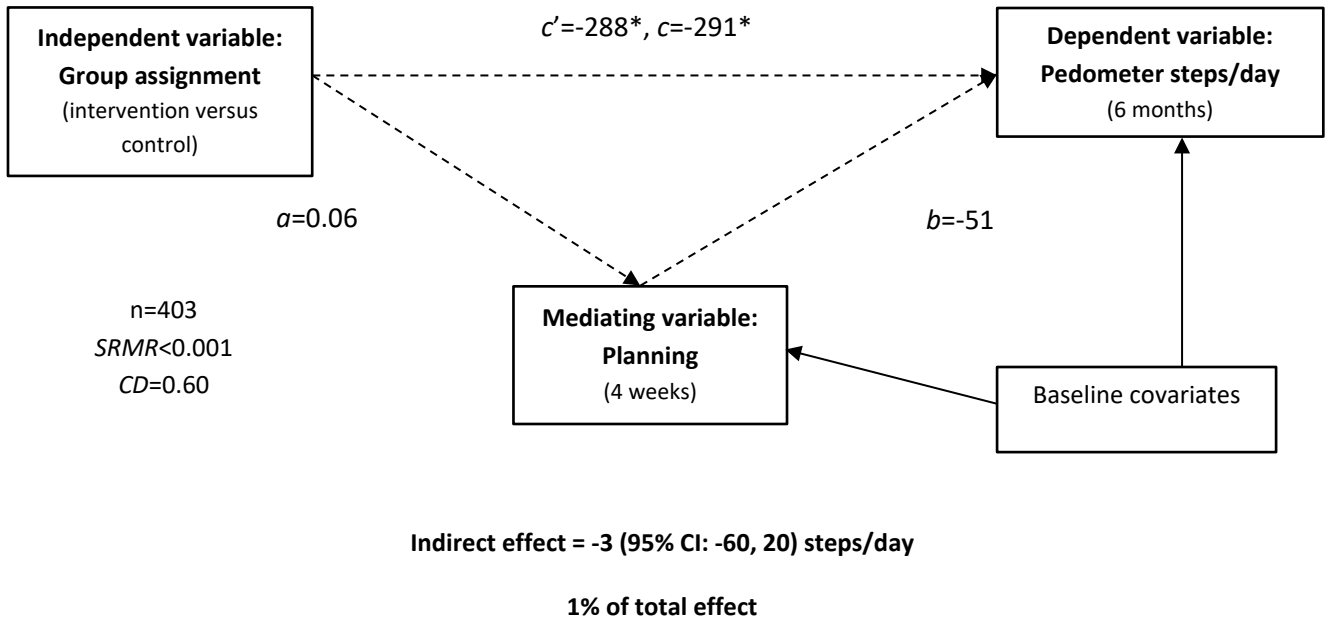


Figure 2.8. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through four-week social norms

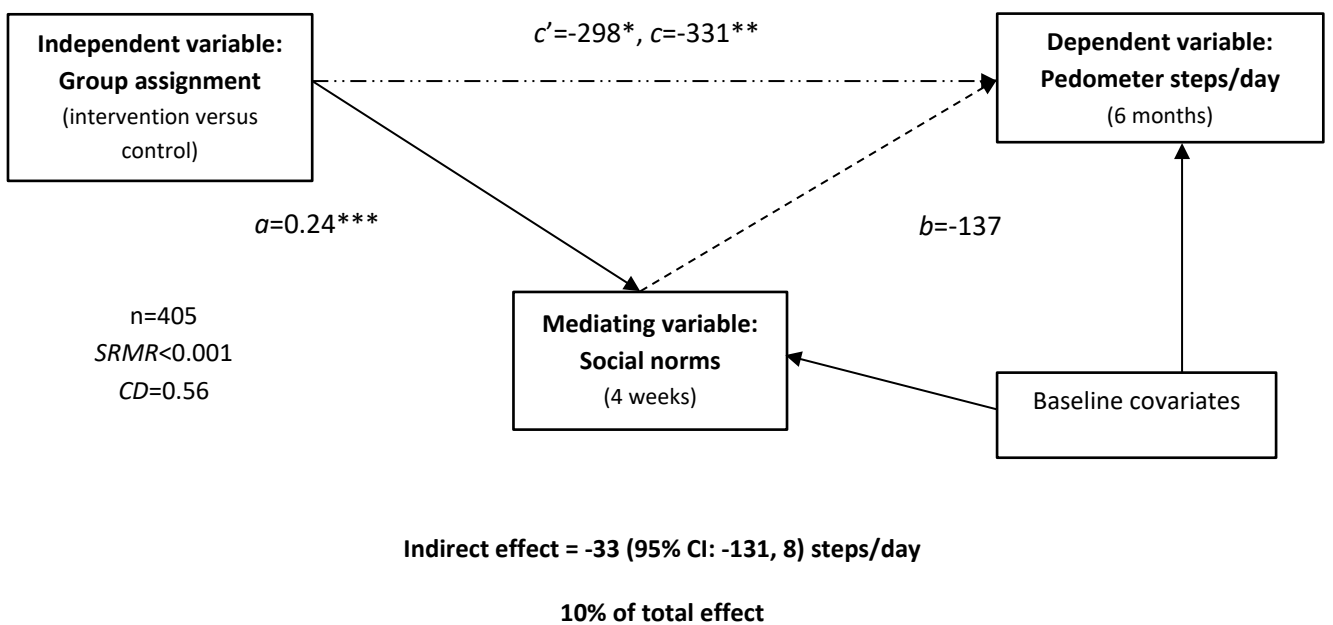


Figure 2.9. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through four-week identified regulation

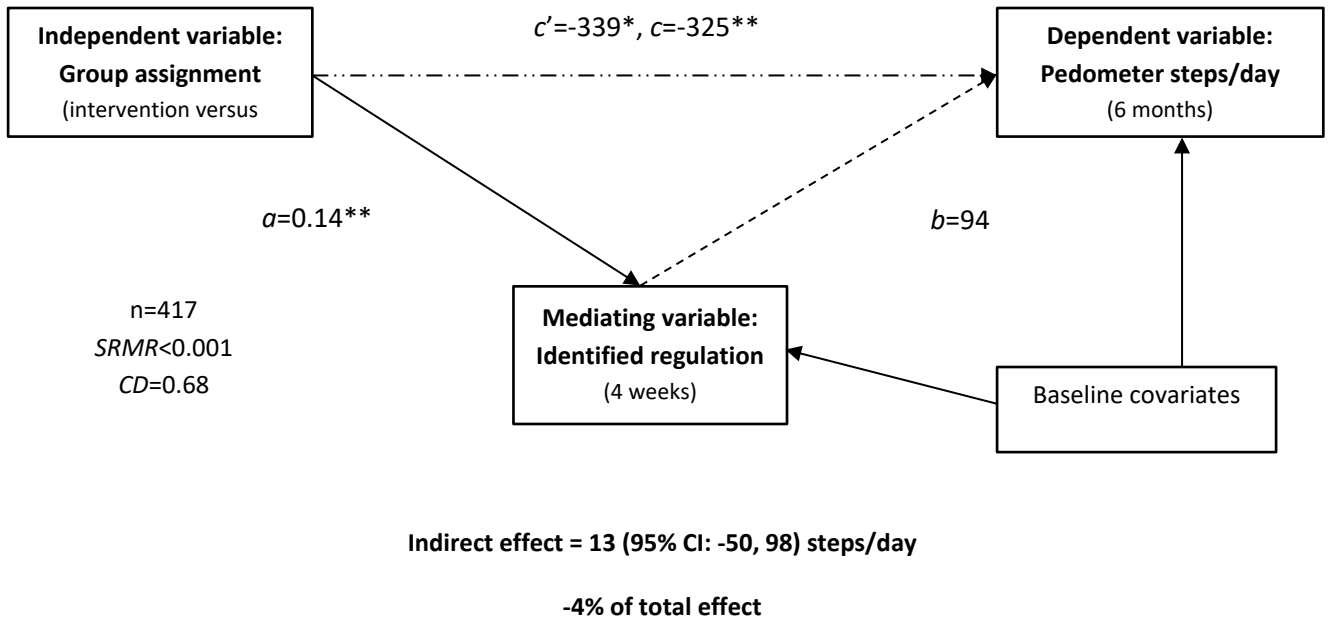


Figure 2.10. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through four-week integrated regulation

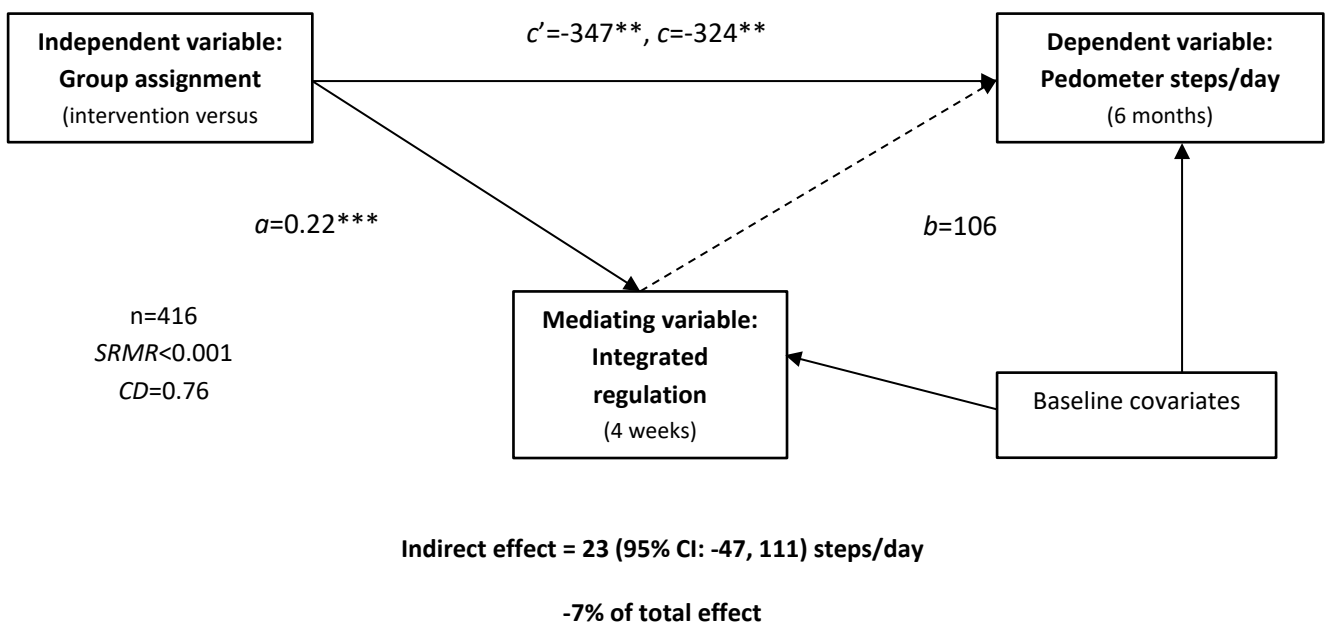


Figure 2.11. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through four-week intrinsic motivation

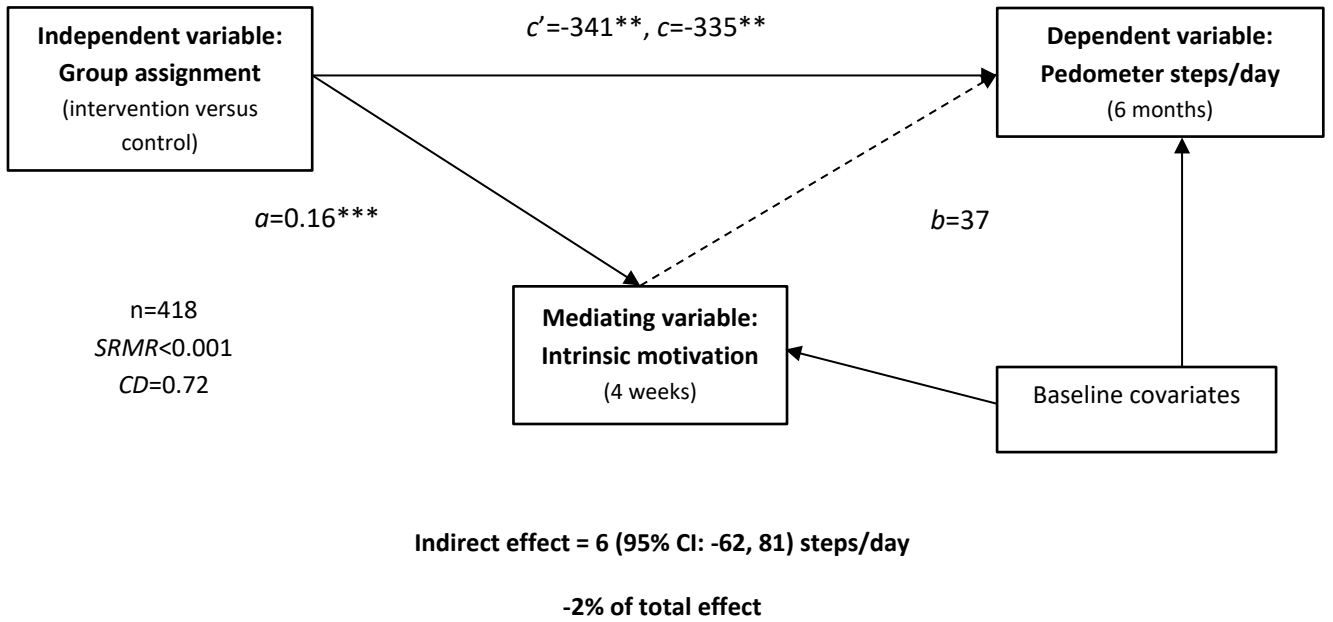


Figure 2.12. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through six-month planning

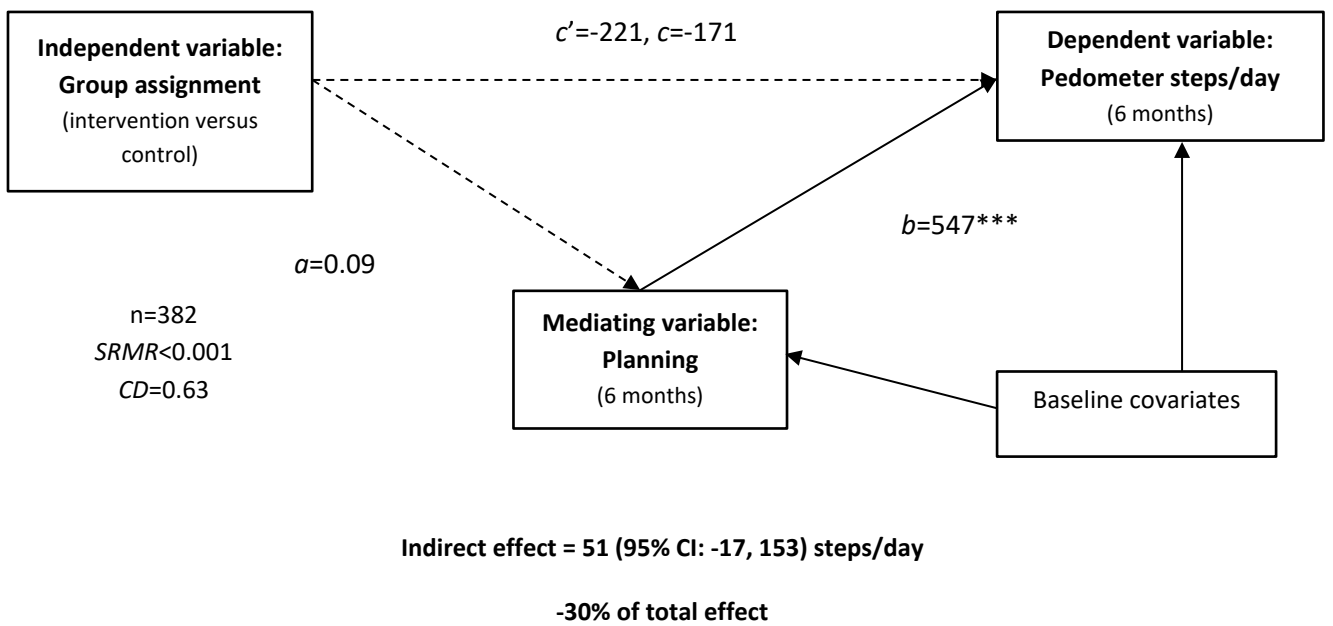


Figure 2.13. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through six-month social norms

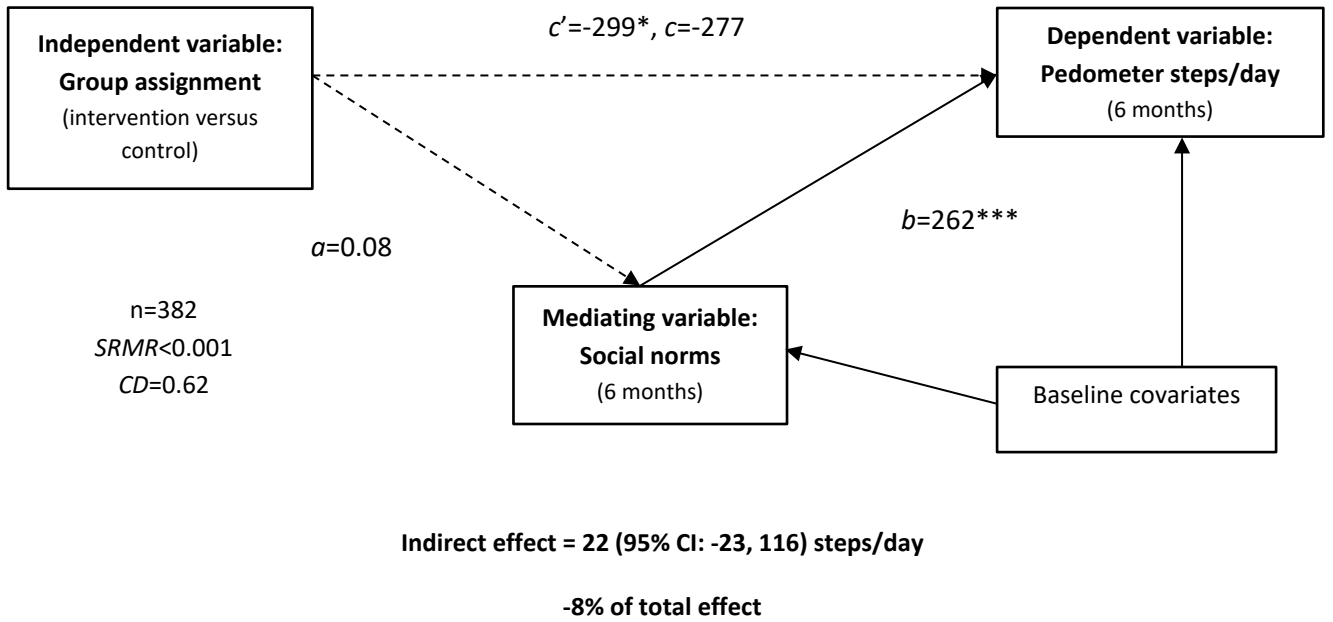


Figure 2.14. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through six-month identified regulation

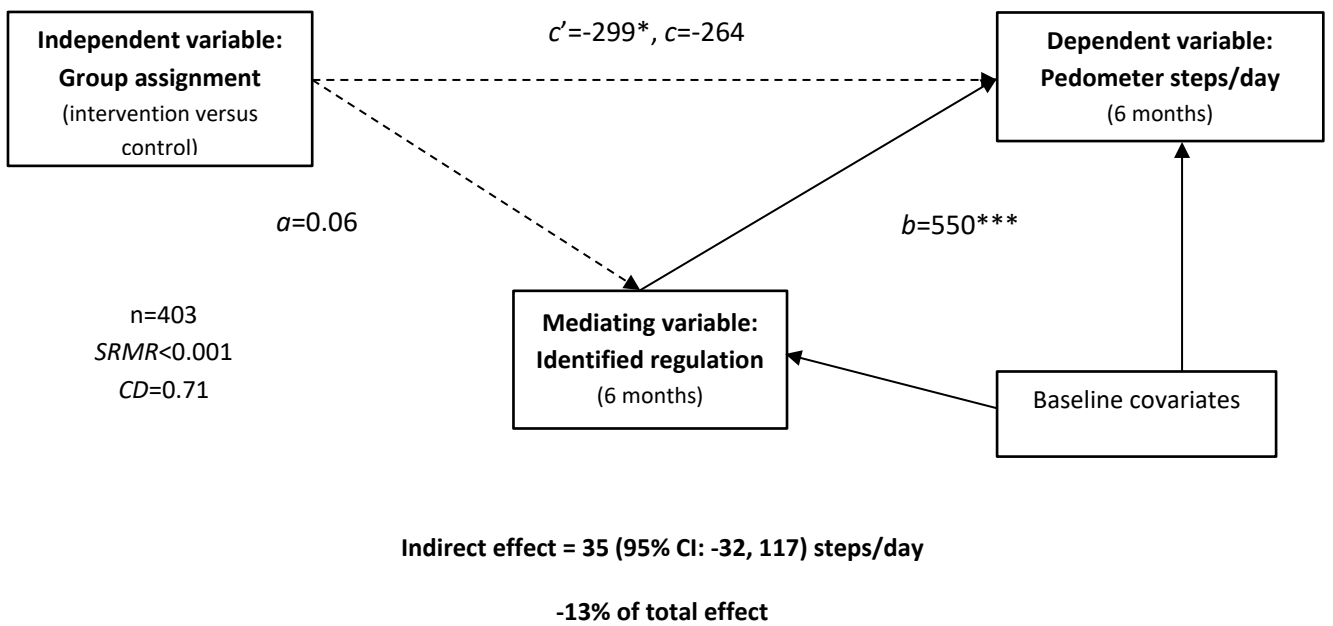


Figure 2.15. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through six-month integrated regulation

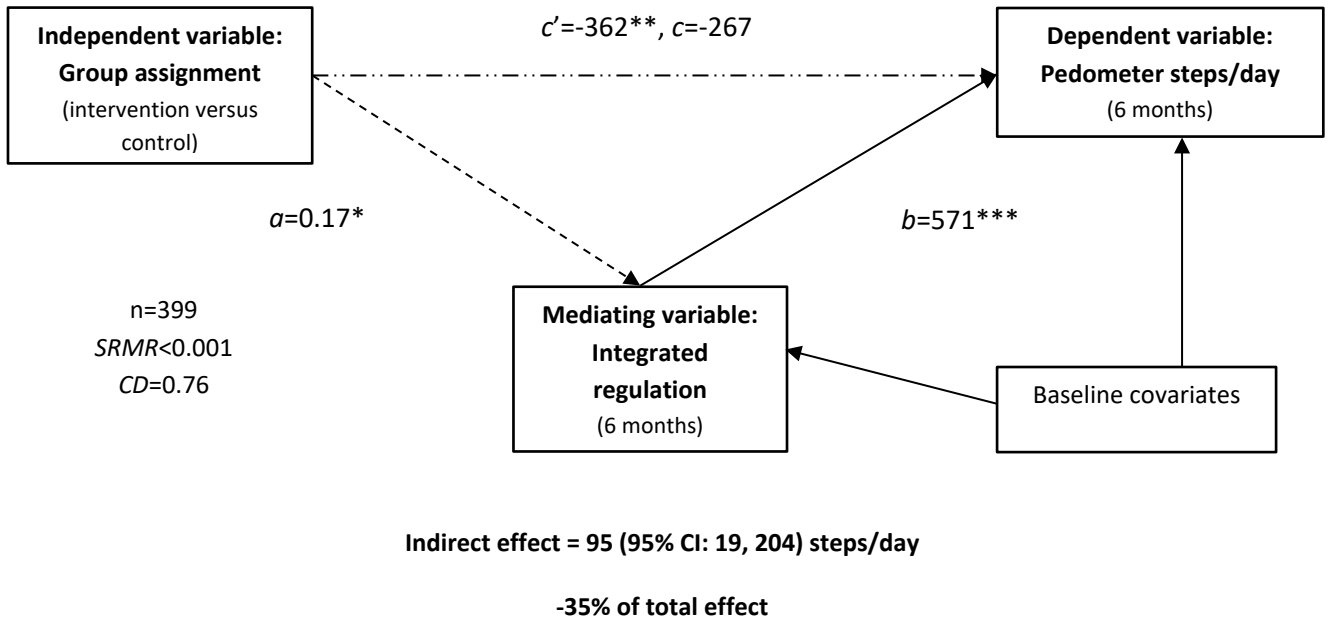


Figure 2.16. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through six-month intrinsic motivation

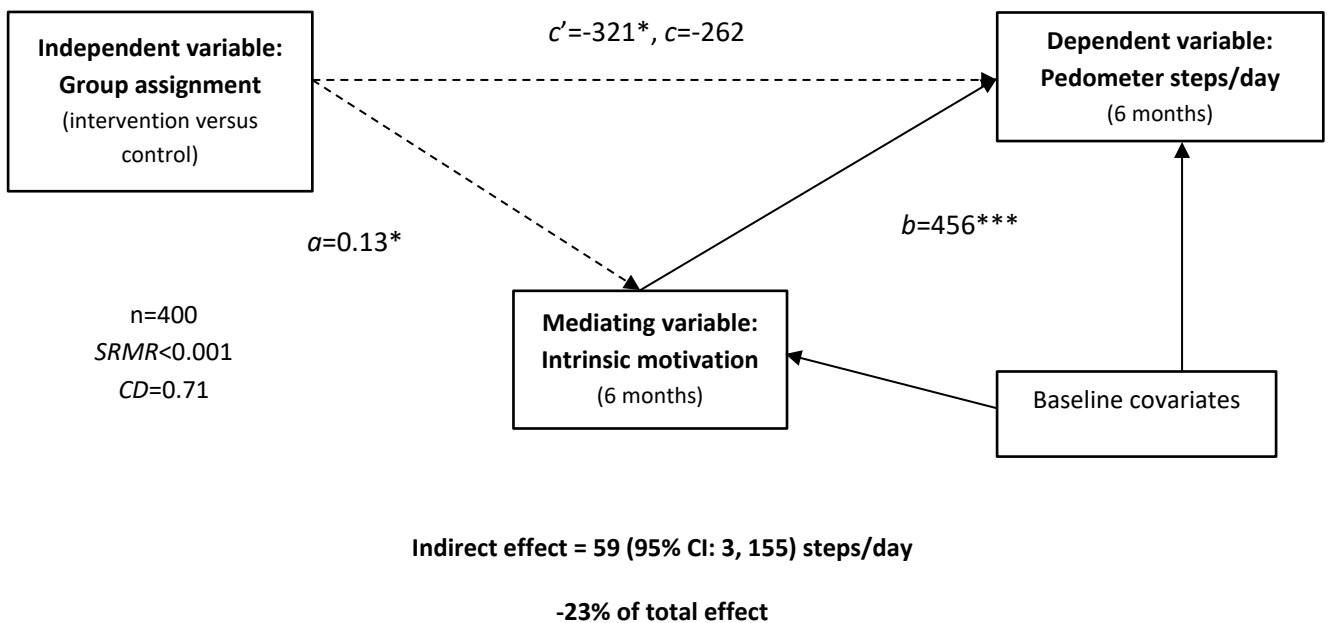


Figure 2.17. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through six-month habit

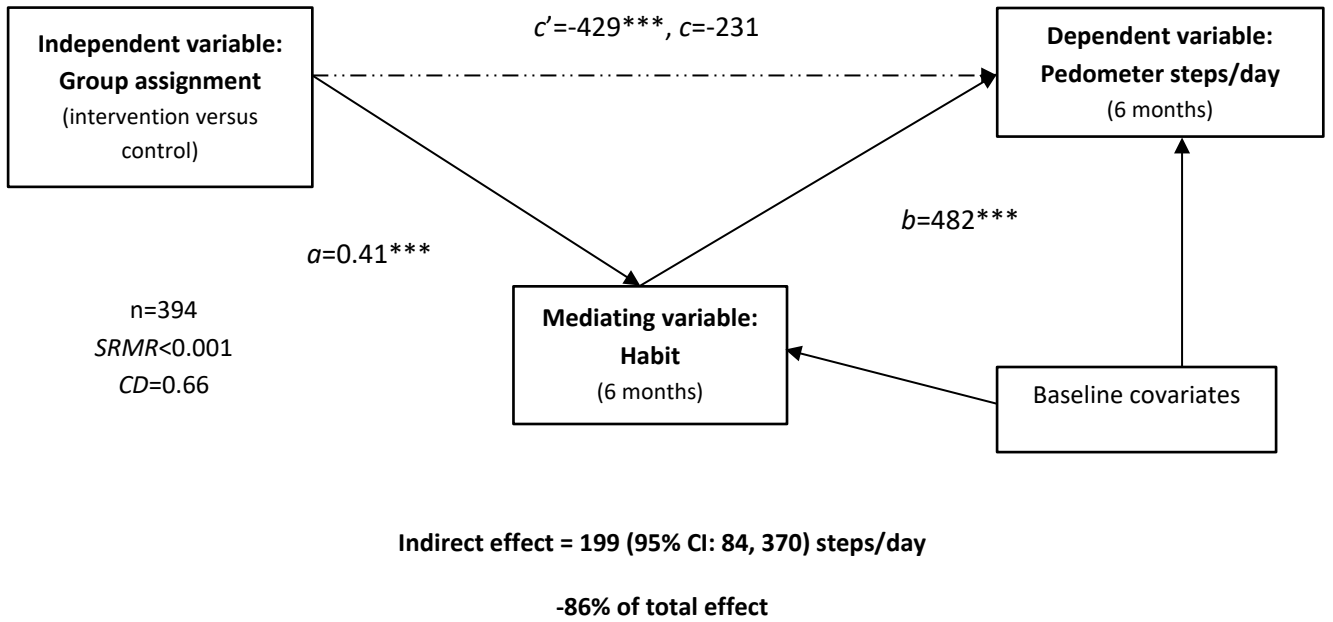


Figure 2.18. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through six-month workplace norms

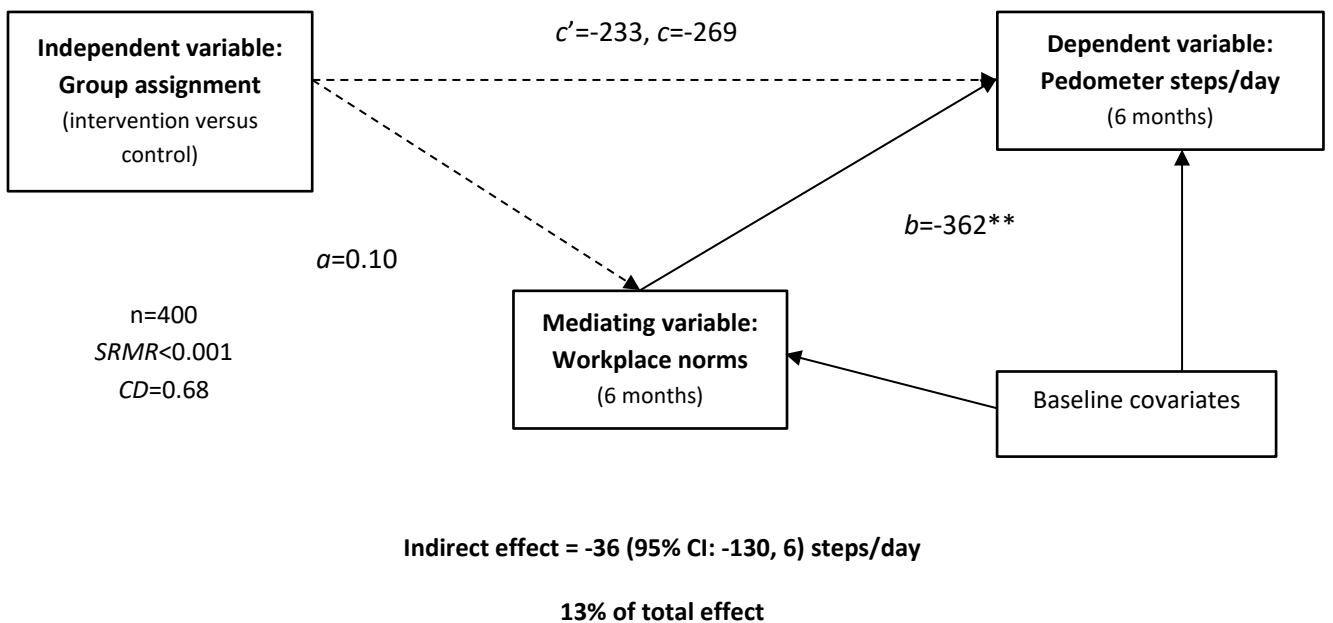


Figure 2.19. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through six-month recovery self-efficacy

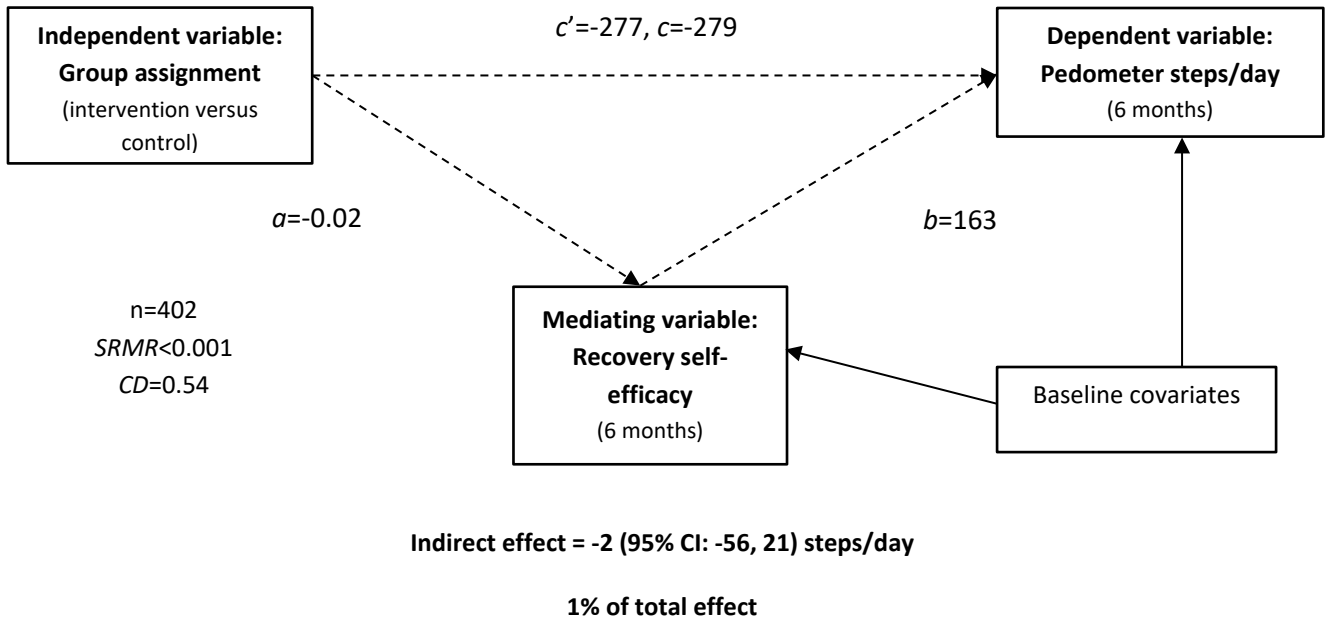


Figure 2.20. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through six-month maintenance self-efficacy

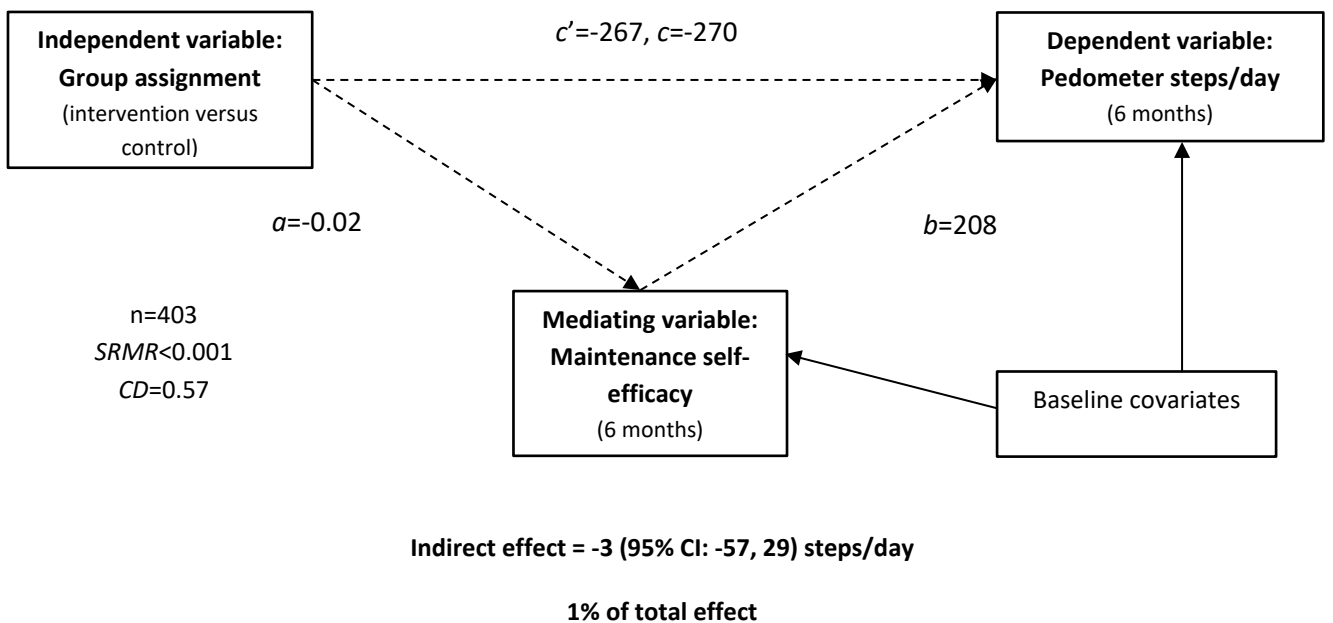


Figure 2.21. Single mediator model showing indirect effect of group assignment on six-month pedometer steps/day through six-month outcome satisfaction

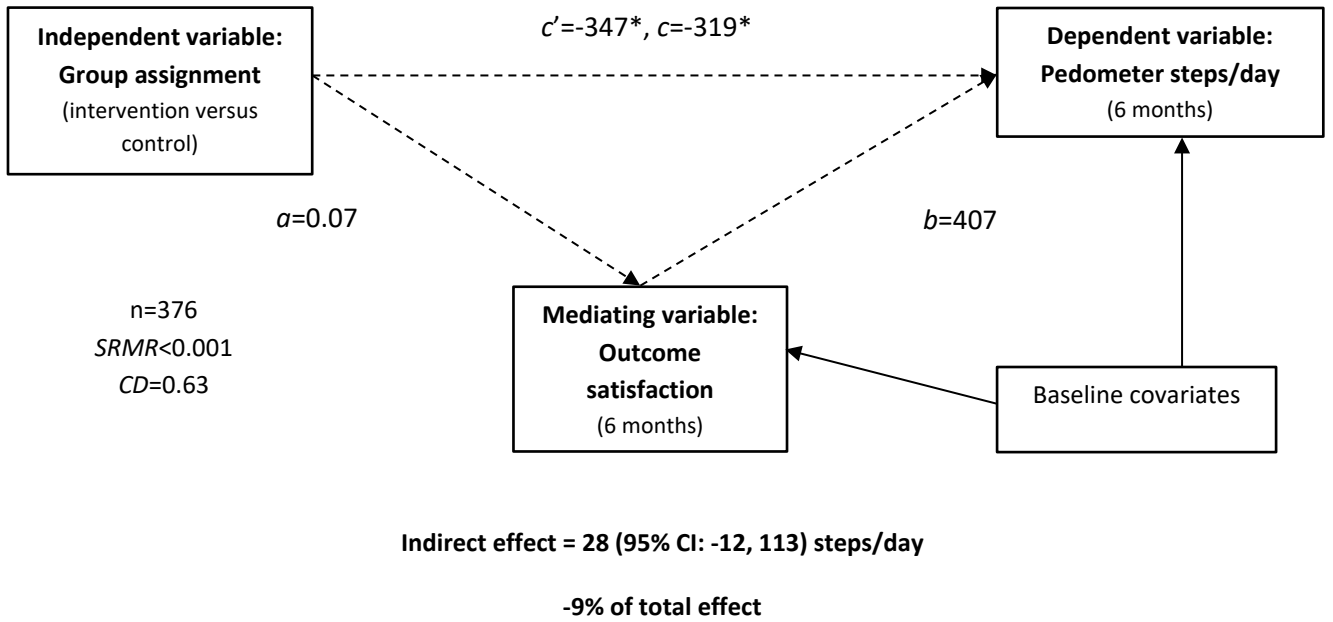


Figure 2.22. Single mediator model showing indirect effect of group assignment on 12-month pedometer steps/day through six-month planning

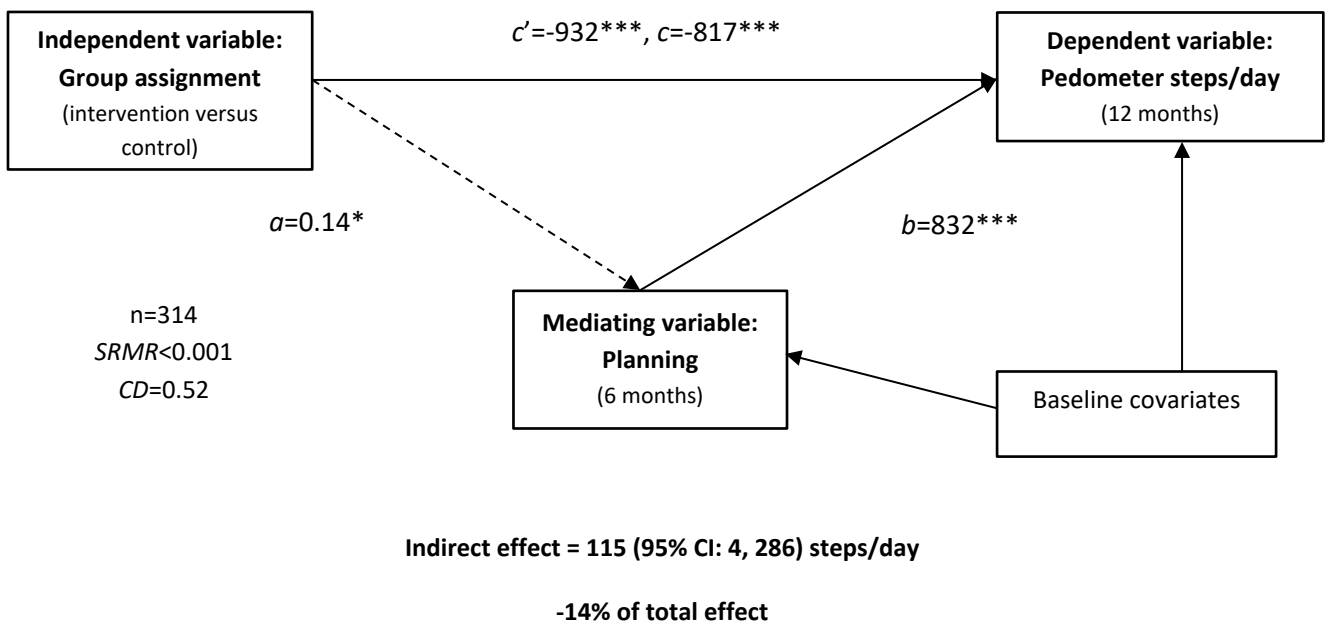


Figure 2.23. Single mediator model showing indirect effect of group assignment on 12-month pedometer steps/day through six-month social norms

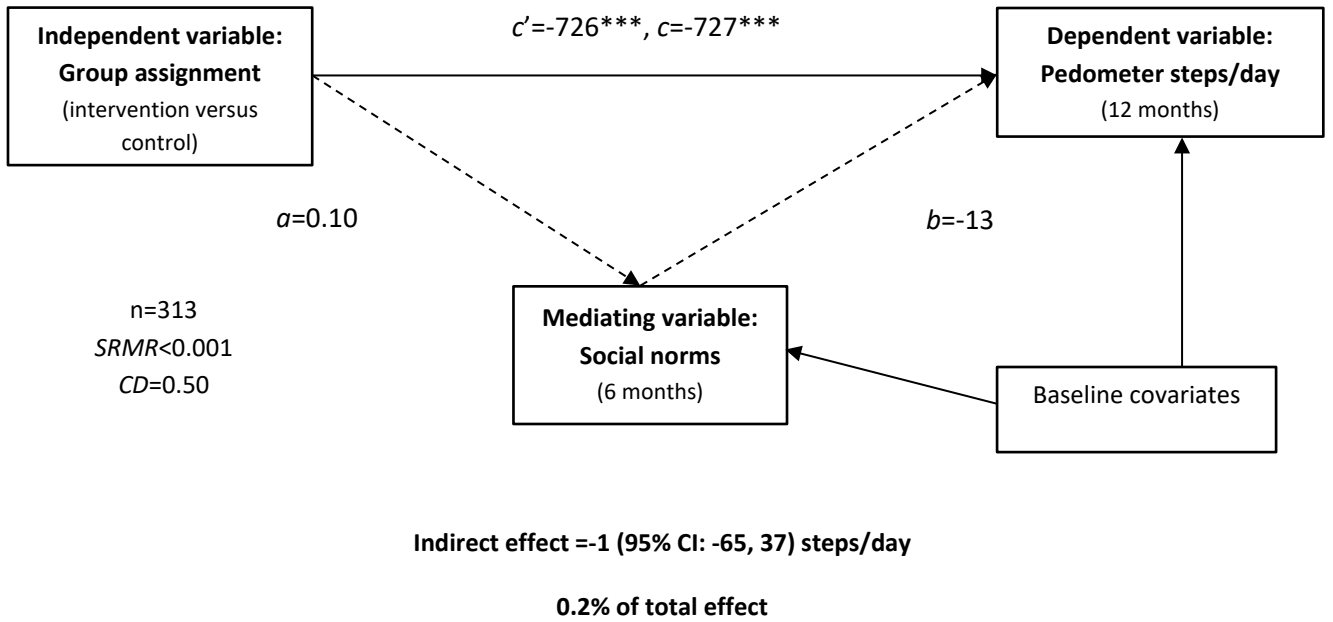


Figure 2.24. Single mediator model showing indirect effect of group assignment on 12-month pedometer steps/day through six-month identified regulation

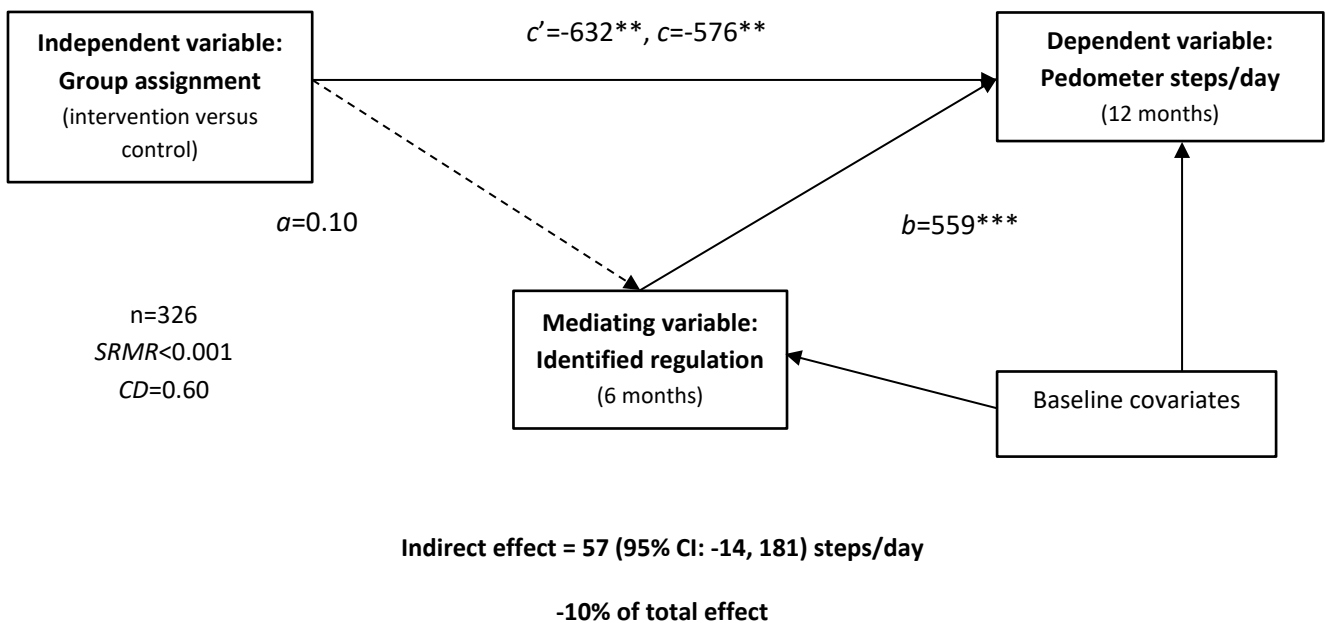


Figure 2.25. Single mediator model showing indirect effect of group assignment on 12-month pedometer steps/day through six-month integrated regulation

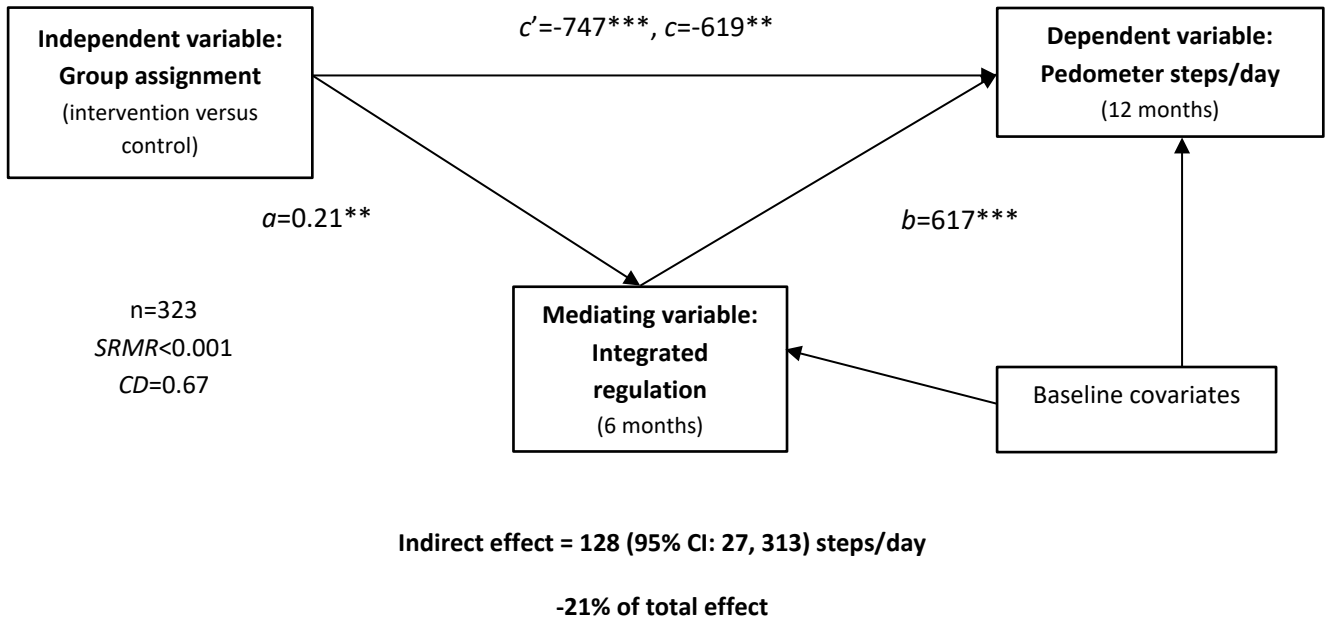


Figure 2.26. Single mediator model showing indirect effect of group assignment on 12-month pedometer steps/day through six-month intrinsic motivation

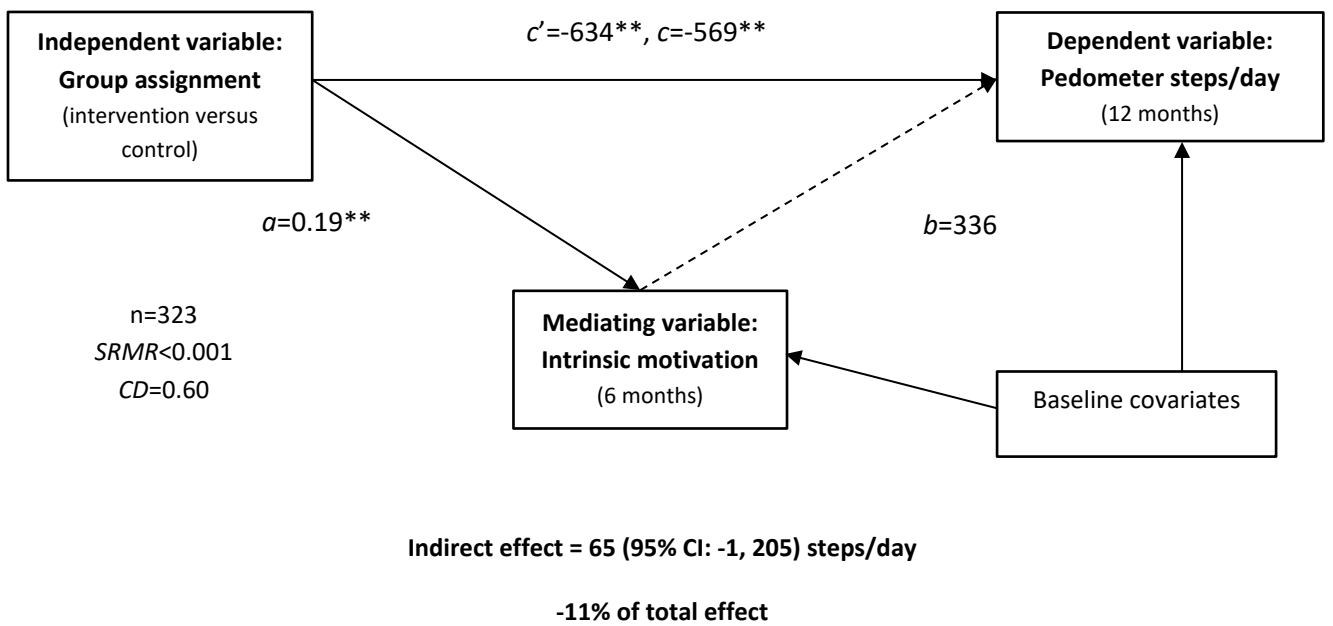


Figure 2.27. Single mediator model showing indirect effect of group assignment on 12-month pedometer steps/day through six-month habit

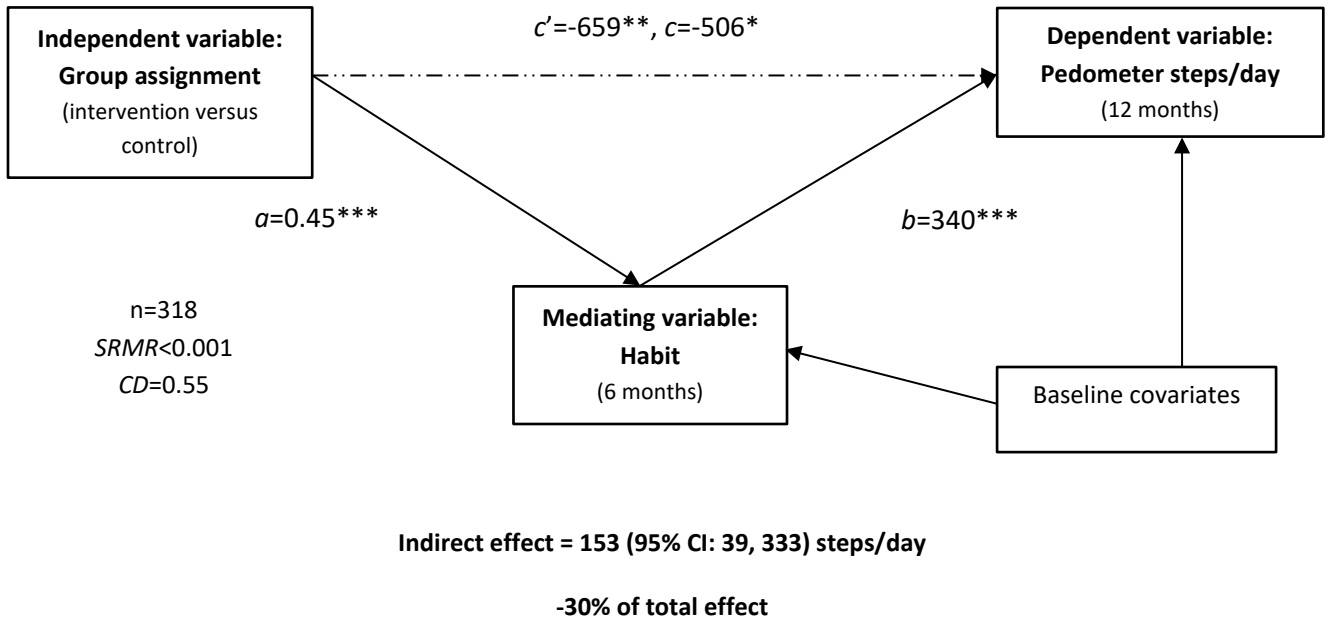


Figure 2.28. Single mediator model showing indirect effect of group assignment on 12-month pedometer steps/day through six-month workplace norms

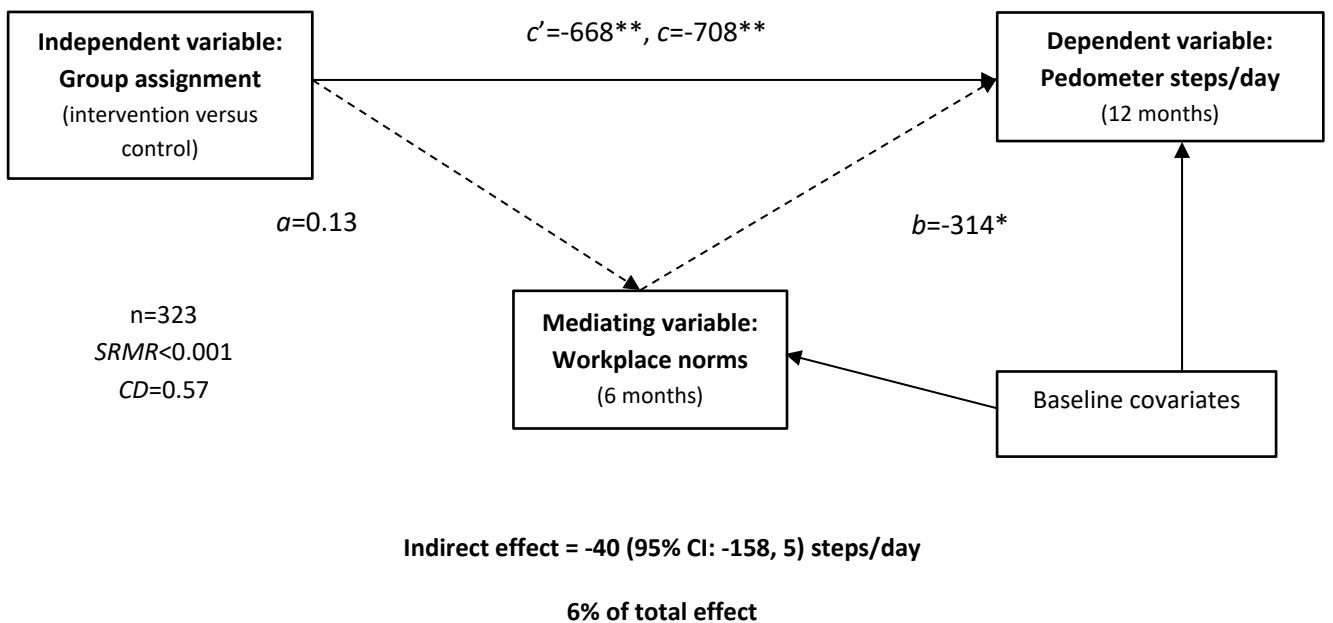


Figure 2.29. Single mediator model showing indirect effect of group assignment on 12-month pedometer steps/day through six-month recovery self-efficacy

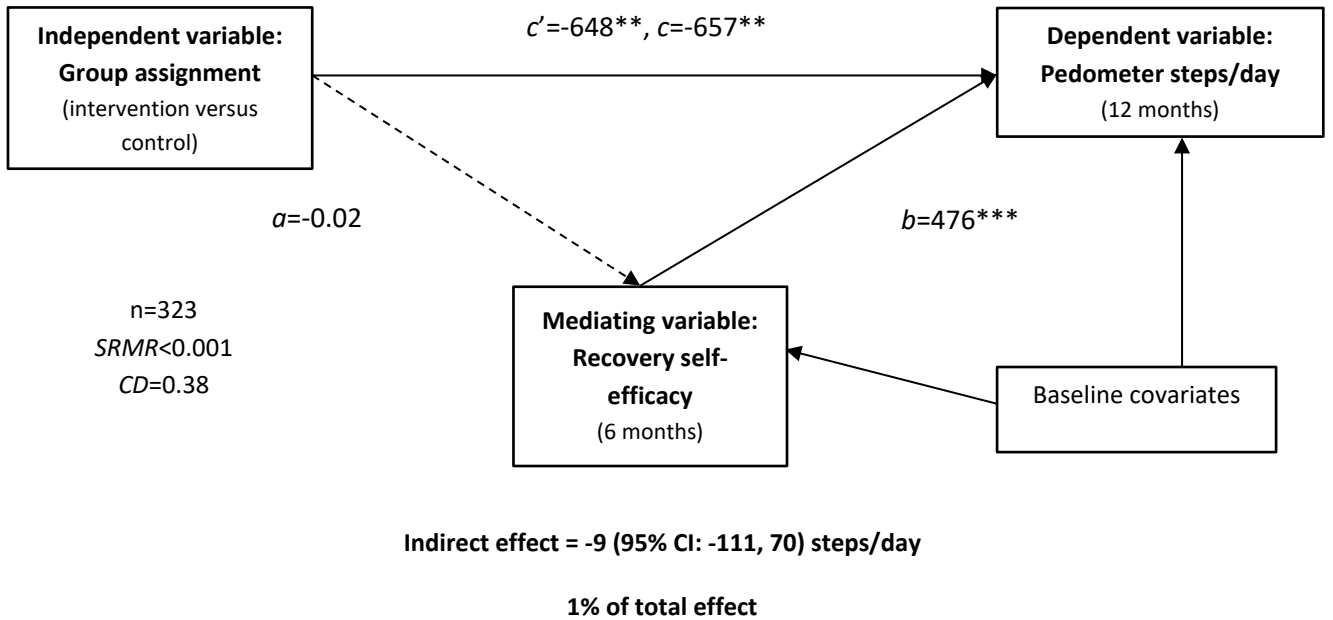


Figure 2.30. Single mediator model showing indirect effect of group assignment on 12-month pedometer steps/day through six-month maintenance self-efficacy

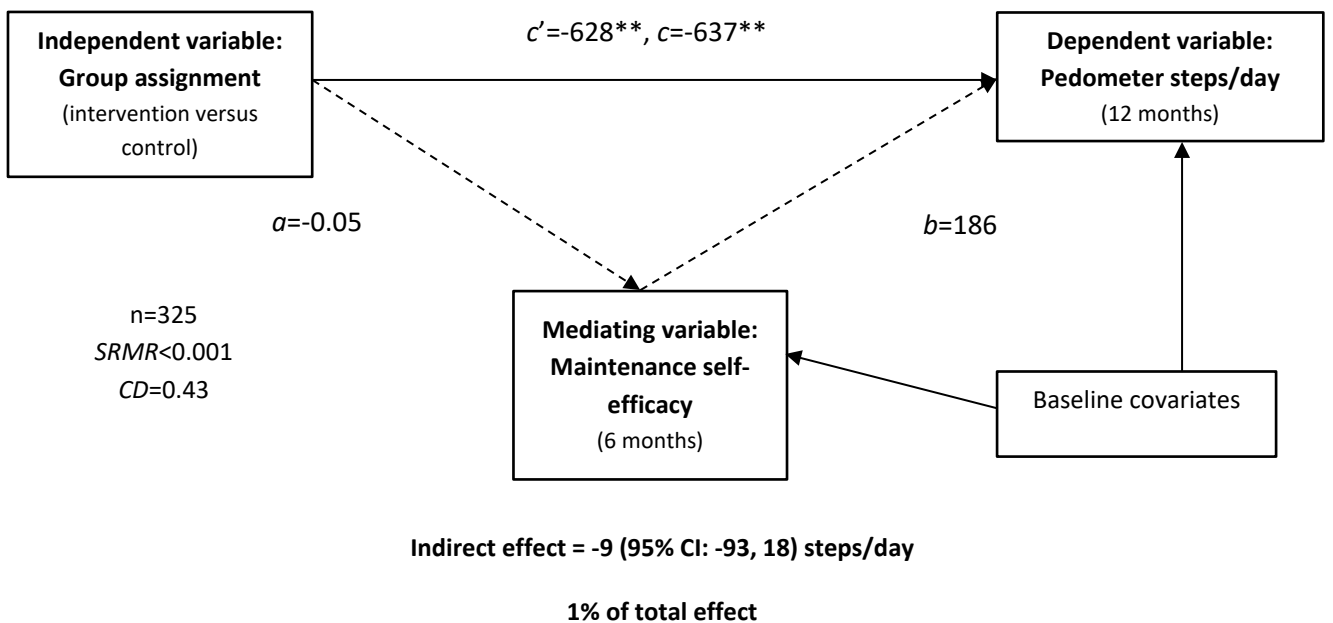
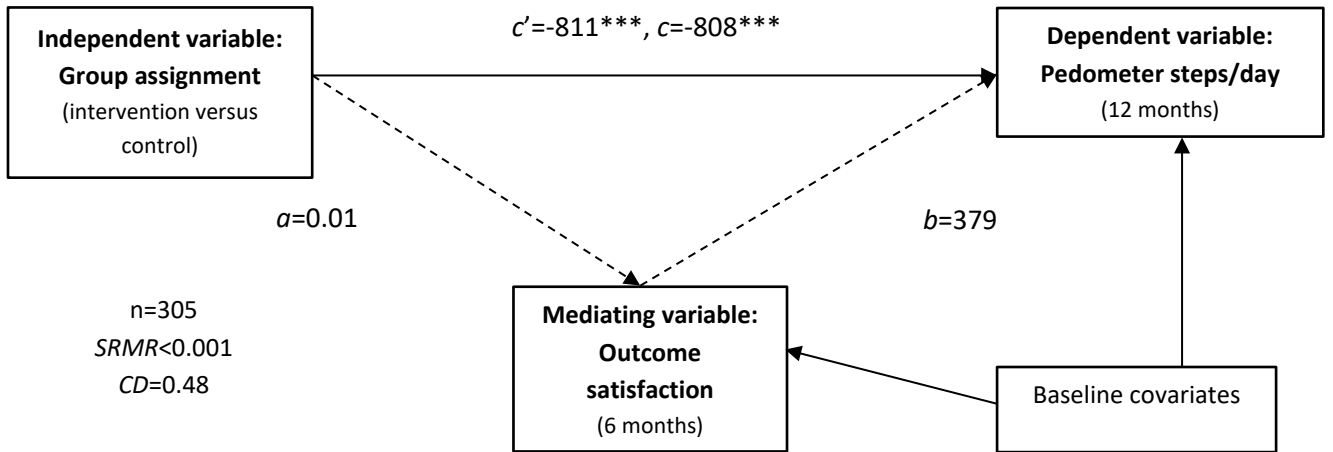


Figure 2.31. Single mediator model showing indirect effect of group assignment on 12-month pedometer steps/day through six-month outcome satisfaction



Indirect effect = 4 (95% CI: -46, 90) steps/day

-0.5% of total effect

* $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$

—▶ denotes significant effect ($p \leq 0.05$)

- - -▶ denotes non-significant effect ($p > 0.05$)

- · · ·▶ denotes different significant levels for the total and direct effects ($p \leq 0.05$ or $p > 0.05$).