Electronic Supplementary Material

Article: Prospective Associations between Sport Participation and Indices of Mental Health across Adolescence

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Table S1.
Confirmatory Factor Analysis for the Strengths and Difficulties Questionnaire at Time 1 (5-factor).

Item	λ	*SE*	R^2
Emotional Problems			
1. I get a lot of headaches	0.96	0.02	0.91
2. I worry a lot	0.95	0.02	0.91
3. I am often unhappy	0.98	0.02	0.95
4. I am nervous in new situations	0.95	0.02	0.91
5. I have many fears	0.96	0.02	0.92
Conduct Problems			
6. I get very angry	0.96	0.02	0.91
7. I usually do as I am told (*rs*)	0.96	0.02	0.92
8. I fight a lot	0.99	0.02	0.97
9. I am often accused of lying or cheating	0.96	0.02	0.92
10. I take things that are not mine	0.99	0.02	0.97
Hyperactivity			
11. I am restless	0.96	0.02	0.92
12. I am constantly fidgeting	0.96	0.02	0.92
13. I am easily distracted	0.96	0.02	0.92
14. I think before I do things (*rs*)	0.96	0.02	0.93
15. I finish the work I am doing (*rs*)	0.96	0.02	0.92
Peer Problems			
16. I am usually on my own	0.97	0.02	0.93
17. I have one good friend or more (*rs*)	0.98	0.02	0.96
18. Other people my age generally like me (*rs*)	0.96	0.02	0.92
19. Other children or young people pick on me	0.97	0.02	0.94
20. I get on better with adults than with people my age	0.96	0.02	0.92
Prosocial			
21. I try to be nice to other people	0.98	0.02	0.97
22. I usually share with others	0.96	0.02	0.92
23. I am helpful if someone is hurt	0.98	0.02	0.96
24. I am kind to younger children	0.98	0.02	0.96
25. I often volunteer to help others	0.96	0.02	0.92

Note. λ = standardized factor loading; *SE* = standard error estimate. All factor loadings are significant at $p < .001$. RMSEA = .07, CFI = .98, TLI = .98, SRMR = .01.

Table S2.
Parameter estimates obtained from random intercept cross-lagged panel models examining prospective associations between team sport participation and mental health indices.

	Depressive Symptoms	**Anxiety Symptoms**	**Emotional symptoms**	**Hyperactivity Symptoms**	**Conduct Problems**	**Peer Problems**	**Prosocial Behavior**
	***B* (*SE*)**	***B* (*SE*)**	***B* (*SE*)**	***B* (*SE*)**	***B* (*SE*)**	***B* (*SE*)**	***B* (*SE*)**
Between-Person Effects							
(BP) Team Sport ↔ MH Index	-.58 (.16)***	-.08 (.02)***	-.35 (.07)***	-.13 (.05)**	-.15 (.05)***	-.36 (.05)***	.10 (.05)**
Prospective Within-Person Effects							
(AR1) Team Sport → Team Sport	.10 (.04)**	.10 (.04)**	.11 (.04)**	.11 (.04)**	.10 (.04)**	.11 (.04)**	.09 (.04)*
(AR2) MH Index → MH Index	.19 (.04)***	.48 (.04)***	.49 (.03)***	.33 (.03)***	.24 (.05)***	.27 (.04)***	.26 (.03)***
(CL1) Team Sport → MH Index	-.29 (.11)**	-.02 (.00)*	-.08 (.03)**	.03 (.02)	.04 (.02)	-.02 (.03)	-.02 (.03)
(CL2) MH Index → Team Sport	-.01 (.01)	-.14 (.07)	-.05 (.02)**	.03 (.03)	.01 (.04)	-.03 (.03)	.02 (.03)
Contemporaneous Within-Person Covariance Estimates							
(CV1) Team Sport ↔ MH Index	-.28 (.15)*	-.04 (.02)**	-.16 (.07)*	-.04 (.07)	-.02 (.04)	.00 (.04)	.01 (.05)
(CV2) Team Sport ↔ MH Index	-.16 (.25)	-.03 (.02)	-.23 (.08)**	.02 (.07)	.01 (.06)	-.09 (.07)	-.04 (.07)
(CV3) Team Sport ↔ MH Index	-.17 (.21)	-.03 (.01)*	-.10 (.05)	.08 (.05)	.10 (.04)*	-.04 (.04)	.00 (.04)
Model Fit Indices							
RMSEA	.026	.066	.055	.026	.032	.048	.031
CFI	.995	.980	.989	.998	.996	.989	.995
SRMR	.013	.037	.024	.013	.015	.021	.018
Invariance Test by Sex							
Constrained Model χ^2 (DF)	36.40 (15)	61.77 (15)	44.04 (15)	27.68 (15)	28.57 (15)	51.14 (15)	38.01 (15)
Unconstrained Model χ^2 (DF)	21.04 (10)	54.41 (10)	36.25 (10)	18.59 (10)	22.92 (10)	40.45 (10)	31.06 (10)
$\Delta\chi^2$	15.36, p = .009	7.36, p = .195	7.80, p = .168	9.08, p = .106	5.65, p = .341	10.69, p = .058	6.95, p = . 224

Note: These analyses entail only the 2877 adolescents with no missing data. MH = Mental health.
*p < .05, **p < .01, ***p < .001.

Table S3.
Parameter estimates obtained from random intercept cross-lagged panel models examining prospective associations between individual sport participation and mental health indices.

	Depressive Symptoms	**Anxiety Symptoms**	**Emotional symptoms**	**Hyperactivity Symptoms**	**Conduct Problems**	**Peer Problems**	**Prosocial Behavior**
	***B* (*SE*)**	***B* (*SE*)**	***B* (*SE*)**	***B* (*SE*)**	***B* (*SE*)**	***B* (*SE*)**	***B* (*SE*)**
Between-Person Effects							
(BP) Ind. Sport ↔ MH Index	-.35 (.13)**	-.04 (.01)**	-.18 (.05)***	-.10 (.06)	-.07 (.03)*	-.04 (.04)	.05 (.05)
Prospective Within-Person Effects							
(AR1) Ind. Sport → Ind. Sport	.11 (.04)**	.11 (.04)**	.11 (.04)**	.11 (.04)**	.11 (.04)**	.11 (.04)**	11 (.04)**
(AR2) MH Index → MH Index	.19 (.04)***	.48 (.04)***	.50 (.03)***	.34 (.03)***	.24 (.05)***	.27 (.04)***	.26 (.03)***
(CL1) Ind. Sport → MH Index	.17 (.12)	-.01 (.00)	-.03 (.03)	-.04 (.04)	.01 (.01)	-.01 (.03)	.01 (.03)
(CL2) MH Index → Ind. Sport	-.01 (.01)	-.09 (.05)	-.03 (.01)*	-.03 (.02)	-.02 (.03)	-.04 (.02)	-.01 (.02)
Contemporaneous Within-Person Covariance Estimates							
(CV1) Ind. Sport ↔ MH Index	.10 (.15)	.01 (.02)	.02 (.06)	-.07 (.06)	-.06 (.04)	-.03 (.04)	.05 (.05)
(CV2) Ind. Sport ↔ MH Index	-.20 (.17)	-.02 (.02)	-.05 (.06)	-.02 (.06)	-.03 (.04)	-.08 (.04)	-.01 (.03)
(CV3) Ind. Sport ↔ MH Index	-.41 (.19)*	-.02 (.01)	-.06 (.05)	.00 (.05)	-.05 (.03)	.00 (.04)	.04 (.05)
Model Fit Indices							
RMSEA	.027	.052	.033	.001	.016	.031	.008
CFI	.991	.983	.994	.999	.999	.993	.999
SRMR	.016	.034	.018	.007	.011	.017	.014
Invariance Test by Sex							
Constrained Model χ^2 (DF)	33.83 (15)	45.07 (15)	26.27 (15)	9.66 (15)	15.66 (15)	32.09 (15)	22.95 (15)
Unconstrained Model χ^2 (DF)	18.84 (10)	38.34 (10)	19.36 (10)	7.45 (10)	13.64 (10)	23.51 (10)	18.04 (10)
$\Delta\chi^2$	14.99, p = .014	6.73, p = .242	6.91, p = .227	2.21, p = .820	2.02, p = .846	8.58, p = .127	4.91, p = .427

Note: These analyses entail only the 2877 adolescents with no missing data. Ind. Sport = Hours of individual sport participation. MH = Mental health.
*p < .05, **p < .01, ***p < .001.

Table S4.
Unconstrained random intercept cross-lagged panel model estimating prospective associations between sport participation and depressive symptoms stratified by sex.

	Team Sport Participation		Individual Sport Participation	
	Boys	Girls	Boys	Girls
	***B* (*SE*)**	***B* (*SE*)**	***B* (*SE*)**	***B* (*SE*)**
Between-Person Effects				
(BP) Sport ↔ Depression	-.82 (.24)***	-.20 (.22)	-.56 (.16)***	-.11 (.20)
Prospective Within-Person Effects				
(AR1) Sport → Sport	.04 (.06)	.18 (.04)***	.14 (.05)**	.07 (.05)
(AR2) Depression → Depression	.07 (.06)	.25 (.04)***	.05 (.06)	.24 (.05)***
(CL1) Sport → Depression	-.10 (.16)	-.34 (.14)*	.43 (.16)**	-.07 (.17)
(CL2) Depression → Sport	.00 (.01)	-.02 (.01)	.00 (.01)	-.02 (.01)**
Contemporaneous Within-Person Covariance Estimates				
(CV1) Sport ↔ Depression	-.20 (.19)	-.40 (.23)	.23 (.18)	-.06 (.24)
(CV2) Sport ↔ Depression	.45 (.41)	-.46 (.31)	.39 (.23)	-.74 (.24)**
(CV3) Sport ↔ Depression	.21 (.33)	-.28 (.25)	.48 (.29)	-.42 (.24)
Model Fit Indices				
RMSEA	.029		.026	
CFI	.994		.992	
SRMR	.017		.018	

Note: These analyses entail only the 2877 adolescents with no missing data.
*$p < .05$, **$p < .01$, ***$p < .001$.