

Association between ADHD symptoms, physical effort discounting, and unhealthy lifestyles in adults

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SUPPLEMENTARY INFORMATION

Further analyses splitting our sample in clinical groups instead of using a transdiagnostic approach.

To have a more comprehensive view of our research, we repeat the main analyses by clinical group (ADHD diagnosis versus control) instead of following a transdiagnostic approach, as we did in the main text.

Concerning the mixed model to explain EEfRT decisions, the best model already included a variable strongly correlated with the clinical group: medication group. Regarding the hypothetical effort discounting task, the goodness-of-fit was significantly poorer when using clinical group instead of the ASRS-18 ($\Delta\text{BIC}(\text{k effort})=7$).

As expected, ADHD symptoms were higher in those volunteers previously diagnosed with ADHD (t-test on the transformed variable: $t(178)=-9.0829$, $p<0.0001$). This was also the case for DCD symptoms ($t(168)=-7.8076$, $p<0.0001$). The remaining variables (BMI, GPAQ, k effort, EEfRT, smoker and drug use) were not significantly different between groups.

We also repeated the regression models to assess the association between ADHD, effort discounting and negative lifestyles, substituting ASRS-18 by clinical diagnosis. None of the regressions was significant, pointing to a higher sensitivity when including symptoms instead of diagnosis.

	Trial 1		Trial 2		Trial 3		Trial 4		Trial 5		Trial 6		Trial 7		Trial 8		Trial 9	
	%	Money	%	Money	%	Money	%	Money	%	Money	%	Money	%	Money	%	Money	%	Money
Block 1	88	3.66	12	1.85	50	1.88	88	2.26	12	2.53	88	3.03	50	2.55	50	4.15	12	3.66
Block 2	88	3.66	12	2.53	12	3.60	88	3.03	88	2.26	50	2.55	50	4.15	50	1.88	12	1.85
Block 3	50	2.55	88	3.66	50	4.15	12	2.53	12	3.60	50	1.85	12	1.85	88	3.03	88	2.26
Block 4	12	3.60	12	2.53	88	3.03	12	1.85	50	1.88	88	2.26	88	3.66	50	2.55	50	4.15
Block 5	12	3.60	12	1.85	12	2.53	50	1.88	50	2.55	50	4.15	88	3.66	88	3.03	88	2.26
Block 6	88	2.26	50	2.55	50	4.15	12	1.85	50	1.88	12	3.60	88	3.66	12	2.53	88	3.03
Block 7	88	3.66	12	3.60	50	4.15	88	2.26	12	2.53	88	3.03	12	1.85	50	1.88	50	2.55
Block 8	50	4.15	88	3.03	88	2.26	50	1.88	12	2.53	50	2.55	12	1.85	80	3.66	12	3.60
Block 9	50	1.88	88	3.66	88	3.03	12	2.53	50	2.55	88	2.26	12	3.60	50	4.15	12	1.85
Block 10	88	3.66	88	3.03	12	3.60	12	2.53	50	4.15	88	2.26	12	1.85	50	1.88	50	2.55

Table S1. Pseudo-randomised decision blocks included in the EEfRT task. Trials were presented in the same order (Block 1-Trial 1 to Block 1-Trial 9; Block 2-Trial 1 to Block 2-Trial 9, etc.) to all participants. % refers to the trial probability (12, 50 or 88%).

Tested models for the EEfRT decisions

	Fixed effects	Crossed random effects	BIC
1	Money, probability, trial number	Subjects and trials	6972
2	Money, probability, trial number, GPAQ	Subjects and trials	6548
3	Money, probability, trial number, ASRS18	Subjects and trials	6943
4	Money, probability, trial number, ASRS18, medication	Subjects and trials	6887
5	Money, probability, trial number, ASRS18, medication, sex	Subjects and trials	6896
6	Money, probability, trial number, ASRS18, medication, GPAQ, smoker	Subjects and trials	6436
7	Money, probability, trial number, DCD	Subjects and trials	6523
8	Money, probability, trial number, DCD, medication	Subjects and trials	6495
9	Money, probability, trial number, DCD, GPAQ	Subjects and trials	6180
10	Money, probability, trial number, DCD, GPAQ, medication	Subjects and trials	6151
11	Money, probability, trial number, DCD, GPAQ, medication, smoker	Subjects and trials	6097
12	Money, probability, trial number, DCD, GPAQ, medication, smoker, sex	Subjects and trials	6106
13	Money, probability, trial number, ASRS18, DCD, medication, GPAQ, smoker	Subjects and trials	6104
14	Money, probability, (probability x medication), trial number, DCD, medication, GPAQ, smoker	Subjects and trials	6077
15	Money, probability, (probability x medication), trial number, ASRS18, DCD, medication, GPAQ, smoker	Subjects and trials	6084

Tested models for the hypothetical effort discounting task

	Fixed effects	Random effects	BIC
1	Money, effort	None	11337
2	Money, effort	Subjects	10631
3	Money, effort, trial	Subjects	10638
4	Money, effort, response time	Subjects	10626
5	Money, effort, response time, group	Subjects	10634
6	Money, effort, response time, ASRS-18	Subjects	10627
7	Money, effort, ASRS-18	Subjects	10631
8	Money, effort, response time, ASRS-18, medication	Subjects	10636
9	Money, effort, response time, DCD	Subjects	10634
10	Money, effort, response time, DCD, medication	Subjects	10642
11	Money, effort, response time, ASRS-18, GPAQ	Subjects	10636
12	Money, effort, response time, ASRS-18, smoker	Subjects	10635
13	Money, effort, response time, ASRS-18, BMI	Subjects	10635
14	Money, effort, response time, ASRS-18, gender	Subjects	10636
15	Money, effort, (money x effort), response time, ASRS-18	Subjects	10381
16	Money, effort, (money x effort), response time	Subjects	10380
17	Money, effort, (money x effort), response time, ASRS-18, medication	Subjects	10390
18	Money, effort, (money x effort), response time, ASRS-18, gender	Subjects	10390
19	Money, effort, (money x effort), response time, ASRS-18, GPAQ	Subjects	10390
20	Money, effort, (money x effort), response time, ASRS-18, smoker	Subjects	10390
21	Money, effort, (money x effort), response time, ASRS-18, BMI	Subjects	10389

Table S2. Several logistic mixed models were tested to choose the best data fitting, which was determined by the Bayesian Information Criterion (BIC; lower values indicate better model fitting; see Methods for details). The top panel refers to the EEfRT, and the bottom panel pertains to the hypothetical effort discounting task. Best models are highlighted in gray background and bold typesetting.

	ASRS-18			EEfRT			k effort			DCD			GPAQ			BMI			SIAC			Smoker			Cigarettes		
	r	p	n	r	p	n	r	p	n	r	p	n	r	p	n	r	p	n	r	p	n	r	p	n	r	p	n
ASRS-18																											
EEfRT	-0.112	0.137	179																								
k effort	0.139	0.062	179	-0.039	0.600	179																					
DCD	0.756	<0.001	170	-0.029	0.710	169	0.069	0.372	169																		
GPAQ	0.001	0.986	166	0.006	0.939	166	-0.053	0.492	166	0.002	0.980	159															
BMI	-0.021	0.787	161	-0.065	0.417	160	-0.015	0.846	160	0.013	0.875	154	0.031	0.698	159												
SIAC	-0.025	0.744	133	0.062	0.424	133	-0.032	0.680	134	-0.025	0.756	130	0.081	0.299	133	0.023	0.778	126									
Smoker	0.161	0.038	166	-0.050	0.526	166	0.041	0.600	166	0.057	0.474	159	-0.046	0.558	165	0.164	0.038	161	0.313	<0.001	132						
Cigarettes	0.117	0.437	46	-0.138	0.359	46	0.112	0.459	46	0.101	0.505	46	0.088	0.560	45	-0.201	0.192	44	-0.039	0.799	41	0.136	0.366	46			
Drug use	0.042	0.570	180	0.025	0.739	180	-0.019	0.804	180	0.120	0.119	170	0.123	0.112	167	0.070	0.378	161	0.057	0.468	134	0.104	0.179	167	0.146	0.333	46

Table S3. Pairwise Pearson's r correlation of the main variables included in the study. Only raw variables are shown. See Table 3 for Box-Cox transformed variables.

Linear regression to assess the influence of ADHD symptoms and effort discounting on sedentary lifestyle

F(5,152)=1.13, p=0.3488

	Coefficient	S.E.	t value	p	Beta
Dependent variable:					
GPAQ (transformed)					
Independent variable(s):					
ASRS-18 (transformed)	-0.21	0.33	-0.66	0.513	-0.13
EEfRT	-1.47	4.02	-0.37	0.715	-0.12
ASRS-18 x EEfRT	0.19	0.55	0.35	0.727	0.13
Covariates:					
BMI (transformed)	0.49	5.68	0.09	0.932	0.007
Sex	-0.76	0.40	-1.88	0.062	-0.16
Intercept	14.40	10.03	1.43	0.153	

Linear regression to assess the influence of ADHD symptoms and effort discounting on alcohol use

F(5,119)=1.08, p=0.3734

	Coefficient	S.E.	t value	p	Beta
Dependent variable:					
SIAC (transformed)					
Independent variable(s):					
ASRS-18 (transformed)	0.012	0.15	0.08	0.935	0.019
EEfRT	-0.74	1.79	-0.41	0.679	-0.16
ASRS-18 x EEfRT	0.07	0.25	0.28	0.780	0.11
Covariates:					
BMI (transformed)	-0.59	2.66	-0.22	0.823	-0.02
Sex	-0.41	0.19	-2.10	0.038	-0.21
Intercept	2.94	4.69	0.63	0.532	

Linear regression to assess the influence of ADHD symptoms and effort discounting on alcohol use

F(5,119)=1.08, p=0.3734

	Coefficient	S.E.	t value	p	Beta
Dependent variable:					
SIAC (transformed)					
Independent variable(s):					
ASRS-18 (transformed)	0.11	0.15	0.70	0.485	0.16
k effort (transformed)	-0.05	0.21	-0.24	0.810	-0.10
ASRS-18 x k effort (tr.)	0.009	0.03	0.31	0.760	0.14
Covariates:					
BMI (transformed)	-1.06	2.63	-0.40	0.688	-0.04
Sex	-0.47	0.20	-2.37	0.019	-0.23
Intercept	3.04	4.74	0.64	0.523	

Logistic regression to assess the influence of ADHD symptoms and effort discounting on smoking

$\chi^2(5)=11.29$, p=0.0459, pseudo-R²=0.0594

	Coefficient	S.E.	z value	p	95% Conf. Interval
Dependent variable:					
Smoker (0=no, 1=yes)					
Independent variable(s):					
ASRS-18 (transformed)	-0.009	0.33	-0.03	0.980	(-0.67,0.65)
EEfRT	-4.18	4.62	-0.90	0.366	(-13.25,4.89)
ASRS-18 x EEfRT	0.51	0.61	0.84	0.402	(-0.68,1.70)
Covariates:					
BMI (transformed)	9.52	5.51	1.73	0.084	(-1.28,20.32)
Sex	-0.61	0.40	-1.54	0.124	(-1.39,0.17)
Intercept	-16.98	9.67	-1.76	0.079	(-35.9,1.98)

Logistic regression to assess the influence of ADHD symptoms and effort discounting on drug use

$\chi^2(5)=3.78$, $p=0.581$, pseudo- $R^2=0.0280$

	Coefficient	S.E.	z value	p	95% Conf. Interval
Dependent variable:					
Drug use from MINI (0=no, 1=yes)					
Independent variable(s):					
ASRS-18 (transformed)	-0.32	0.43	-0.73	0.465	(-1.16,0.53)
EEfRT	-3.95	5.31	-0.74	0.457	(-14.4,6.5)
ASRS-18 x EEfRT	0.73	0.72	1.01	0.311	(-0.68,2.14)
Covariates:					
BMI (transformed)	8.71	6.53	1.33	0.182	(-4.09,21.5)
Sex	0.11	0.48	0.24	0.813	(-0.83,1.05)
Intercept	-15.4	11.56	-1.33	0.183	(-38.07,7.27)

Logistic regression to assess the influence of ADHD symptoms and effort discounting on drug use

$\chi^2(5)=2.34$, $p=0.8007$, pseudo- $R^2=0.0169$

	Coefficient	S.E.	z value	p	95% Conf. Interval
Dependent variable:					
Drug use from MINI (0=no, 1=yes)					
Independent variable(s):					
ASRS-18 (transformed)	-0.18	0.38	-0.46	0.643	(-0.93,0.58)
k effort (transformed)	0.47	0.58	0.82	0.412	(-0.66,1.60)
ASRS-18 x k effort	-0.05	0.08	-0.68	0.494	(-0.20,0.10)
Covariates:					
BMI (transformed)	5.30	6.46	0.82	0.412	(-7.36,18.0)
Sex	0.009	0.48	0.02	0.984	(-0.93,0.95)
Intercept	-0.18	11.64	-0.79	0.430	(-31.99,13.62)

Table S4. Non-significant multiple linear regression models to assess the effect of ADHD symptoms and effort discounting on negative lifestyles. See Table 4 for significant models.