The mediating role of executive functioning on school achievement in children with ADHD: a population-based study.



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### INTRO

• Background: Executive dysfunction play a central role in ADHD symptoms and impairments, however little is known about its mediating effect on school achievement in this vulnerable group. Table 2. Association between Other Mental Health Conditions (OMS) and ADHD.

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• Objectives: Herein, we take advantage of a large populational sample of children to examine the impact of ADHD in school achievement as mediated by executive functioning (EF).

### **METHODS**

- Consents and analyzable data were obtained from 3,205 children (93.9% of the target sample), 48% females, aged 5 to 12 years (M = 8, SD = 1.96).
- ADHD was ascertained according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM 5) with validated questionnaires filled out by parents and teachers.
- The Executive Function Inventory for Children and Adolescents (EFICA) was completed by the parents.
- Mediation models and logistic regression analysis were applied. A mediation analysis was run to test the hypothesis using estimates of the indirect effect obtained via percentile bootstrap.
- R language was used, and the significance level was set at 0.05.

# RESULTS

• Of the final sample, 79 children (2.5%) met DSM-5 criteria for ADHD with a significant association with school achievement (X2(4) = 264.59, p < 0.001).

	1	71 (30.6%)	8 (0.3%)	79 (2.5%)	
N-Miss		0	1156	1156	
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Table 3. School performance as a function of ADHD diagnosis.

ADHD				
School performance	Yes (N=79)	No (N=3126)	Total (N=3205)	p value
				< 0.001
1 (very below)	43 (55.1%)	214 (6.9%)	257 (8.0%)	
2 (below)	25 (32.1%)	622 (20.0%)	647 (20.3%)	
3 (average)	8 (10.3%)	1461 (46.9%)	1469 (46.0%)	
4 (above)	2 (2.6%)	569 (18.3%)	571 (17.9%)	
5 (very above)	0 (0.0%)	249 (8.0%)	249 (7.8%)	

Table 4. Results of a logistic regression model indicating the odds of participants with **ADHD** having low school performance.

		DV: Low school performance				
	Predictors	Odds Ratio	95% CI	Statistic	р	
	(Intercept)	0.07	0.06 - 0.09	-21.44	<0.001	
···.	ADHD	6.43	3.37 - 13.59	5.28	<0.001	
	EFICA	1.03	1.03 - 1.03	14.69	<0.001	
	Observations	3193				

- Children with ADHD have a higher risk of low school achievement (OR 6.43, 95% CI 3.37-13.59, p < 0.001).
- ADHD negatively predicts school achievement ( $\beta$  = -1.4, p < 0.01) and EF significantly mediate the relationship between ADHD and school achievement ( $\beta = -0.83$ , p < 0.01).
- Regression analyses revealed that about 5% of the variance of the results are explained by the predictors.

# CONCLUSIONS

The present findings provide some evidences that children with ADHD with not as bad executive functioning are less likely to have a low school achievement giving plausibility to future researches on the effects of EF interventions on school achievement in this vulnerable group.

	Final sample (	3.206)	
Characteristic	N	% or range	M (SD)
Age (total)	3205	5-12	8.0 (1.96)

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R<sup>2</sup> Tjur 0.115

Table 5. Results of low school performance, ADHD and OMD.

	DV: Low school performance				
Predictors	Odds Ratio	95% CI	Statistic	р	
(Intercept)	0.35	0.32 – 0.38	-25.21	<0.001	
 ADHD	8.67	4.41 - 18.70	5.92	<0.001	
 OMD	2.58	1.88 - 3.54	5.90	<0.001	
Observations	3193				
R <sup>2</sup> Tjur	0.054				

Figure 1. Mediation model (ADHD, EFICA vs. School performance).



		-	School performance	
t	otal effect = -1.402			

(p < 0.001)

Figure 2. Mediation m	odel (ADHD, OMD vs	s. School performance)
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**Disclosure of interest** The authors report no conflict of interest.

Female	1544	48.1%	-
Male	1661	51.8%	-
Race			
White	2097	48.08%	-
Non-white	838	19.2%	-
Non-respondents	270	6.19%	-

"The present findings provide some evidences that children with ADHD with not as bad executive functioning are less likely to have a low School achievement giving plausibility to future researches on the effects of EF interventions on school achievement in this vulnerable group". 

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