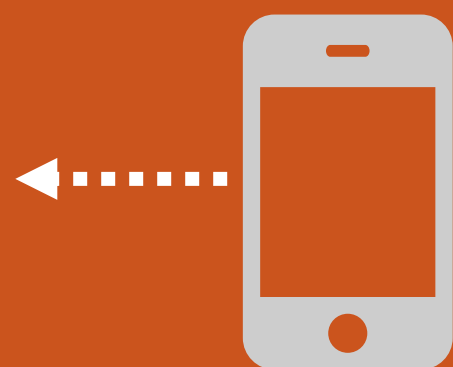


What's New?

- Our research examines the relationship between ACEs and PA among adolescents using accelerometry technology to estimate average Fitbit daily steps.
- The use of this quantitative, reliable, and consistent measurement of PA helps offer new insight into the association between ACEs and PA in young people.



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Associations between adverse childhood experiences & early adolescent physical activity in the United States

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Objective

The objective of this study was to determine the associations between number of adverse childhood experiences (ACEs) and physical activity (PA) in a population-based, demographically diverse cohort of 9–14 year-old early adolescents and to determine which types of ACEs were most associated with PA levels.

Methods

We analyzed data (n=7,046) from the Adolescent Brain Cognitive Development (ABCD) Study 4.0 release at baseline and year 2 follow up. ACE (cumulative score and subtypes) and PA (average FitBit daily steps) was analyzed using logistic and linear regression analyses.

Results

Adjusted models suggest a dose-dependent, significant, inverse association of ACEs (2 or more), with Fitbit daily steps (ACEs = 2, B = -254.9, 95% CI -472.4, -37.4, P= 0.021); (ACEs=3, B= -337.1, 95% CI -598.2, -76.1, P= 0.011); (ACEs≥ 4, B= -688.0, 95% CI -1019.9, -61.5, P= <0.001) in adjusted models. Of the ACEs subtypes, emotional neglect (B= -1147.3, 95% CI -1728.9, -565.6, P= < 0.001), physical neglect (B= -454.7, 95% CI -740.8, -168.6, P= 0.001), household substance use (B= -153.5, 95% CI -300.2, -6.8, P= 0.040), household divorce or separation (B= -284.4, 95% CI -475.3, -93.5, P= 0.003), and household mental illness (B= -358.3, 95% CI -515.3, -201.3, P= < 0.001) were inversely and significantly associated with Fitbit daily steps after adjusting for confounders.

Table 1. Sociodemographic, Adverse Childhood Experiences (ACEs), and Daily Steps of Adolescent Brain Cognitive Development (ABCD) Study Participants (Year 2, N = 7046) (Baseline)

Sociodemographic Characteristics	Mean (SD)/%
Age (years)	12.0 (0.6)
Sex, n (%)	
Female	48.4%
Male	51.6%
Race and ethnicity (%)	
White	58.7%
Latino/Hispanic	15.6%
Black	15.3%
Asian	5.7%
Native American	3.7%
Other	1.0%
Household income (%)	
Less than \$75,000	63.8%
≥\$75,000	36.2%
Parent with college education or more (%)	12.6%
Number of ACEs	
0	11.3%
1	24.4%
2	27.6%
3	20.7%
4+	16.0%
ACEs type	
Physical Abuse	0.9%
Sexual Abuse	1.1%
Emotional Neglect	0.8%
Physical Neglect	6.8%
Household Substance Use	46.4%
Household Divorce or Separation	12.2%
Household Mental Illness	57.3%
Household Violence	65.6%
Household Criminal Justice Involvement	30.2%
Emotional Abuse	1.7%
Steps per day (median)	9004

SD indicates standard deviation.
Proportion weights were applied to yield estimates based on the American Community Survey from the US Census.

Table 2. Associations Between Adverse Childhood Experiences (ACEs) and Fitbit Daily Steps at Two-Year Follow-Up in the Adolescent Brain Cognitive Development Study

	Unadjusted		Adjusted*	
	Steps per day		Steps per day	
	B (95% CI)	P	B (95% CI)	P
Number of ACEs				
0			Ref	
1	-321.7 (-627.1, -16.4)	.04	-347 (-652.6, -42.6)	.03
2	-266.2 (-562.3, 30.1)	.08	-390.9 (-686.6, -95.3)	.01
3	-213.8 (-531.6, 103.9)	.19	-318.4 (-633.4, -3.3)	.048
4+	-645.2 (-977.7, -312.6)	<.01	-567.2 (-902.2, -232.2)	.01
ACE subtypes†				
Physical Abuse	528.9 (-865.3, 1923.1)	.46	637.7 (-676.0, 1951.6)	.34
Sexual Abuse	-325.4 (-1191.9, 541.0)	.46	174.5 (-642.4, 991.5)	.68
Emotional Neglect	-926.0 (-1867.6, 15.6)	.05	-696.3 (-1601.4, 208.8)	.13
Physical Neglect	-323.2 (-650.5, 4.1)	.05	-423.7 (-752.8, -94.6)	.01
Household Substance Use	-521.6 (-762.0, -281.2)	<.01	-149.4 (-314.9, 16.0)	.08
Household Divorce or Separation	-521.6 (-762.0, -281.2)	<.01	-275.4 (-521.5, -29.2)	.03
Household Mental Illness	-202.6 (-373.8, -31.5)	.02	-317.1 (-488.3, -145.9)	<.01
Household Violence	56.4 (-110.0, 222.9)	.51	65.9 (-101.1, 232.9)	.44
Household Criminal Justice Involvement	-157.5 (-343.4, 28.3)	.1	-44.2 (-230.5, 141.9)	.64
Emotional Abuse	-991.6 (-1758.9, -224.3)	.01	-719.3 (-1430.8, -7.9)	.047

Bold indicates P < .05.
* Covariates: age, race and ethnicity, sex, household income, parent education, study site, body mass index (BMI), study period (pre- or during COVID pandemic), participants who were twins or siblings.
† Outputs represent the abbreviated output for a series of linear regression models with each ACE subtype as the independent variable and steps per day as the dependent variable. Thus, the table represents the output from ten regression models in total.

Discussion

Our results suggest that there is an inverse, dose-dependent relationship between experiencing ACEs and physical activity as measured by daily steps. Beyond the association of cumulative ACEs with lower daily steps, we found that the specific subtypes significantly associated with fewer steps per day. Knowing that levels of physical activity are diminished among adolescents who have experienced more ACEs highlights the importance of screening for ACEs among young people at an early age to help identify those who could benefit from interventions that support increased physical activity.