## Physical Activity and Mental Health of New York City Public High School Students

Regular physical activity is critical to adolescents' lifelong health and developmental outcomes.[1] It is associated not only with positive physical health, but also with better academic performance, school success, and good mental health.[1-3] The mental health benefits of regular exercise include reduced anxiety and feelings of depression, increased self-confidence, more positive self-expression, and improved perception of quality of life.[1,3] Several studies have also found that physical activity can decrease adolescents' risk for emotional and behavioral problems by improving the amount and quality of their sleep.[3-6] Among adolescents, adequate sleep is vital for positive development, daytime functioning, and emotional well-being.[5] Sleep deprivation has been shown to be strongly associated with adolescent depression, alcohol abuse, and suicide.[3-5]

This report examines associations between physical activity and mental health in order to further understand this relationship and inform efforts aimed at supporting healthy development among high school adolescents.

Many high school students in New York City are not physically active

Percentage of physically active New York City public high school students by number of days active, 2017

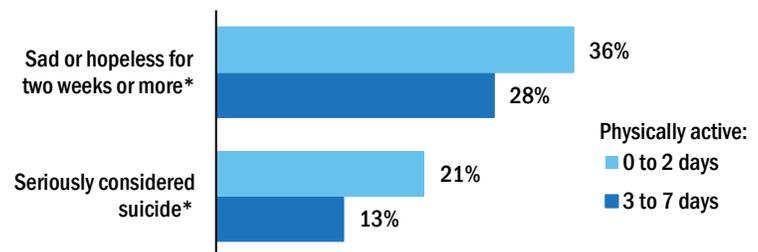Number of days physically active for 60 minutes or more in the past seven days
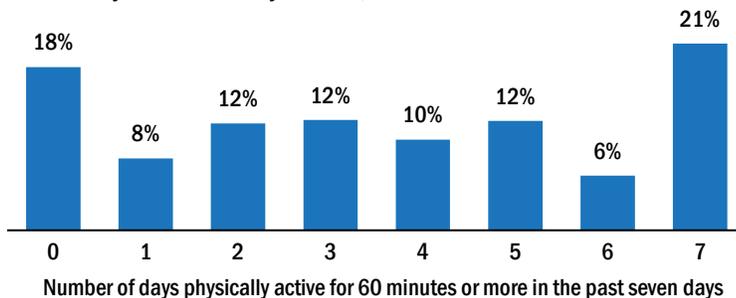
Source: NYC Youth Risk Behavior Survey, 2017

- In 2017, only 21% of public high school students reported meeting the national guidelines for getting 60 or more minutes of physical activity every day.
- Nearly one in five students reported getting less than 60 minutes of physical activity on each of the past seven days (18%).

Higher levels of physical activity are associated with better emotional well-being

- Students who were physically active for three or more days in the past week were less likely to report feeling sad or hopeless for two weeks or more during the past 12 months, compared with their peers who were physically active for two or fewer days (28% vs. 36%).
- Students who were physically active for three or more days during the past week were less likely than those active for two or fewer days to report that they seriously considered suicide (13% vs. 21%) during the past 12 months.

Prevalence of adverse mental health by number of days of physical activity^ among New York City public high school students, 2017

Physically active:
■ 0 to 2 days
■ 3 to 7 days

^ Physically active for 60 minutes or more in the past seven days
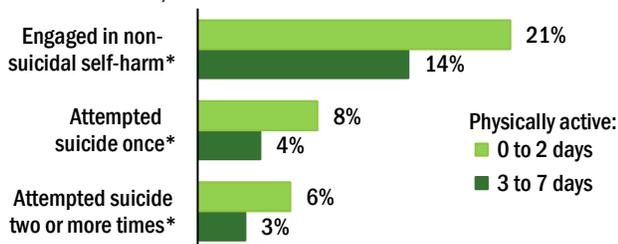* Mental health symptoms in the past 12 months
Source: NYC Youth Risk Behavior Survey, 2017

Definitions: **Recommended physical activity:** Based on the 2018 Physical Activity Guidelines for Americans, children and adolescents should get 60 or more minutes of physical activity per day.
Adequate Sleep Based on the American Academy of Pediatrics (AAP) recommendations, for adolescents between 13 and 18 years old, adequate sleep is defined as getting eight to ten hours of sleep every day. Due to data limitations, in this Epi Data Brief, adequate sleep refers to getting at least eight hours of sleep on an average school night.

Higher levels of physical activity are associated with lower prevalence of self-harming behaviors

Prevalence of self-harming behaviors by number of days of physical activity^ among New York City public high school students, 2017

- Engaged in non-suicidal self-harm*: 21% (0 to 2 days), 14% (3 to 7 days)
- Attempted suicide once*: 8% (0 to 2 days), 4% (3 to 7 days)
- Attempted suicide two or more times*: 6% (0 to 2 days), 3% (3 to 7 days)

Physically active:
- 0 to 2 days
- 3 to 7 days

^ Physically active for 60 minutes or more in the past seven days
* Self-harming behaviors in the past 12 months
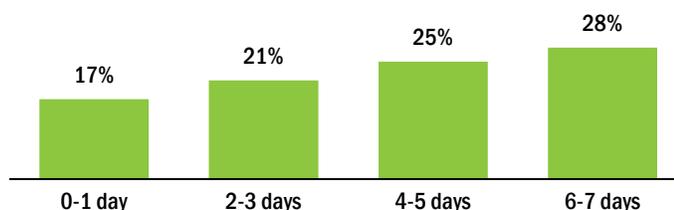*Source: NYC Youth Risk Behavior Survey, 2017*

- Students who were physically active for three or more days during the past week were less likely than those active for two or fewer days to report that they engaged in non-suicidal self-harm (14% vs. 21%) or attempted suicide in the past 12 months (attempted suicide once: 4% vs. 8%; attempted suicide two or more times: 3% vs. 6%).

Physically active students report getting more sleep

- In 2017, less than a quarter (23%) of high school students got adequate sleep on an average school night.

- Compared with high school students who were physically active for one day or less, students who were physically active for two or three days, four or five days, and six or seven days were more likely to get adequate sleep (17% vs. 21%, 25%, and 28%, respectively).

Prevalence of adequate sleep* by number of days of physical activity^ among New York City high school students, 2017

- 0-1 day: 17%
- 2-3 days: 21%
- 4-5 days: 25%
- 6-7 days: 28%

^ Physically active for 60 minutes or more in the past seven days
* Eight hours of sleep on an average school night
Source: NYC Youth Risk Behavior Survey, 2017

References:
1 U.S. Department of Health and Human Service. Physical Activity Guidelines for Americans, 2nd edition. 2018. https://health.gov/paguidelines/second-edition/pdf/Physical_Activity_Guidelines_2nd_edition.pdf Accessed December 4, 2018.
2 Institute of Medicine of the National Academies. Educating the Student Body: Taking Physical Activity and Physical Education to School. 2013. http://www.nationalacademies.org/hmd/Reports/2013/Educating-the-Student-Body-Taking-Physical-Activity-and-Physical-Education-to-School.aspx Accessed August 13, 2018.
3 U.S. Department of Health and Human Services. 2018 Physical Activity Guidelines Advisory Committee. 2018 Physical Activity Guidelines Advisory Committee Scientific Report. Washington, DC. https://health.gov/paguidelines/second-edition/report/pdf/PAG_Advisory_Committee_Report.pdf Accessed on December 4, 2018.
4 Dolezal, BA, Neufeld, EV, Boland, DB, Martin, JL, & Cooper CB. 2017. Interrelationship between Sleep and Exercise: A Systematic Review. *Advances in Preventive Medicine*, 2017: 1364387.
5 Tarokh L, Saletin JM, Carskadon MA. Sleep in adolescence: physiology, cognition and mental health. *Neuroscience and Biobehavioral Reviews*. 2016; 70:182-188. doi:10.1016/j.neubiorev.2016.08.008
6 Yoon C, Levanon Seligson A, McGlinchey E, Davila M. Inadequate Sleep and Mental Health of New York City School Children and Adolescents. New York City Department of Health and Mental Hygiene: Epi Data Brief (99); January 2018.

MORE **New York City Health Data and Publications at** nyc.gov/health/data

Visit EpiQuery – the Health Department's interactive health data system at nyc.gov/health/EpiQuery

New York City Department of Health and Mental Hygiene

Epi Data Tables

Physical Activity and Mental Health of New York City Public High School Students

Data Tables

Table 1.	Physical activity, amount of sleep, and mental health of New York City public high school students, 2017
Table 2.	Mental heath outcomes and adequacy of sleep by days of physical activity, sex, and race/ethnicity of New York City public high school students, 2017

Data Sources

2017 New York City Youth Risk Behavior Survey (2017 NYC YRBS) is a biennial self-administered, anonymous survey conducted in NYC public high schools by the Health Department and the NYC Department of Education. For more survey details, visit https://www1.nyc.gov/site/doh/data/data-sets/nyc-youth-risk-behavior-survey.page

The analyses in this Epi Data Brief focused on 7,638 high school students in grades 9 through 12 who provided a valid response to the physical activity question on the survey. These adolescents represented 206,698 adolescents in NYC.

Table 1. Physical activity, amount of sleep, and mental health of New York City public high school students, 2017

Source: NYC Youth Risk Behavior Survey, 2017

Data are weighted to the NYC high school student population.

	Total Analytic Sample ᵠ	
	%	**95% CI**
Number of days physically active for 60(+) minutes per day, past 7 days		
0 days	18.2	(16.4, 20.3)
1 day	8.5 ᴰ	(7.5, 9.5)
2 days	11.9	(10.9, 12.9)
3 days	12.3	(11.0, 13.6)
4 days	10.1	(9.1, 11.1)
5 days	12.2	(10.8, 13.8)
6 days	6.1	(5.3, 6.9)
7 days	20.8	(19.4, 22.3)
Hours sleeping per day on an average school night		
4 or less hours	13.7	(12.3, 15.2)
5 hours	14.8	(13.7, 15.9)
6 hours	23.2	(21.8, 24.7)
7 hours	25.6	(24.1, 27.2)
8 hours	16.9	(15.4, 18.6)
9 hours	4.2	(3.4, 5.2)
10(+) hours	1.7	(1.4, 2.0)
Adequacy of sleep		
Inadequate sleep (< 8 hours)	77.2	(74.9, 79.4)
Adequate sleep (>= 8 hours)	22.8	(20.6, 25.1)
Felt sad or hopeless almost everyday for 2(+) weeks in a row, past 12 months		
Yes	31.0	(29.2, 32.9)
No	69.0	(67.1, 70.8)
Seriously considered suicide, past 12 months		
Yes	16.3	(15.0, 17.6)
No	83.7	(82.4, 85.0)
Number of suicide attempts, past 12 months		
0 times	89.9	(88.5, 91.1)
1 time	5.8	(5.0, 6.8)
2(+) times	4.3	(3.7, 5.0)
Non-suicidal self-harm, past 12 months		
Yes	16.7	(15.3, 18.2)
No	83.3	(81.8, 84.7)

U indicates rounding up.

D indicates rounding down

95% confidence intervals (CIs) are a measure of estimate precision. The wider the interval, the more imprecise the estimate.

ɸ Analysis restricted to high school students who indicated they were in grade 9 through 12 and with a non-missing response to the physical activity item on the survey

Mental health outcomes and adequacy of sleep by days of physical activity, sex, and race/ethnicity of New York City public high school students, 2017

Sources: NYC Youth Risk Behavior Survey, 2017

Data are weighted to the NYC public high school student population.

	Felt sad or hopeless almost everyday for 2(+) weeks in a row (past 12 months)			Seriously considered suicide (past 12 months)			Number of suicide attempts (past 12 months)									Non-suicidal self-harm (past 12 months)			Getting adequate sleep, average school night (≥ 8 hours/day)		
	Yes			Yes			0 times			1 time			2 or more times			Yes			Yes		
Total	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value
Total	31.0	(29.2, 32.9)		16.3	(15.0, 17.6)		89.9	(88.5, 91.1)		5.8	(5.0, 6.8)		4.3	(3.7, 5.0)		16.7	(15.3, 18.2)		22.8	(20.6, 25.1)	
Number of days physically active for 60(+) minutes per day, past 7 days																					
0-2 days	36.1	(34.5, 37.7)	Referent	20.8	(18.3, 23.5)	Referent	85.4	(83.1, 87.4)	Referent	8.5 D	(7.3, 9.8)	Referent	6.2	(4.9, 7.7)	Referent	20.9	(18.7, 23.2)	Referent	17.6	(15.0, 20.6)	Referent
3-7 days	27.9	(25.5, 30.4)	**<0.001**	13.5 D	(12.1, 14.9)	**<0.001**	92.6	(91.5, 93.6)	**<0.001**	4.2	(3.3, 5.4)	**<0.001**	3.2	(2.5, 4.6)	**0.001**	14.1	(12.7, 15.6)	**<0.001**	26.0	(23.7, 28.4)	**<0.001**
Number of days physically active for 60(+) minutes per day, past 7 days																					
0 or 1 days	37.2	(35.1, 39.2)	Referent	21.2	(18.8, 23.8)	Referent	83.6	(80.8, 86.1)	Referent	9.4	(7.6, 11.7)	Referent	7.0	(5.6, 8.7)	Referent	21.0	(18.8, 23.4)	Referent	17.0	(14.0, 20.6)	Referent
2 to 3 days	32.8	(29.8, 35.8)	**0.016**	17.3	(14.6, 20.4)	**0.017**	89.4	(87.4, 91.1)	**<0.001**	5.6	(4.4, 7.0)	**0.004**	5.0	(4.1, 6.2)	**0.022**	18.2	(15.7, 21.1)	**0.050**	21.3	(18.9, 23.9)	**0.023**
4 to 5 days	27.5 D	(24.5, 30.6)	**<0.001**	12.4	(10.1, 15.1)	**<0.001**	94.6	(92.4, 96.2)	**<0.001**	3.8	(2.4, 5.9)	**<0.001**	1.6	(1.0, 2.5)	**<0.001**	13.3	(11.6, 15.2)	**<0.001**	24.7	(21.2, 28.5)	**<0.001**
6 to 7 days	26.5	(23.1, 30.3)	**<0.001**	13.8	(12.0, 15.9)	**<0.001**	92.3	(90.7, 93.6)	**<0.001**	4.3	(3.4, 5.6)	**<0.001**	3.4	(2.4, 4.8)	**0.001**	13.8	(11.8, 16.1)	**<0.001**	28.2	(25.4, 31.0)	**<0.001**
Sex																					
Female	37.6	(35.2, 40.0)	Referent	19.2	(17.5, 21.0)	Referent	89.5	(87.7, 91.1)	Referent	6.1	(5.2, 7.1)	Referent	4.3	(3.3, 5.8)	Referent	19.5 U	(17.8, 21.4)	Referent	22.4	(19.7, 25.3)	Referent
Male	23.6	(21.9, 25.3)	**<0.001**	12.8	(11.3, 14.6)	**<0.001**	90.8	(89.6, 92.0)	0.104	5.3	(4.3, 6.6)	0.187	3.8	(3.2, 4.7)	0.512	13.1	(11.4, 15.1)	**<0.001**	23.5 D	(21.1, 26.0)	0.431
Race/ethnicity ᵠ																					
White	28.5 D	(24.6, 32.7)	Referent	14.5 D	(11.9, 17.5)	Referent	93.0	(89.0, 95.6)	Referent	4.2	(2.4, 7.2)	Referent	2.8	(1.6, 4.8)	Referent	15.5 D	(12.6, 18.9)	Referent	22.7	(19.0, 26.9)	Referent
Black	29.8	(26.8, 32.9)	0.639	16.3	(13.5, 19.6)	0.396	89.0	(86.6, 91.0)	**0.032**	7.0	(5.7, 8.6)	**0.030**	4.0	(2.8, 5.6)	0.256	13.1	(11.1, 15.5)	0.143	22.0	(19.3, 25.0)	0.765
Latino	34.2	(31.4, 37.1)	**0.028**	17.8	(16.0, 19.8)	0.051	88.7	(86.6, 90.6)	**0.031**	6.2	(5.1, 7.6)	0.101	5.0	(4.0, 6.3)	**0.042**	19.6	(17.7, 21.6)	**0.015**	24.4	(21.5, 27.5)	0.540
Asian	26.8	(23.2, 30.8)	0.588	14.2	(12.7, 16.0)	0.876	93.8	(91.6, 95.5)	0.705	3.4	(2.3, 5.0)	0.592	2.8	(1.9, 4.2)	0.987	13.5 D	(11.6, 15.6)	0.196	21.8	(17.4, 27.0)	0.769
Other	38.0	(33.3, 43.0)	**0.002**	19.1	(16.0, 22.7)	**0.038**	84.4	(79.7, 88.2)	**0.009**	10.3	(7.5, 13.9)	**0.004**	5.3	(3.0, 9.2)	0.207	20.1	(16.1, 24.8)	0.091	18.8	(14.3, 24.3)	0.201

*Estimate should be interpreted with caution. Estimate's Relative Standard Error (a measure of estimate precision) is greater than 30%, or the 95% CI's half width is greater than 10, or the sample size is too small, making the estimate potentially unreliable.

U indicates rounding up.

D indicates rounding down

95% confidence intervals (CIs) are a measure of estimate precision. The wider the interval, the more imprecise the estimate.

Bold p-values indicate a statistically significant difference from the reference group.

Ψ For the purpose of this publication, Latino includes persons of Hispanic or Latino origin, as identified by the survey question "Are you Hispanic or Latino?" and regardless of reported race. Black, White, Asian and Other race categories exclude those who identified as Latino.