

# Letters

## RESEARCH LETTER

### Prevalence and Likelihood of Meeting Sleep, Physical Activity, and Screen-Time Guidelines Among US Youth

Sleep, physical activity, and screen-time behaviors among adolescents are risk factors for physical health (eg, obesity),

mental and emotional health, behavioral outcomes (eg, tobacco use), and performance-based outcomes (eg, academic achievement).<sup>1-3</sup> Accordingly, it is recommended that children (age 6-12 years) sleep 9 to 12 hours and adolescents (age 14-18 years) sleep 8 to 10 hours a night and that both groups accumulate at least 1 hour of moderate-intensity or vigorous-

**Table. Prevalence and Adjusted Relative Odds of Meeting Recommendations for Sleep, Screen Time, and Physical Activity Among US Youth per Youth Risk Behavior Surveillance Survey, 2011-2017**

Characteristic	Sample Size, No.	Youth Meeting Sleep, Physical Activity, and Screen-Time Recommendations			Adjusted Odds Ratio (95% CI)		
		Weighted % (95% CI)	Female	Male	Overall	Female	Male
Overall	59 397	5.0 (4.6-5.4)	3.0 (2.7-3.3)	7.0 (6.5-7.5)	NA	NA	NA
Age, y							
≤14	6659	5.8 (4.9-6.6)	3.7 (2.9-4.6)	8.0 (6.6-9.5)	1 [Reference]	1 [Reference]	1 [Reference]
15	14 837	5.6 (4.9-6.3)	3.4 (2.8-4.0)	7.8 (6.7-8.8)	0.91 (0.74-1.12)	0.90 (0.68-1.19)	0.92 (0.70-1.19)
16	15 120	4.6 (4.1-5.2)	2.6 (2.0-3.1)	6.7 (5.8-7.5)	0.77 (0.63-0.94)	0.70 (0.52-0.95)	0.80 (0.63-1.01)
17	14 309	3.4 (3.0-3.8)	1.9 (1.5-2.3)	4.9 (4.1-5.6)	0.54 (0.44-0.66)	0.50 (0.36-0.70)	0.56 (0.43-0.72)
≥18	8472	6.8 (6.0-7.6)	4.3 (3.3-5.2)	8.8 (7.6-10.1)	1.09 (0.89-1.35)	1.21 (0.87-1.68)	1.05 (0.81-1.37)
Race/ethnicity							
Non-Hispanic white	32 687	6.3 (5.8-6.8)	3.8 (3.3-4.2)	8.9 (8.1-9.6)	1 [Reference]	1 [Reference]	1 [Reference]
Non-Hispanic black	8244	2.0 (1.6-2.5)	1.3 (0.9-1.7)	2.8 (2.0-3.5)	0.31 (0.25-0.39)	0.34 (0.23-0.49)	0.30 (0.23-0.40)
Hispanic/Latino	12 838	4.0 (3.5-4.4)	2.5 (2.0-3.0)	5.4 (4.7-6.1)	0.66 (0.58-0.75)	0.71 (0.55-0.92)	0.64 (0.54-0.75)
Non-Hispanic Asian	2015	2.5 (1.6-3.5)	0.9 (0.2-1.7)	4.0 (2.2-5.8)	0.37 (0.25-0.55)	0.22 (0.10-0.50)	0.44 (0.37-0.71)
Other <sup>a</sup>	3613	4.8 (3.8-5.8)	2.5 (1.7-3.4)	7.1 (5.4-8.8)	0.81 (0.66-1.01)	0.74 (0.51-1.09)	0.84 (0.65-1.09)
Weight categories							
Normal weight <sup>b</sup>	39 855	5.5 (5.1-5.9)	3.4 (3.0-3.7)	7.8 (7.1-8.4)	1 [Reference]	1 [Reference]	1 [Reference]
Underweight <sup>c</sup>	1728	4.4 (2.9-5.9)	2.4 (0.7-4.1)	5.7 (3.6-7.7)	0.72 (0.50-1.03)	0.72 (0.34-1.50)	0.72 (0.48-1.09)
Overweight <sup>d</sup>	9467	4.4 (3.7-5.1)	2.4 (1.8-3.1)	6.4 (5.2-7.6)	0.80 (0.68-0.95)	0.79 (0.61-1.03)	0.81 (0.65-0.99)
Obese <sup>e</sup>	8347	3.3 (2.8-4.0)	1.5 (1.0-2.0)	4.6 (3.7-5.5)	0.57 (0.47-0.69)	0.48 (0.33-0.71)	0.59 (0.48-0.73)
Tobacco use							
Nonuser	47 542	4.8 (4.5-5.2)	3.1 (2.8-3.4)	6.7 (6.1-7.3)	1 [Reference]	1 [Reference]	1 [Reference]
User <sup>f</sup>	11 855	5.6 (5.0-6.4)	2.3 (1.6-3.0)	7.7 (6.7-8.7)	1.27 (1.07-1.50)	0.99 (0.69-1.44)	1.32 (1.08-1.61)
Alcohol use							
Nonuser	38 707	5.2 (4.8-5.6)	3.4 (3.0-3.8)	7.0 (6.3-7.6)	1 [Reference]	1 [Reference]	1 [Reference]
User <sup>f</sup>	20 690	4.6 (4.1-5.1)	2.2 (1.9-2.6)	7.0 (6.2-7.8)	0.93 (0.81-1.07)	0.72 (0.56-0.93)	1.04 (0.86-1.35)
Marijuana use							
Nonuser	46 162	5.3 (4.9-5.6)	3.2 (2.8-3.5)	7.4 (6.8-8.0)	1 [Reference]	1 [Reference]	1 [Reference]
User <sup>f</sup>	13 235	4.1 (3.6-4.6)	2.2 (1.7-2.7)	5.7 (4.9-6.5)	0.81 (0.69-0.96)	1.06 (0.79-1.43)	0.75 (0.61-0.92)
Asthma							
Never diagnosed	19 172	5.0 (4.6-5.5)	2.7 (2.5-3.2)	7.2 (6.5-7.8)	1 [Reference]	1 [Reference]	1 [Reference]
Diagnosed <sup>g</sup>	34 288	4.9 (4.4-5.4)	3.2 (2.8-3.7)	6.6 (5.9-7.4)	1.00 (0.89-1.13)	1.16 (0.98-1.39)	0.94 (0.81-1.08)
Depression							
No symptoms	41 631	6.1 (5.7-6.6)	3.8 (3.4-4.3)	7.9 (7.3-8.5)	1 [Reference]	1 [Reference]	1 [Reference]
Symptoms <sup>h</sup>	17 766	2.3 (2.0-2.6)	1.7 (1.3-2.0)	3.5 (2.9-4.1)	0.44 (0.38-0.50)	0.46 (0.36-0.57)	0.43 (0.36-0.52)

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); NA, not applicable.

<sup>a</sup> Includes Native Hawaiian/Pacific Islander and non-Hispanic individuals of multiple race/ethnicities.

<sup>b</sup> Normal weight is defined as a body mass index (BMI) percentile from the 5th to less than the 85th percentile.

<sup>c</sup> Underweight is defined as a BMI percentile equal to or less than the 5th percentile.

<sup>d</sup> Overweight is defined as a BMI percentile from the 85th to less than the 95th percentile.

<sup>e</sup> Obesity is defined as a BMI percentile equal to or greater than the 95th percentile.

<sup>f</sup> Tobacco, alcohol, and marijuana use are defined as reporting use at least once in the last 30 days.

<sup>g</sup> Asthma diagnosis is defined as reporting having ever been told by a physician or nurse that he or she has asthma.

<sup>h</sup> Depression is defined as a patient reporting feeling so sad or hopeless almost every day for a 2-week period or longer within the last 12 months that he or she stopped doing some usual activities.

intensity aerobic physical activity and limit screen time (ie, exposure to all screen-based digital media) to less than 2 hours within a 24-hour period.<sup>3,4</sup> Meeting recommendations for all 3 behaviors may have a greater association with health outcomes than meeting any 1 recommendation in isolation. However, the prevalence and likelihood of US adolescents meeting these recommendations in combination across various sociodemographic factors is unknown.

**Methods** | Cross-sectional data from the 2011, 2013, 2015, and 2017 cycles of the Youth Risk Behavior Surveillance Survey were used. Multiple imputation by chained equations were used to address missing data issues and to derive the final analytic data set including all participants. Determination of recommendations met was based on the behavioral targets defined.

Prevalence estimates and the adjusted log odds of concurrently achieving the recommendations for sleep, physical activity, and screen time were estimated by sex and in strata by age, race/ethnicity, body mass index, risky behaviors, reported asthma diagnosis, and presence of depression symptoms. The study protocol was reviewed by The University of Texas Health Science Center at Houston Committee for the Protection of Human Subjects and received exempt status. Data are deidentified, and informed consent from participants was not required. All analyses were conducted using Stata version 15.1 (StataCorp), and results were considered significant at the .05 level (2-sided).

**Results** | A total of 59 397 participants were included in the unweighted data set (Table). Overall, 5.0% (95% CI, 4.6-5.4) of US adolescents met recommendations for sleep, physical activity, and screen time concurrently. Stratified analysis by sex revealed a lower proportion of girls (3.0% [95% CI, 2.7%-3.3%]) than boys (7.0% [95% CI, 6.5%-7.5%]) met all 3 behavioral recommendations. The observed sex differences were consistent across all other subgroups of interest.

There were significant disparities in the odds of meeting all 3 behavioral recommendations by age (for participants of both sexes who were 16 years old: adjusted odds ratio [aOR], 0.77 [95% CI, 0.63-0.94] and 17 years old: aOR, 0.54 [95% CI, 0.44-0.66], compared with those 14 years and younger), race/ethnicity (non-Hispanic black participants: aOR, 0.31 [95% CI, 0.25-0.39]; Hispanic/Latino participants: aOR, 0.66 [95% CI, 0.58-0.75]; non-Hispanic Asian participants: aOR, 0.37 [95% CI, 0.25-0.55], compared with non-Hispanic white participants), body mass index (participants who were overweight: aOR, 0.80 [95% CI, 0.68-0.95]; participants with obesity: aOR, 0.57 [95% CI, 0.47-0.69], compared with participants of normal weight), marijuana use (aOR, 0.81 [95% CI, 0.69-0.96]), and depressive symptoms (aOR, 0.44 [95% CI, 0.38-0.50]). Girls who reported alcohol use had 28% (95% CI, 7%-44%; aOR, 0.72 [95% CI, 0.56-0.93]) lower odds of meeting all the recommendations concurrently compared with girls who did not use alcohol.

**Conclusions** | Study findings indicate that only 5% of US high school students (3% of girls; 7% of boys) spend the optimal time

sleeping and being physically active while limiting screen time, with important disparities shown by vulnerable subgroups. These findings demonstrate the need for future studies clarifying the role of parenting style and home environment. The multicomponent nature of these behaviors supports investigating systems-level interventions aimed at coordinating behavior changes at multiple levels of the social-ecological model.<sup>5</sup> Future research should also evaluate the synergistic associations between these behaviors, particularly if spending the optimum time in 1 behavior leads to more or less time in the other behaviors.

Self-reported data used in these analyses may be biased. This supports the need for device-based evaluations of the 24-hour cycle, including differences in behavioral profiles on weekdays and weekends.

Finally, findings have high clinical relevance, and suggest that physicians should be encouraged to use the 5 A's Behavior Change Framework and *ask* about these behaviors at every patient encounter, *advise* patients and parents on the importance of the behaviors, *assess* potential barriers to *assist* with counseling on best practices, and *arrange* for follow-up to reassess behaviors or refer to specialists as needed.<sup>6</sup>

Gregory Knell, PhD  
Casey P. Durand, PhD  
Harold W. Kohl III, PhD  
Ivan H. C. Wu, PhD  
Kelley Pettee Gabriel, PhD

**Author Affiliations:** Department of Health Promotion and Behavioral Science, The University of Texas Health Science Center at Houston, Dallas (Knell, Durand); Michael and Susan Dell Center for Healthy Living, The University of Texas Health Science Center at Houston, Austin (Knell, Durand); Department of Epidemiology, Human Genetics, and Environmental Sciences, The University of Texas Health Science Center at Houston, Austin (Kohl, Pettee Gabriel); Department of Kinesiology and Health Education, The University of Texas at Austin, Austin (Kohl); The University of Texas MD Anderson Cancer Center, Houston (Wu); Dell Medical School, The University of Texas at Austin, Austin (Pettee Gabriel).

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**Corresponding Author:** Gregory Knell, PhD, Michael & Susan Dell Center for Healthy Living, Department of Health Promotion & Behavioral Sciences, School of Public Health, The University of Texas Health Science Center at Houston, 6011 Harry Hines Blvd, Suite V7.116A, Dallas, TX 75239 ([gregory.knell@uth.tmc.edu](mailto:gregory.knell@uth.tmc.edu)).

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**Concept and design:** Knell, Durand, Kohl, Pettee Gabriel.

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**Drafting of the manuscript:** Knell, Durand, Wu.

**Critical revision of the manuscript for important intellectual content:** Knell, Durand, Kohl, Pettee Gabriel.

**Statistical analysis:** Knell, Durand, Wu.

**Supervision:** Durand, Kohl, Pettee Gabriel.

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## US National and State-Level Prevalence of Mental Health Disorders and Disparities of Mental Health Care Use in Children

In children, mental health disorders have deleterious consequences on individual and socioeconomic factors<sup>1</sup> and can impede healthful transitioning into adulthood,<sup>2</sup> and the incidence of mental health disorders has been increasing over the decades.<sup>3</sup> Recent initiatives led by global and national agencies were created to identify priority focus areas regarding the mental health-related burden. Some of the emerging priorities included developing child mental health policies, implementing prevention and early intervention strategies for transition-age youth, and reducing disparities for mental health care use.<sup>4</sup> This study sought to inform these initiatives by providing recent national and state-level estimates of the prevalence of treatable mental health disorders and mental health care use in children.

**Methods** | Data were from the 2016 National Survey of Children's Health, a nationally representative, parent-proxy survey of US children younger than 18 years.<sup>5</sup> The completion rate for those who initiated the web-based and mail-based survey instruments was 69.7%, with an overall response rate of 40.7%. A total of 50 212 surveys representing US children aged 0 to 17 years were completed.

Parents responded to the prompt, "Has a doctor or other health care provider EVER told you that this child has" a mental health disorder? If yes, parents responded to the prompt, "If yes, does this child CURRENTLY have the condition?" A mental health disorder was considered if the respondent reported yes to the second prompt for depression, anxiety problems, or attention-deficit/hyperactivity disorder compared with no from the first or second prompt for these conditions. Mental health care use in the last year

in children with at least 1 mental health disorder was determined by the prompt, "DURING THE PAST 12 MONTHS, has this child received any treatment or counseling from a mental health professional? Mental health professionals include psychiatrists, psychologists, psychiatric nurses, and clinical social workers."

Weighted prevalence estimates were calculated using SAS version 9.4 (SAS Institute) to account and adjust for the complex survey design. Logistic regression determined the association between mental health disorders and covariates. Covariates were selected based on their relevance to children and outcomes, availability in National Survey of Children's Health, and the extent of missingness to avoid data truncation (<2%). The prevalence of the 2 outcome measures were transformed into quartiles to determine state-specific disparities. Children without current health insurance and younger than 6 years were excluded. Prevalence estimates were compared between those with and without mental health disorders using  $\chi^2$  test. All *P* values were 2-tailed, and significance was set at a *P* value less than .05.

**Results** | An estimated 46.6 million children were included for analysis. The national prevalence of at least 1 mental health disorder was 16.5% (weighted estimate, 7.7 million). After adjustments, all covariates were associated with mental health disorders except for continuous insurance (Table). The state-level prevalence of at least 1 mental health disorder ranged from 7.6% (Hawaii) to 27.2% (Maine).

The national prevalence of children with a mental health disorder who did not receive needed treatment or counseling from a mental health professional was 49.4%, which ranged from 29.5% (Washington, DC) to 72.2% (North Carolina). After transforming state-level data into quartiles, Figure, A shows the prevalence of mental health disorders in children and Figure, B shows the prevalence of children with at least 1 mental health disorder who did not receive needed treatment or counseling from a mental health professional.

**Discussion** | The principal finding was that half of the estimated 7.7 million US children with a treatable mental health disorder did not receive needed treatment from a mental health professional. This estimate varied considerably by state. Of the 13 states that were in the top quartile for mental health disorder prevalence (Figure, A), Alabama, Mississippi, Oklahoma, and Utah were also in the top quartile for the prevalence of children with a mental health disorder who did not receive needed treatment (Figure, B).

State-level practices and policies play a role in health care needs and use,<sup>6</sup> which may help to explain the state variability observed in this study. Nevertheless, initiatives that assist systems of care coordination have demonstrated a reduction of mental health-related burdens across multiple domains.<sup>1</sup> Policy efforts aimed at reducing burden and improving treatment across states are needed.