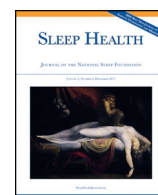




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## Racial/ethnic sleep disparities in US school-aged children and adolescents: a review of the literature

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## ABSTRACT

Sleep is essential for optimal health, well-being, and cognitive functioning, and yet nationwide, youth are not obtaining consistent, adequate, or high-quality sleep. In fact, more than two-thirds of US adolescents are sleeping less than 8 hours nightly on school nights. Racial and ethnic minority children and adolescents are at an increased risk of having shorter sleep duration and poorer sleep quality than their white peers. In this review, we critically examined and compared results from 23 studies that have investigated racial/ethnic sleep disparities in American school-aged children and adolescents ages 6–19 years. We found that White youth generally had more sufficient sleep than minority youth, Hispanics had more than Blacks, and there was inconclusive evidence for Asians and other minorities. Recommendations for researchers include the following: (1) explore underlying causes of the disparities of these subpopulations, with a particular interest in identifying modifiable causes; (2) examine factors that may be impacted by racial/ethnic sleep disparities; (3) use a multidimensional approach to measuring sleep disparities; and (4) examine how beliefs about sleep are patterned by race/ethnicity. Understanding sleep disparities can inform interventions, policies, and educational programs to minimize sleep disparities and their impact on health, psychological, and educational outcomes.

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## Introduction

Sleep is essential for optimal health, well-being, and cognitive functioning, and yet nationwide, youth are not obtaining consistent, adequate, or high-quality sleep.<sup>1,2</sup> A consensus statement on sleep time recommendations issued by the National Sleep Foundation advises that school-aged children (6–13 years) receive 9–11 hours, teenagers (14–17 years) receive 8–10 hours, and young adults (18–25 years) receive 7–9 hours of sleep nightly.<sup>3</sup> The Foundation also recommends obtaining high-quality sleep, which is indicated by falling asleep quickly, sleeping through the night, having high sleep efficiency, and taking fewer naps during the day.<sup>4</sup> However, youth are not meeting these guidelines, as more than two-thirds of US adolescents sleep fewer than 8 hours nightly on school nights.<sup>5</sup>

Insufficient sleep can lead to a host of adverse health, psychological, and educational outcomes. Although most documented health outcomes associated with inadequate sleep have been established primarily in adult populations,<sup>6</sup> the evidence among pediatric populations is growing. In a nationally-representative longitudinal study, children and adolescents 3 to 18 years with shorter sleep durations, later bedtimes, or earlier wake times at baseline were more likely to be overweight and have higher body mass indexes at 5-year followup.<sup>7</sup> Additionally, poor sleep can impair cognitive functioning and emotional regulation,<sup>8–11</sup> as a cross-sectional study of children 7 to 11 years showed that longer actigraphy-measured habitual sleep duration was associated with improved academic performance, IQ, and reasoning skills.<sup>12</sup> Furthermore, youth experience a number of biological and social changes that prime them for sleep insufficiency including early school start times,<sup>13–15</sup> circadian phase delay,<sup>16</sup> bedtime autonomy,<sup>17</sup> academic pressures,<sup>18</sup> part-time jobs,<sup>19</sup> and technology<sup>20,21</sup> and caffeine use.<sup>21</sup> The importance of combatting these challenges that youth face to obtaining adequate sleep has gained recent widespread recognition, evident in Healthy People 2020's objective to increase the proportion of adolescents that obtain sufficient sleep.<sup>22</sup>

Sociodemographic characteristics such as race/ethnicity may also influence sleep behaviors and patterns.<sup>23</sup> Race and ethnicity are social constructs that encompass social groupings based on societal and cultural values, beliefs, norms, and practices, where the latter term's main purpose is to discern the groupings of the former, such as "Hispanic white" vs "non-Hispanic white."<sup>24</sup> In this review, we operationalize the term *race/ethnicity* to refer to these socially constructed groupings and subgroupings. One's racial/ethnic identification can impact sleep habits and patterns and even influence physiological processes, which in turn can also disrupt sleep.<sup>23</sup> In adults, Blacks are more likely than Whites to report short<sup>25,26</sup> or long sleep duration,<sup>27,28</sup> which are both risk factors for increased morbidity and mortality.<sup>27,28</sup> Additionally, Black adults are more likely to have poorer self-reported sleep quality and greater daytime sleepiness than Whites.<sup>26</sup>

Several reviews and meta-analyses have documented sleep disparities by race/ethnicity in the general and/or adult population.<sup>27,29–34</sup> Emerging literature has also explored childhood and adolescent sleeping patterns, but how these differ by race/ethnicity has not been well examined,<sup>35,36</sup> as most sleep studies in this age group tend to feature small and homogeneous study samples, focusing primarily on Whites.<sup>37</sup> No reviews to date have focused their attention exclusively on racial/ethnic disparities in sleep patterns among US children and/or adolescents, or how different methodological considerations may impact findings of racial/ethnic sleep disparities in this population.

This review builds on previous literature by critically reviewing previous studies that have examined racial/ethnic sleep disparities in school-aged children and adolescents in the United States. The purpose of this review was to (1) critically examine and summarize existing studies that have investigated racial/ethnic differences in a

variety of sleep outcomes in US school-aged children and adolescents ages 6–19 years old, (2) explore how racial/ethnic sleep disparities may differ by study methodology, and (3) identify impactful areas for future research.

## Methods

On June 5, 2017, four databases (PubMed, Web of Science, Embase, and PsycInfo) were searched with the phrase "sleep and (children or adolescents or young adults) and (race or ethnic groups or ethnicity) and (duration or bedtime or wake time or sleep wake problems or sleep problems or sleepiness or efficiency or variability or onset or activity or sleep onset latency or inadequate sleep or sleep disturbance or insomnia or hypersomnia or quality or fragmentation)." No start date filter was used, and the search yielded 1943 records (Fig. 1). Additional articles were located through searching Google Scholar and hand-searching references from other articles. Articles were deemed eligible if they met the following inclusion criteria: (1) study examined sleep disparities as one of its primary objectives; (2) study was a peer-reviewed publication; (3) study was written in English; (4) study sample was from the United States; (5) results included descriptive data on racial/ethnic disparities in one or more sleep outcomes; and (6) majority or all of the study sample was within the age range of 6–19 years, or the study separated results by age group. Figure 1 describes the article screening process. We identified 23 studies included in this review (Table 1).

This review conceptualizes sleep disparities as discrepancies between races/ethnicities in a variety of sleep dimensions, with a special focus on sleep duration, sleep/wake problems (including insomnia symptoms and inadequate sleep), and bedtime/sleep onset. Additionally, this review defines the term *minority* as all races/ethnicities other than White. We critically analyzed and synthesized studies assessing sleep disparities in US school-aged children and adolescents. Three of the authors (DG, JG, JC) independently reviewed all of the articles included for completion of Tables 1, 2, and A1, which compared findings by study methodology, including sleep variables measured, age of participants, instruments used for data collection, and whether studies examined covariates. Any inconsistencies in interpretation of findings were discussed and resolved.

## Results

Table 1 summarizes characteristics of the 23 studies that assessed sleep disparities across race/ethnicity in American children and adolescents. Studies included both local and national samples of children and adolescents, with the majority of the local studies stemming from southern US regions. Study designs were mainly cross-sectional (87%), and several were prospective cohort (13%). Study sizes ranged from 60 to 272,077 participants, most had approximately equal proportions of males and females, and were racially/ethnically diverse. Roughly half of studies examined a single sleep outcome (52%), and the other half (48%) examined more than one sleep outcome. Sleep duration was the most commonly measured outcome (78%), followed by sleep/wake problems (30%) and then bedtime/sleep onset (22%). Other outcomes examined were wake time, daytime sleepiness, efficiency, night-to-night variability (in duration, bedtime, sleep onset, and wake time), quality, and fragmentation. Instruments and data sources used to measure sleep outcomes varied widely (Table 2).

Overall, every study found racial/ethnic disparities for at least 1 sleep outcome. Studies frequently used Whites as a reference group and found that this population had better or more sleep than minorities. There were fewer studies examining differences in sleep across 2 or more minority groups, but several studies indicated that Blacks

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