Health Disparities in Pediatric Sleep

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KEYWORDS

• Adolescence • Disparities • Early childhood • Health equity • Middle childhood • Pediatrics • Sleep

KEY POINTS

- Cross-sectional and longitudinal research has established that there are disparities in pediatric sleep health and sleep disorders by race, ethnicity, and socioeconomic status from birth through adolescence.
- Factors at multiple socioecological levels (ie, child, family, school, health-care system, neighborhood, and sociocultural), including historical and ongoing racism, discrimination, and oppression, contribute to these disparities.
- Mechanistic research and studies using an intersectional lens to understand overlapping marginalized identities are needed to advance sleep health disparities research.
- Interventions addressing multilevel socioecological determinants of disparities are needed to promote pediatric sleep health equity.

PEDIATRIC SLEEP HEALTH DISPARITIES

The National Institute of Minority Health and Health Disparities (NIMHD) defines a health disparity as a health difference that adversely affects disadvantaged populations on one or more health outcomes.[1] Health disparity populations include individuals from racially and ethnically minoritized backgrounds, those of lower socioeconomic status (SES) backgrounds, gender minorities, rural populations, and those with identities at the intersection of these and other categories. This article reviews disparities in pediatric sleep health and sleep disorders and potential determinants of these disparities. Much of this research focuses on disparities by race and ethnicity, which are sociopolitical constructs.[2,3] Observed disparities do not result from biological differences by race and ethnicity but rather are a manifestation of historical and ongoing racism, discrimination, and oppression that produce differential exposure to adverse social and environmental factors. Accordingly, we apply a socioecological framework[4] to examine interacting social and environmental factors that may contribute to pediatric sleep health disparities and their related outcomes (**Fig. 1**). These factors exist at multiple levels of the social ecology, including the individual child and family levels, the educational and health-care systems levels, and the broader neighborhood/community level and sociocultural context.

As defined by Buysse[5] and expanded for pediatrics,[6] sleep health is a multidimensional construct that encompasses sleep patterns (eg, duration, continuity/awakenings), perceived sleep quality, alertness, and sleep-related behaviors (eg, bedtime routines, electronics usage). Sleep disorders in this review include behavioral concerns, such as insomnia and related symptoms (eg, broad caregiver-perceived or child/adolescent-perceived sleep problems, difficulty falling/returning to sleep) and medically based concerns.[7]

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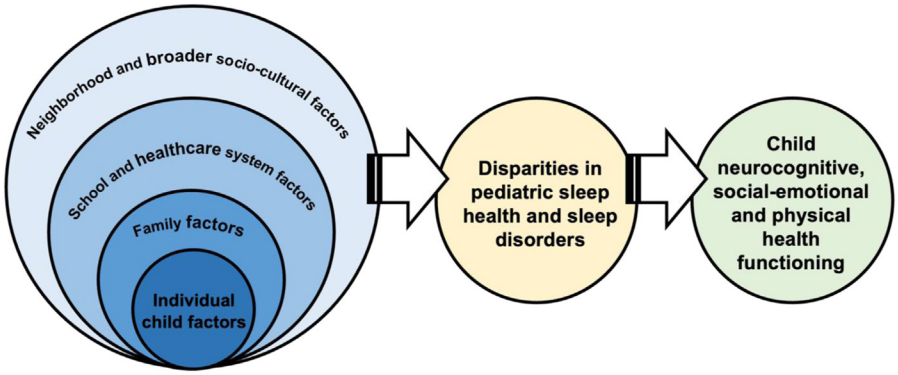

Fig. 1. Socioecological framework applied to determinants and consequences of pediatric sleep health disparities.

Sleep disorder disparities research is mostly limited to insomnia and sleep disordered breathing (SDB). We review racial, ethnic, and socioeconomic disparities in sleep health and these sleep disorders by age, from early childhood (ages 0–5 years) through middle childhood (6–11 years) and adolescence (12–18 years). We then discuss socioecological contributors to these disparities and future research directions.

DISPARITIES IN SLEEP HEALTH

Early Childhood

Research primarily conducted in the United States (US) has demonstrated that racial, ethnic, and socioeconomic sleep health disparities begin in early development. Most studies have examined sleep duration, continuity (awakenings), and behaviors, particularly bedtime routines. Studies of infants and toddlers show that those of African American/Black (hereafter, "Black"), Hispanic/Latinx (hereafter, "Latinx"), and Asian backgrounds tend to obtain less sleep than their non-Hispanic/Latinx White (hereafter, "White") counterparts.[8–13] A study following 194 infants from ages 1 to 6 months found that Latinx infants' nighttime sleep duration was approximately 30 minutes less at 1 month and an hour less at 6 months compared with White infants.[9] These racial differences in nighttime sleep duration have persisted during the coronavirus pandemic.[10] A systematic review of sleep in 2 to 5 year olds found that White children had longer nighttime sleep duration and napped less frequently than Black and Latinx children,[14] suggesting that disparities in nighttime sleep duration could be due to differences in daytime sleep. Nonetheless, longitudinal research has demonstrated that despite differences in napping, total (24 hours) sleep duration was shorter in Black, Latinx, and Asian infants from birth to age 2, by approximately 24 minutes, 49 minutes, and 57 fewer minutes of sleep per day, respectively, compared with White infants.[11]

In some studies, when adjusting for family SES, racial, and ethnic differences in sleep duration attenuate for Latinx and Black children but remain or become stronger for Asian children.[12,15] A study of 9-month-olds modeled cumulative exposure to multiple family SES variables, such as maternal education and family poverty, and found that greater cumulative risks were associated with a long sleep onset latency and/or frequent and long night awakenings.[16] There is also evidence that young children living in lower-SES neighborhoods, typically indexed according to US Census data, experience later bedtimes, a long sleep onset latency, and short sleep duration compared with those in higher SES neighborhoods, although this research does not always include both family and neighborhood SES.[17,18] A study of 80 Black infants found that after controlling for family SES, infants in lower-SES neighborhoods had more night awakenings, suggesting unique neighborhood-level links with sleep.[19]

Most early childhood sleep health research has focused on bedtime routines, with a systematic review showing that consistent bedtime routines are less prevalent among Latinx and Black children compared with White children.[14] In addition to this finding, a study of 3217 3-year-olds found that children with a mother who had less education, those with a lower family income, and those in larger households were also less likely to have a bedtime routine.[20] In another study, greater cumulative risk, indexed by family and neighborhood SES as well as caregiver depressive symptoms, was associated with greater likelihood of poor sleep health, including an inconsistent bedtime routine, insufficient sleep duration, and caffeine consumption.[21]

Middle Childhood

A systematic review of racial and ethnic sleep health disparities in children aged 6 to 19 years found that across ages, White youth consistently obtain more sleep than Black and Latinx youth, with inconclusive results for Asian youth.[22] A study of 1293 youth aged 6 to 12 years found that Asian, Black, and Latinx children slept an average of 23, 17, and 14 minutes less than White children.[23] A previously discussed longitudinal study found that at every time point from birth to age 7, Black, Latinx, and Asian children were more likely to obtain insufficient sleep compared with White children, although including SES in analyses attenuated differences for Black and Latinx children.[12]

Compared with early childhood research, fewer studies of socioeconomic sleep health disparities have been conducted with school-aged children. In a study of socioeconomic position (SEP), objective SEP (family income) was related to self-reported child sleep duration, whereas subjective SEP was related to daytime sleepiness and caregiver-reported sleep duration but only in children aged 8 to 13 years but not adolescents.[24] In another study, children who grew up in neighborhoods with historically high poverty were more likely to exhibit insufficient sleep duration.[25] A study of third-grade and fourth-grade children examined associations among multiple SES indicators and actigraphic sleep, and moderation by race and ethnicity.[26] Poor caregiver-perceived economic well-being was linked to short actigraphy-derived sleep minutes and variable sleep onset, while children attending impoverished schools had a short sleep duration. Lower maternal education was linked to low sleep efficiency in Black but not White children, underscoring the importance of examining race, ethnicity, and multiple SES indicators.

Adolescence

As in research on school-aged children, most adolescent sleep health disparities studies have focused on sleep duration. In a systematic review, Black youth obtained less sleep than White and Latinx youth but findings for Asian youth were inconclusive.[22] A study of 1543 adolescents found that Black and Latinx youth reported shorter sleep duration than both White and Asian youth.[27] The same study found race by gender interactions, with Latinx men obtaining less sleep than White and Asian men, and Black women obtaining less sleep than White women. Another study found that Black adolescents obtained approximately 35 minutes less sleep and more actigraphy-derived wake after sleep onset than both Latinx and Asian youth.[28] Another study has shown short actigraphy-derived nighttime sleep duration[29] and fragmented sleep[30] in Black versus White adolescents, although in one study total 24-hour sleep duration did not differ by race.[29]

With regard to socioeconomic disparities, a study of adolescents found that those of lower SES backgrounds had a longer sleep onset, shorter duration, and greater weekday to weeknight variability compared with youth of higher-SES.[31] In another study of multiple objective and subjective SES factors, objective SEP was related to adolescents' perceived sleep disturbances, whereas subjective SEP was associated with poor self-reported sleep quality and short caregiver-reported child sleep duration.[24] Lower SES may also exacerbate linkages between poor sleep health and adolescent functioning.[32] Adjusting for race and ethnicity, shorter and less efficient actigraphy-derived sleep patterns in older adolescents were linked to worse cognitive and behavioral functioning but only among youth from lower SES backgrounds.[32]

BEHAVIORAL SLEEP DISPARITIES

Early Childhood

One of the few studies examining racial and ethnic differences in caregiver-perceived child sleep problems found that a higher proportion of White mothers of preschoolers reported concerns about their child's difficulty falling asleep compared with Black but not Latina mothers.[33] In another study, Black caregivers reported increased preschooler bedtime difficulties compared with White caregivers but there were no racial differences in the proportion of caregiver-reported overall child sleep problems.[34] A study of sleep disorders diagnosed in primary care found that White infants and toddlers were more likely to receive any sleep disorder diagnosis, including insomnia, than those from Black or "other" racial and ethnic backgrounds.[7] With regard to socioeconomic variation, research on 14,980 young children found that caregivers living in neighborhoods with the lowest SES, determined via a US Census-based index, were less likely to report a child sleep problem than those in higher SES neighborhoods, despite shorter caregiver-reported child sleep duration and longer sleep onset latencies among those in lower SES neighborhoods.[18] Research also indicates that preschoolers exposed to greater cumulative risks, including lower family and neighborhood SES, were more likely to have caregiver-reported insomnia symptoms.[21]

Middle Childhood

Some school-based research suggests increased caregiver-reported child sleep problems in Latinx

and Black children (94%) compared with a sample of predominantly White children (23%).[35,36] A retrospective study found that White patients were more likely than Black patients to present to a pediatric sleep clinic with behavioral sleep problems, such as difficulty falling asleep, than with medically-based sleep concerns.[37] A study of 271 children showed that having a lower SES background was associated with increased perceived sleep/wake problems and greater daytime sleepiness.[38] Other studies have examined interrelations among sociodemographic factors, sleep, and child outcomes. For instance, Black children with sleep problems had worse cognitive and academic functioning compared with White children with sleep problems.[39] In another study, Black children experiencing financial hardship exhibited a more variable sleep onset and more self-reported sleep problems compared with Black children without financial hardship, while no such pattern occurred in White children.[26]

Adolescence

Longitudinal research on a large cohort of youth with childhood insomnia symptoms (CISs) has demonstrated that symptoms tend to persist in Black and Latinx compared with White adolescents.[40] CIS persistence rates were higher in White youth from lower SES backgrounds compared with White youth from higher SES backgrounds, whereas persistence rates were higher in racially and ethnically minoritized youth regardless of SES. Trouble sleeping in older adolescents, which may reflect insomnia or the circadian disturbances that are prevalent among teenagers, also varies by family and neighborhood SES. Among older adolescents, lower perceived neighborhood cohesion was associated with trouble sleeping, and this effect was stronger in adolescents with lower maternal education.[41] One study found that Latinx adolescents reported fewer difficulties maintaining sleep than non-Latinx adolescents,[42] whereas another study found no differences among Black, Latinx, and White adolescents in insomnia prevalence.[43] In a study of multiple sociodemographic factors, adolescents identifying as "Mexican" (vs "Mexican-American") and foreign-born youth were at lower risk for insomnia, and those from lower SES backgrounds were higher risk for insomnia.[44]

MEDICAL SLEEP DISPARITIES

Early Childhood

Few studies have examined early childhood disparities in medical sleep disorders. Research is generally limited to SDB, a spectrum of breathing difficulties during sleep from mild snoring to severe obstructive sleep apnea (OSA).[45,46] One study found that Black infants and toddlers (25%) were more likely to exhibit habitual snoring (≥3 nights/wk) than White children (15%).[47] In another study, Black and Latinx preschoolers were more than twice as likely than White children to have SDB symptoms.[48] A Canadian study found that children aged 2 to 8 years with OSA were more likely to reside in more densely populated neighborhoods with lower average rates of family income and more single-parent households.[49]

Middle Childhood and Adolescence

SDB affects approximately 10% to 17% of children, with 1% to 3% experiencing OSA.[50,51] Black youth are 4 to 6 times more likely to experience SDB than White youth,[46,52] with some evidence of increased OSA severity on polysomnogram in Black compared with White children.[53] Children from lower-SES families and neighborhoods are also more likely to experience SDB than those living in higher SES contexts.[54–56] Disparities also exist in SDB treatment, likely due to differential access to and contact with the health-care system. Several studies indicate that OSA treatment via adenotonsillectomy is less prevalent in Black and Latinx compared with White youth.[54,57–59] A recent study found that Black and Latinx youth with Medicaid insurance were less likely to receive SDB surgical treatment compared with White youth, who also had shorter wait times for surgery.[60] Some research suggests that adenotonsillectomy for OSA may not improve OSA-related behavioral symptoms as much in Black youth compared with those of White and other racial and ethnic backgrounds.[59] Studies using insurance as a proxy for SES have additionally found that compared with those with private insurance, publicly insured youth tend to have lower adenotonsillectomy rates and greater SDB treatment delays, both in initial polysomnography and surgeries.[57,61]

MULTILEVEL DETERMINANTS OF PEDIATRIC SLEEP DISPARITIES

Bronfenbrenner's socioecological framework[4] (see **Fig. 1**) has been applied to understand contributors to pediatric sleep health[6] and to sleep health disparities across the life span[62] and in pediatric SDB.[63] The factors outlined below are not an exhaustive list of contributors. Future research is needed to identify how these, and other modifiable factors, can be leveraged to promote sleep health equity. Given its multilevel nature, racism (eg, systemic, structural, institutional; personally

mediated; and internalized)[64–67] and discrimination are included at each socioecological level.

Child Level

Child characteristics such as prematurity, respiratory issues, and obesity are linked with variation in sleep patterns and SDB and may contribute to disparities.[46,52] Early childhood temperament may also influence sleep patterns as a function of caregiver characteristics, such as mood or parenting style.[68,69] For example, compared with infants with "easy" temperaments, those with "difficult" temperaments exhibit poor sleep outcomes, including frequent night awakenings and short sleep duration.[69] A longitudinal study following mother–infant dyads from birth to age 6 months found that infant temperament moderated maternal emotional availability at bedtime and infant sleep duration, with high-surgency infants exhibiting greater increases in sleep duration in the context of higher maternal bedtime emotional availability.[70] As parenting behaviors vary cross-culturally, more research is needed on these linkages in racially and ethnically minoritized families and in other countries/regions.

Personally mediated and/or internalized racism and discrimination are other child-level factors linked with poor sleep, primarily in adolescents.[28,71–73] Daily discrimination was related to increased same-night sleep disturbances and next-day sleepiness in Asian, Black, and Latinx teens,[28] which could contribute to racial and ethnic sleep health disparities. A study of college students also found that discrimination was related to poor sleep, and that this association was stronger among students who also reported higher levels of internalized racism.[71]

Family Level

Sleep health literacy and beliefs are family factors that also may contribute to sleep health disparities. Lower sleep health literacy, which is correlated with SES, has been associated with poor child sleep health.[74,75] Research also shows that the negative sleep-related impacts of having a television in the bedroom are more pronounced among racially and ethnically minoritized children compared with their White peers.[76] Qualitative research indicates that limited sleep health knowledge may contribute to poor sleep in racially and ethnically minoritized adolescents.[77,78] One of these studies was conducted with American Indian/Alaska Native (AI/AN) teens, who described the importance of family cohesion in helping to maintain stable sleep environments and, in turn, optimal sleep health.[77]

The sleep environment, which includes sleep arrangements (ie, bed-sharing and room-sharing) as well as light, noise, and temperature, among other factors,[79] likely contributes to sleep health disparities. Families of lower-SES may need to bed-share and/or room-share due to limited resources, whereas other families may practice bed-sharing intentionally, as part of their cultural practices and/or preferences, or in response to a child sleep problem.[80,81] Generally, African and Asian countries/regions exhibit higher rates of bed-sharing compared with European and American countries/regions.[80,82] In one US study of families from low-SES backgrounds, Black and Latinx families were more likely to bed-share than White families.[83] The effects of sleep arrangements on child sleep are mixed, and likely depend on the context in which families are bed-sharing/room-sharing. Understanding this context is crucial for identifying how sleep arrangements and aspects of the sleep environment can be enhanced to promote sleep health equity, particularly among families experiencing noisy, crowded, and/or transitional sleep environments.

Qualitative research has also revealed that caregivers cite family work/school schedules, household responsibilities, and other family members' sleep schedules as barriers to child and family sleep health.[84–86] Among Black adolescents, more household chaos was associated with greater disruptions to youth sleep by other household members' behaviors, including electronics use and evening social visits.[87] Family irregularity has been longitudinally associated with more reported child sleep problems, short sleep duration, and long sleep onset.[88] Household chaos and family relationships are associated with child sleep in several other studies.[89] For instance, there is evidence that household chaos mediates associations between positive parenting and sleep health, and between family resources and child sleep duration.[90,91] One study found that better parent–child relationships were associated with decreased insomnia risk, particularly among Latinx adolescents compared with White and Black youth.[92]

Family members' experiences of racism and discrimination are also linked to child sleep. Caregiver experiences of racial discrimination, for example, are associated with short early childhood sleep duration.[93] Caregivers' experiences of racism may also impact factors associated with child sleep, including caregiver mood,[64–66-] parenting,[67] and caregivers' own sleep.[94] A study of gendered racial discrimination found that higher levels of mothers' gendered racial stress was directly associated with poor child sleep, although

racial/ethnic discrimination was not.[95] This finding highlights the importance of intersectionality in research on the role of racism and discrimination in sleep health disparities.

School/Health-Care Level

Although racism at the school and health-care system levels has not been studied in relation to child sleep, biases in these systems likely contribute to disparities in sleep-related outcomes and treatments. Research shows that teachers and health-care providers hold implicit pro-White/anti-Black biases, which can affect teacher–student and provider–patient interactions and result in differential care.[96–99] A systematic review found that health-care providers hold implicit racial and ethnic biases, and that these biases were associated with disparities in treatment recommendations and patient–provider communication, expectations, and empathy.[97] Research also suggests that children with public insurance are less likely to be offered an appointment than privately insured children, which may reflect socioeconomic bias.[100] More research on how racism and discrimination in school and health-care systems can contribute to disparities in child sleep and related functional outcomes is needed. In addition, given that delaying school start times can benefit adolescent sleep,[101] more research is needed on how school schedules could contribute to or buffer against sleep health disparities.

Neighborhood Level

Both physical (eg, air quality, green space) and social (eg, safety) characteristics of neighborhoods impact child sleep, including sleep patterns, insomnia symptoms, and SDB.[17] For example, environmental allergens and toxins may lead to increased SDB symptoms via upper airway inflammation.[55,56] As previously mentioned, environmental factors such as light, noise, and community violence may contribute to child and family sleep disruptions.[26,38,79] Although research examining neighborhood factors is growing, mechanistic studies of modifiable determinants are needed.

SUMMARY AND FUTURE DIRECTIONS

The research in this review suggests that there are well-established racial, ethnic, and socioeconomic sleep health disparities from early childhood through adolescence. At the same time, there are notable research gaps. Most research to date has examined Black–White racial disparities, with less research on other racial and ethnic groups. Only a handful of studies have examined sleep in other NIMHD-designated pediatric health disparity populations, such as gender minorities.[102] Even fewer studies have applied an intersectional framework,[103] which is critical for understanding the causes and influences of sleep health disparities among those with multiple marginalized identities. Research is also needed on dimensions of sleep health beyond duration, timing, and sleep behaviors such as bedtime routines. Future research should also examine contributors to disparities in the prevalence and outcomes of other behavioral and medical sleep disorders.

As described in the recent NIH workshop report on sleep health disparities, there is a need for mechanistic studies, particularly regarding the role of racism and discrimination in these disparities.[3] Interventions that are culturally responsive and address modifiable determinants at multiple socio-ecological levels are also urgently needed.[3] The vast majority of pediatric sleep interventions have been tested with predominantly White families and/or those with higher educational levels.[104] To avoid perpetuating research-to-practice gaps, future research should focus on adapting and evaluating evidence-based interventions in collaboration with health disparity populations and in accessible care settings.[105] Community-engaged research strategies, such as community-based participatory research,[3,105] as well as qualitative and mixed methods, and racial and ethnic health equity principles[106] should be incorporated in both interventional and mechanistic research seeking to address pediatric sleep health disparities.

CLINICS CARE POINTS

- Clinicians should assess for and incorporate multilevel (ie, child, family, school, health-care system, neighborhood, and sociocultural) social and environmental factors when conducting pediatric sleep evaluation, case conceptualization, and treatment-planning.
- Focusing on modifiable social and environmental determinants of sleep health disparities can guide equitable sleep health promotion efforts.
- Clinical training and practice in pediatric sleep should include approaches to reduce implicit and explicit bias and to enhance equitable, culturally humble, and family-centered care.

DECLARATION OF INTERESTS

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