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Racial Differences in Reported Napping and Nocturnal Sleep in 2- to 8-Year-Old Children

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Abstract

Objectives—The objectives of this study were to examine racial differences in reported napping and nighttime sleep of 2- to 8-year-old children, to identify factors accounting for these differences, and to determine if variability in napping was related to psychosocial functioning.

Methods—Caretakers of 1043 children (73.5% non-Hispanic white; 50.4% male) 2 to 8 years old from a community sample reported on their children's napping behavior and nighttime sleep. Caretakers of 255 preschool children (3–5 years old) also completed the Behavior Assessment System for Children.

Results—A more gradual age-related decline in napping was found for black children. At age 8, 39.1% of black children were reported to nap, compared with only 4.9% of white children. Black children also napped significantly more days per week, had shorter average nocturnal sleep durations, and slept significantly less on weekdays than on weekend nights. Despite differences in sleep distribution, total weekly sleep duration (diurnal and nocturnal) was nearly identical for the 2 racial groups at each year of age. Logistic regression analysis revealed that demographic variables were related to but did not fully explain napping differences. Napping in a subset of preschoolers was not significantly related to psychosocial functioning.

Conclusions—There are remarkable racial differences in reported napping and nighttime sleep patterns beginning as early as age 3 and extending to at least 8 years of age. These differences are independent of commonly investigated demographic factors. Differences in napping behavior do not seem to have psychosocial significance in a sample of preschool children.

Keywords

racial differences; napping; sleep; children; psychosocial functioning

The first few years of life are associated with dramatic changes in sleep amount and distribution. The 15 to 17 hours of daily sleep of neonates drops to ~14 hours by the age of 1 year and then declines more gradually to ~10 hours by the age of 8 years.[1–3] The polyphasic sleep/wake pattern present at birth quickly shifts to one characterized by a primary nocturnal sleep period and 2 daytime naps, 1 in the morning (which disappears at ~2 years) and 1 in the afternoon.[4, 5] Between the ages of 2 and 5 years, the frequency of afternoon naps declines, and the biphasic

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sleep/wake pattern gives way to a consolidated pattern of sleep occurring only at night.[6] Changes in sleep structure also occur during this period, with an adult-like sleep architecture emerging by approximately the age of 5 years.[1,3] These pronounced changes in sleep likely reflect maturation of chronobiological and homeostatic mechanisms well known to regulate sleep/wake cycling and sleep structure in adults.[6,7] The actions of these mechanisms are modulated by environmental, biomedical, psychosocial, and cultural/familial factors in a way that permits sleep needs to be met and/or alertness to be maintained in widely varying circumstances. Among children, as among adults, inadequate or poor-quality sleep is closely linked to disturbances of behavior and mood.[8–10] Moreover, good sleep may be important for normal cognitive and emotional development.[11]

This study is an investigation of the early childhood transition from a biphasic to a consolidated, or monophasic, sleep/wake pattern. Most studies have found that the proportion of children napping regularly drops gradually from close to 100% at the age of 2 years to <10% at the age of 6 years.[4,5,12,13] The age-related decrease in napping is closely linked to the aforementioned reduction in total daily sleep duration. Cultural preferences may play an important role in regulation of napping behavior.[6,14] For example, most Icelandic children stop napping by their fourth birthday,[13] whereas the majority of American children typically stop napping between ages 4 and 5 years.[4] Currently, little is known about napping beyond the descriptive level. The age at which napping is no longer obligatory has not been established, and the factors influencing when children stop (or continue) napping (eg, school schedules, home routines, regulatory systems) have not been investigated systematically. Furthermore, little is known about the benefits and consequences of biphasic versus monophasic wake/sleep patterns during childhood.

The major objective of this study was to examine racial differences in caretaker-reported napping and nighttime sleep. In a recent study of 2- to 5-year-old children sampled from pediatric patient streams in a major midwestern-US population center, Lavigne et al[8] found that minority (black, Hispanic, and “other”) children were reported to take substantially more and longer daytime naps and to sleep less at night than were non-Hispanic white children. It is important to determine if this finding is generalizable to minorities living in other geographic areas of the United States. The data now available to guide research and clinical practice related to children’s sleep/wake patterns have come from studies of mostly non-Hispanic white children.[4,5,13,15,16] Given the increasingly complex racial makeup of the United States, normative data on children’s sleep may need to be organized by racial group. Additionally, finding an explanation for racial differences would increase our understanding of factors that regulate sleep and wakefulness in children. Racial variability in napping may be due to a number of factors including (1) differences in awareness of afternoon sleep tendency by children and/or their caretakers, (2) cultural or family-related differences in attitudes about the acceptability of a regular afternoon nap, and (3) genetic differences either in sleep need or in the functioning of the chronobiological and/or homeostatic mechanisms regulating sleep.

In this study, we compared the caretaker-reported napping and nighttime sleep of non-Hispanic white and black children in a community sample of 2- to 8-year-olds. Based on findings by Lavigne et al,[8] it was anticipated that black children would be reported to nap more and spend less time in bed at night than would white children of the same age. One of the specific questions posed was whether the stronger nap tendency of black children reflected greater sleep need as opposed to a difference in the way in which sleep was distributed. A second question concerned whether racial differences in sleep could be accounted for by demographic differences. A final question concerned whether variability in napping behavior in preschool children was importantly related to measures of daytime behavioral and emotional functioning.

METHODS

Participants

Data for the present analysis were combined from 3 separate cross-sectional studies of sleep in preschool and early school-aged children. All studies were conducted between July 2000 and December 2002, used identical sampling and recruitment strategies, and only enrolled families from a tricounty area of southern Mississippi. The primary sampling strategy involved face-to-face contact with caretakers at multiple sites in the community (eg, day care centers, preschools, shopping malls, community events). Families were also recruited by using a snowball sampling strategy, which involved asking participants to refer others for potential participation in the study.[17] Sampling sites and procedures were chosen to facilitate the attainment of a representative group of families from the tricounty population. Inclusion required that the child be between 2 and 8 years old and that the primary caregiver be fluent in the English language and have telephone access. When >1 child in a family was identified for inclusion, the Kish procedure was used to limit the within-sampling unit non-coverage error and ensure independent observations[18]; thus, caretakers reported on only 1 child per family. Comprehensive data for determining response rate were available for 2 studies. A total of 1060 families with children who met criteria were recruited; 115 refused to participate and 17 did not complete all requirements (response rate: 88%). Only a small proportion of the sample belonged to racial groups other than white or black. Members of these other groups (3 Asian American, 4 Hispanic, 1 American Indian, and 15 multiracial) were excluded from the analysis.

Caretakers who agreed to participate signed consent forms approved by an institutional review board and completed a set of questionnaires inquiring about family demographics and the children's medical history and sleep. Questionnaires were administered via 2 methods: telephone interview (n = 632; study 1) and pencil and paper (n = 411; studies 2 and 3). Regardless of administration procedure, caretakers took ~45 minutes to complete all study materials. Participants from the third study (n = 255) also completed the Behavioral Assessment System for Children (BASC) at the sleep research laboratory. These families were paid $20 for their participation. To reduce missing data, research staff checked the pencil-and-paper questionnaires and requested completion of omitted items before participants left the research session.

Measures

Socioeconomic Status—The Four Factor Index of Social Status provides an index of socioeconomic status (SES) based on the occupation and education level of the household contributor(s) (A.B. Hollingshead, PhD, Four-Factor Index of Social Status, unpublished paper, 1975). Computed scores range from 8 to 66 (lowest to highest SES, respectively), and cutoff scores provide several SES categories: levels I (55–66), II (40–54), III (30–39), IV (20–29), and V (8–19).

Napping and Nocturnal Sleep—Using a 1-month reference period, caretakers reported their children's typical bedtimes and wake times for weekdays and weekends, number of days per week the children napped, and the typical nap start and end times. Nocturnal sleep duration for both weekdays and weekends was calculated from respective bedtimes and wake times. Likewise, nap duration was computed from nap start time to nap end time. Total sleep duration refers to the average time children spent in bed per 24-hour period, including nap (diurnal) and nocturnal sleep duration (weekday and weekend sleep durations were proportionately represented). Importantly, validity coefficients between caretaker report and actigraphically estimated sleep duration are reported to be adequate for research instruments (r = 0.74).[19]

BASC—The BASC is a pencil-and-paper normative instrument that requires parents or other caregivers to rate how often specific behaviors occur.[20] The BASC assesses aggression, anxiety, attention problems, atypicality, conduct problems, depression, hyperactivity, somatization, withdrawal, adaptability, leadership, and social skills. It yields composite scores for externalizing problems, internalizing problems, adaptive skills, and a behavioral symptoms index. Standardized *T* scores are categorized as "within normal limits," "at risk," or "clinically significant." At-risk scores ($T = 60–69$) point to problem areas that may require additional assessment. Scores in the clinically significant range ($T \geq 70$) suggest problem areas in need of additional investigation or treatment. The BASC has adequate validity (eg, very high correlations with Achenbach tests), internal consistency ($\alpha = .72$ to .93), and test-retest reliability ($\alpha = .70$ to .91) for research and clinical tools.

Analysis

All analyses were performed with the aid of Statistical Package for Social Sciences (SPSS) version 11.0. A total of 184 participants (17.6%) did not report head-of-household occupation with adequate specificity, thereby preventing the computation of SES. Participants missing data on SES were coded as such with a dummy variable for missing in the analysis. Missing data (<2%) for bedtime, wake time, nap start time, and nap end time were replaced with mean values from the remaining children of the same age and race. Summary measures were presented as means ± standard deviation, and comparisons involving continuous variables were performed by using *t* tests. Categorical data were analyzed by using a χ^2 test. Hierarchical logistic regressions were performed to assess the relationships between napping ("yes" or "no") and age, racial status, and control variables. The significance level for comparisons was set at .05. In the case of multiple comparisons, the α level was divided by the number of comparisons (Bonferroni test) to control for an inflated type I error rate.[21]

RESULTS

Participants

The overall sample consisted of 1043 children (male: 526; female: 517) 2 to 8 years old (4.5 ± 1.8 years). Table 1 presents the characteristics of the 767 non-Hispanic white (73.5%; hereafter referred to as "white") and 276 black (26.5%) children in the study. The proportion of white and black participants in the present sample is comparable to data reported in the *2000 Census of Population and Housing*[22] from the sampled tricounty area in southern Mississippi (white: 71.0%; black: 26.2%). The mean ages of white and black children were statistically equal (4.5 ± 1.8 vs 4.4 ± 1.8 years, respectively), and the proportion of children belonging to each racial group was the same across ages (see Table 1). The sample included significantly more black than white females (χ^2 [1, $N = 1043$] = 3.97; $P < .05$). In terms of birth order, white and black children were equally likely to be first born. Only-child status, however, was significantly more common among black than among white children (χ^2 [1, $N = 1043$] = 7.47; $P < .01$). Regular use of medications, regardless of central nervous system effect (stimulant, depressant, none), was equal across racial groups. Caretakers of black children were more likely to report the presence of chronic illnesses (eg, asthma, allergies, gastroesophageal reflux disease, sickle cell anemia, cerebral palsy, epilepsy) than were those of white children (χ^2 [1, $N = 1043$] = 5.43; $P < .05$). The numbers of children with reported psychiatric disorders (eg, attention-deficit/hyperactivity disorder, conduct disorder, oppositional defiant disorder, separation anxiety), developmental disabilities (eg, Down syndrome, mental retardation, pervasive developmental disorder), and learning disabilities/speech and language problems were statistically comparable across racial groups. Black children were more likely to reside with a single mother than white children (χ^2 [1, $N = 1043$] = 97.90; $P < .001$). Analysis of parental age revealed that black children had significantly younger mothers (black: 28.7 years; white: 31.4 years; $t = 6.26$, $P < .001$) and fathers (black: 32.0 years; white: 33.8 years; $t = 3.02$,

$P = .003$) than did white children. SES was higher among white families than among black families (χ^2 [1, $N = 843$] = 82.71, $P < .001$).

The demographic characteristics of the subsample of children ($n = 255$) for whom psychosocial functioning was assessed were similar to those of the overall sample in terms of race, age, and gender. The proportion of white and black participants in the subsample is comparable to that in the overall sample (white: 71.0%; black: 29.0%). The racial groups did not differ in the proportion of males and females (white: 49.2% male; black: 47.3% male). The mean ages of white and black children were statistically equal (4.0 ± 0.81 vs 4.0 ± 0.77, respectively), and the proportion of children belonging to each racial group was similar across ages.

Napping Behavior

Nearly all 2-year-old children of both racial groups were reported to nap. Beyond the age of 2, however, the relationship between age and napping is strikingly different for black and white children (see Fig 1a). The percentage of white children taking ≥1 naps per week declined in nearly linear fashion from 95% at the age of 2 years to <10% at the age of 8 years. In contrast, no decrease in the percentage of black children taking naps was seen until the age of 5 years, and almost 40% of the children were still napping at the age of 8 years. A hierarchical logistic regression analysis was used to examine the relationship between age, race, and napping (taking ≥1 naps per week). Age and race were entered in the first step of the analysis, and the product of age and race was entered in the second step to test for an interaction effect. Significant partial effects were found in step 1 for both age ($\beta = -.88$, Wald $\chi^2 = 229.39$, $P < .001$; odds ratio: 0.42) and race ($\beta = 1.89$, Wald $\chi^2 = 63.58$, $P < .001$; odds ratio: 6.59). Thus, after controlling for age, the odds of napping among black children were >6.5 times greater than among white children. Although examination of Fig 1a shows that racial differences increase with age, the interaction effect in step 2 of the logistic regression analysis was not significant.

A second hierarchical logistic regression analysis was performed to assess whether the relationship between race and napping behavior was accounted for by group differences in demographic variables including child's gender, only-child status, chronic illness, single-mother status, mother's age (father's age was not used because of a high correlation with mother's age), and SES. Demographic variables were entered in the first step of the analysis, followed by age and race in the second step. Finally, the product term was entered in the third step.

The results of the second logistic regression analysis are presented in Table 2. Significant effects were obtained in the first step for 2 of the demographic variables when the remaining demographic variables were held constant. That is, children were more likely to take naps if they were only children ($P < .001$), and younger mothers were more likely to have children taking naps ($P < .001$). At step 2, however, age ($P < .001$) and racial group ($P < .001$) remained strongly related to napping. Additionally, after controlling for the demographic variables, the interaction effect approached significance in step 3 ($P = .08$).

Among children taking naps, the mean number of naps per week declined gradually with age in both racial groups. The decline was more gradual for black children (see Fig 1b). An age-by-race analysis of variance of this variable for children 2 to 6 years old (the number of white children napping at 7 and 8 years of age was too small for analysis) yielded significant effects for both age ($F = 13.98$, $df = 4/674$, $P < .001$, $\eta^2 = .08$) and race ($F = 11.59$, $df = 1/674$, $P = .001$, $\eta^2 = .02$). The age-by-race interaction was not significant. The SD for number of days napping was significantly smaller for black children (1.7) than for white children (1.9; $F = 6.90$, $df = 1/682$, $P = .009$).

An age-related decline in nap duration from ~120 minutes to ~60 minutes is evident in Fig 1c ($F = 13.63$, $df = 6/670$, $P < .001$, $\eta^2 = .11$). The 2 racial groups did not differ on this variable. The range of reported nap duration (30–240 minutes) was identical for the 2 groups (white SD: 35.0; black SD: 44.1).

Nocturnal Sleep Duration

Black children had less reported nocturnal sleep than did white children. A race-by-age-by-time (weekday versus weekend) mixed-model analysis of variance resulted in a significant interaction between race and time ($F = 7.59$, $df = 1/1016$, $P = .006$, $\eta^2 = .01$). Black children spent ~20 fewer minutes in bed on weekday nights than did white children (Fig 2a). A significant but much smaller difference in the same direction was seen on weekend nights (Fig 2b). The weekend convergence in sleep duration for the 2 groups was mostly because black, but not white, children spent 15 to 20 more minutes in bed on weekends relative to weekdays. An age-related decline of ~30 minutes in nocturnal sleep duration for both racial groups can be seen in Fig 2 ($F = 5.21$, $df = 6/1016$, $P < .001$, $\eta^2 = .03$). The SD for weekday (white: 51.3; black: 64.4; $F = 11.68$, $df = 1/1033$, $P < .001$) and weekend (white: 55.6; black: 76.5; $F = 25.36$, $df = 1/1030$, $P < .001$) nocturnal sleep was significantly smaller for white children than for black children. There was a tendency for the variability to decline with age.

Figure 3 highlights racial differences in weekday/weekend sleep. Three important relationships can be seen. Each relationship was verified in a race-by-age-by-time (weekday versus weekend) mixed-model analysis of variance of bedtimes and wake times. It is immediately apparent that both groups delayed their bedtimes and wake times on weekends relative to weekdays. The delays were significant for both black and white children; however, as evidenced by a significant race-by-time interaction effect, the delay in weekend bedtime was longer for black than for white children (66 vs 40 minutes; $F = 48.16$, $df = 1/1018$, $P < .001$, $\eta^2 = .05$). The interaction was significant for wake time as well ($F = 57.68$, $df = 1/1029$, $P < .001$, $\eta^2 = .05$), with black children having a more delayed wake time (81 vs 46 minutes). Comparing Fig 3a and b, it is apparent also that black children were spending ~20 fewer minutes in bed each weeknight (as was shown in the earlier analysis of nocturnal bedtime), because their bedtimes averaged ~10 minutes later (black, 8:59 PM; white, 8:48 PM; $t = 3.24$, $P = .001$), and their wake times averaged ~10 minutes earlier (black, 6:48 AM; white, 6:59 AM; $t = 2.62$, $P = .01$). On weekends, black children went to bed ~35 minutes later than white children (black, 10:05 PM; white, 9:28 PM; $t = 8.32$, $P < .001$) and slept an average of 27 minutes longer (black, 8:10 AM; white, 7:43 AM; $t = 5.04$, $P < .001$). A final relationship of interest, shown in Fig 3 is that for both racial groups there was an age-related phase advance of both bedtimes and wake times on weekday nights but not on weekend nights, which was verified by a significant age-by-time interaction for both bedtime ($F = 9.90$, $df = 6/1018$, $P < .001$, $\eta^2 = .06$) and wake time ($F = 9.68$, $df = 6/1028$, $P < .001$, $\eta^2 = .05$). Mean bedtimes advanced ~30 minutes (from 9:08 PM for 2-year-olds to 8:37 PM for 8-year-olds). Mean wake times advanced >1 hour (from 7:25 AM for 2-year-olds to 6:23 AM for 8-year-olds). The SD for weekday bedtime (white: 45 minutes; black: 52 minutes) and wake time (white: 54 minutes; black: 58 minutes) was not significantly different for the 2 racial groups. However, the SD for weekend bedtime (white: 53 minutes; black: 65 minutes; $F = 10.65$, $df = 1/1031$, $P = .001$) and wake time (white: 60 minutes; black: 81 minutes; $F = 40.56$, $df = 1/1033$, $P < .001$) was significantly smaller for white children than for black children. There was a tendency for the variability to decline with age.

Total Sleep Duration

Total sleep duration was nearly identical at each age for white and black children. For both groups, total sleep duration decreased in nearly linear fashion with age, from ~717 minutes per day to ~590 minutes per day ($F = 54.83$, $df = 6/987$, $P < .001$, $\eta^2 = .25$).

Napping and Psychosocial Functioning

Information about psychosocial functioning was available only for a subsample of 3- to 5-year-old children (n = 255). Of these children, 81.2% were reported to nap ≥1 days per week. Nap duration ranged from 30 to 210 minutes (mean: 93.2; SD: 33.1). The relationship between napping behavior and psychosocial functioning, as measured by the BASC, was assessed in several ways. Comparisons of napping and nonnapping children were made within and across age groups. For each of these comparisons, the presence or absence of naps had no significant impact on levels of psychosocial functioning. The correlation between number of days per week with naps and BASC scale scores was also examined within and across ages. Again, no significant relationships were found. There were too few black children (n = 39) in the sample who did not nap to compare racial groups in the analysis of psychosocial functioning.

DISCUSSION

In this study, we found marked differences between the napping behavior of white and black 2- to 8-year-old children in a representative sample from a tricounty area in south Mississippi. Between the ages of 3 and 8 years, black children were much more likely to nap and to take more naps per week than were white children. This difference remained even after controlling for variables related to both racial group and napping, such as mother's age and marital status. Nocturnal sleep duration was shorter for black children than for white children, especially on weekdays. Black but not white children significantly increased their sleep duration on weekend nights relative to weekday nights. Remarkably, total sleep duration was nearly identical for the 2 groups despite differences in the distribution of sleep. No relationships were found, in the subset of 3- to 5-year-old children, between napping behavior and a measure of psychosocial functioning.

The results of this study are consistent with those of previous studies of sleep and napping behavior in children. As in other studies, nearly all 2-year-old children were reported to take naps regularly.[4,5] A majority of the white children in the current sample gave up naps before the age of 6 years, a finding that matches other reports of napping among white children.[4,13] The findings of this study also confirm and extend the limited amount of available information regarding the sleep patterns of minority children. Lavigne et al,[8] whose subjects came from pediatric populations in a large metropolitan area in Illinois, found that 2- to 5-year-old minority children napped longer and more often and spent less time sleeping at night than did non-Hispanic white children. Taken together, the results of the current study and the Lavigne et al study suggest widely generalizable racial differences in napping and nocturnal sleep in young children. Because afternoon napping patterns may influence the schedules of day care centers, schools, and families, it may be especially important to collect normative data organized by racial group.

The racial differences in napping found in this study are unlikely to be caused by a differential need for sleep. That is, the mean total (nocturnal plus diurnal) amount of time spent in bed was almost exactly the same for both racial groups at each age. The greater tendency to nap by black children is balanced by the tendency to spend less time sleeping at night. Similar findings were obtained by Lavigne et al[8] in their comparison of sleep distribution among non-Hispanic white and minority groups.

The relationship between race and napping described here is unlikely to be caused by group differences in SES, gender, chronic illness, or only-child status. Significant group differences were also found for several variables related to napping (maternal and paternal age, maternal marital status); however, effect sizes were small in relation to the importance of race. There are a number of additional demographic variables (eg, mother's work status, child's school/day care status, number of persons in the home) that may be related to napping behavior. We

do not believe that group differences in these variables are likely to explain the large racial effects described here.

The napping differences found in this study may be closely related to racial differences in caretaker awareness and/or acceptance of children's daytime sleep propensity. It has been proposed that napping decreases in proportion to the ability of children to meet their total sleep need at night.[6] As children grow older and their need for sleep declines, there is presumably a period during which sleep need can be met through either biphasic or monophasic sleep. At this juncture, napping may be a choice made by the child or the caretaker. This choice would be subject to the biases of families and cultures regarding awareness of daytime sleepiness and acceptability of a daytime sleep period. Cultural influences on sleep distribution are quite evident in studies comparing siesta versus nonsiesta cultures.[14,23] A strong bias against napping may account for the finding that most Icelandic children stop napping by the age of 4 years.[13] Greater awareness and acceptance of children's napping would account for the relatively greater amounts of diurnal sleep reported for black children. It is notable in the current study that napping remained a common practice (almost 40% still napping) among the oldest of the black children. A cultural explanation of these findings suggests that napping differences may persist throughout childhood and adolescence and also may be present in adulthood. To our knowledge, no research to date has addressed this question.

It is possible that the racial differences described here are related also to biodevelopmental factors. There are well-known age differences in the onset of puberty and menarche between black and white children,[24–26] and there may be differences in the maturation of chronobiological and homeostatic mechanisms as well. It is interesting in this regard that black but not white children evidenced a tendency to sleep later on weekend mornings. This tendency, to our knowledge, has previously been found only in association with adolescence.[27,28] Additionally, there are a large number of studies showing differences in sleep problems and sleep-related factors between black and white children and adults, including narcolepsy severity, periodic limb movement disorder, sleep-disordered breathing, asthma, cosleeping, and daytime sleepiness.[29–35] It cannot be ruled out that there are age-independent genetic differences between the 2 racial groups in the regulation of sleep and wakefulness.

The findings of this study suggest that there is no relationship between napping behavior and psychosocial functioning in the 3- to 5-year-old subset. No differences were found between children who napped and those who had given up napping in terms of emotional or behavioral outcomes. This is not to say that problems are not possible or even likely when nap routines conflict with daytime circumstances created by the family or school setting. It may also be the case that the psychosocial benefits or consequences of napping are not manifested until later in childhood. Of interest to clinicians and researchers is whether children who are forced to give up naps because of preschool or other circumstances are more likely to have behavioral or emotional difficulties in the daytime. Conversely, it is of interest whether children who are permitted to nap beyond the time when most children are assumed to quit napping are placed at a psychosocial disadvantage. Examination of psychosocial functioning in the present study does not address this issue directly, and to our knowledge, there is no research to date evaluating the psychosocial consequences or benefits of napping. Clinical observations have indicated that children who do not nap are fussier and have shorter attention spans than children who nap regularly.[36] These observations do not provide evidence of whether the lack of napping results in poor behavioral outcomes or if behavioral problems or difficult temperament lead to reduced napping.

The most important limitation of this study is that the definition of napping was open to parental interpretation. It is possible that caregivers reported napping when their children were simply resting or reported naps that occurred at day care or preschool without actual knowledge that

the children were sleeping. In addition, information regarding day care or preschool attendance was not obtained. Such attendance would likely influence opportunities to nap. A second limitation is the lack of multiple measures of sleep. Although reported time in bed correlates highly with actigraphic estimates of sleep duration,[19] there may be racial differences in latency to sleep onset and nocturnal sleep quality. It cannot be ruled out that racial differences in quantity and quality of sleep mediate in some way the differences in sleep distribution observed here. Additionally, limited information was obtained about other variables such as night waking and cosleeping, which may have affected the validity of parental estimates of sleep duration. A third limitation involves the comparison of only 2 racial groups. The differences found here may represent only 1 part of a broad range of racial differences in the sleep patterns of children. A final limitation of this study is the assessment of psychosocial outcomes. Only 1 measure of emotional/behavioral functioning was included, which limited the range of outcomes that could be examined. Additionally, psychosocial outcomes were only assessed for a portion of the total sample, limiting the age range for which relationships between napping and daytime functioning outcomes could be evaluated.

We have confirmed and extended research showing racial differences in napping and the distribution of sleep. These findings highlight the need for normative developmental sleep data that are delineated by racial group. Additional research should also address the causes of these differences and further assess their psychosocial significance. The results of this study are likely to be of considerable importance to researchers interested in the regulation of wakefulness and sleep in young children and to pediatricians and caretakers with questions about normative behaviors and the importance and modifiability of daytime sleep.

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ABBREVIATIONS

BASC	Behavioral Assessment System for Children
SES	socioeconomic status

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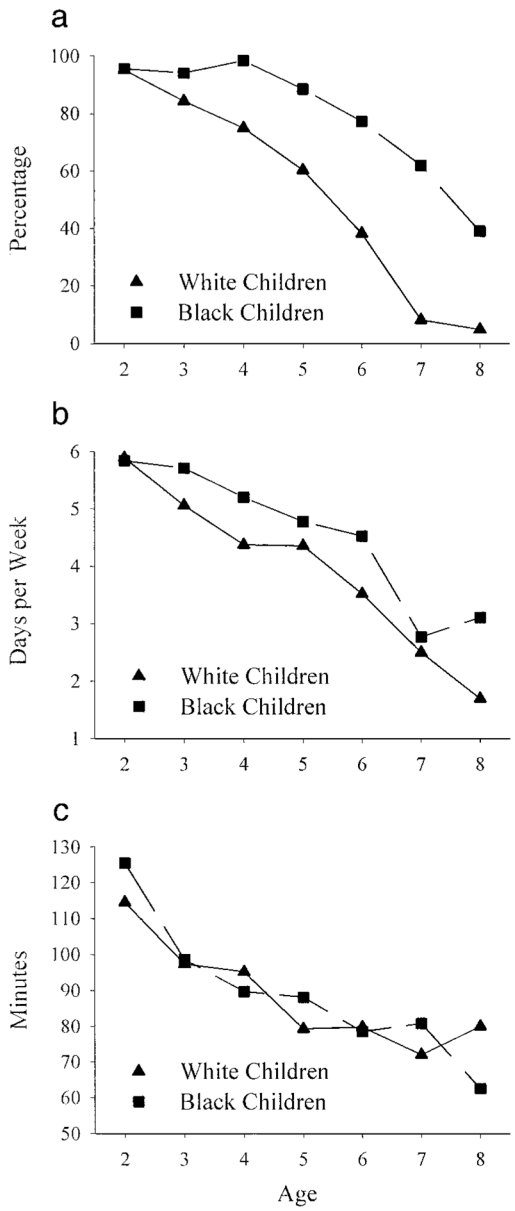

Fig 1.
Nap-related measures for 2- to 8-year-old children: napping ≥1 days per week (a), days per week napping (b), and nap duration (c).

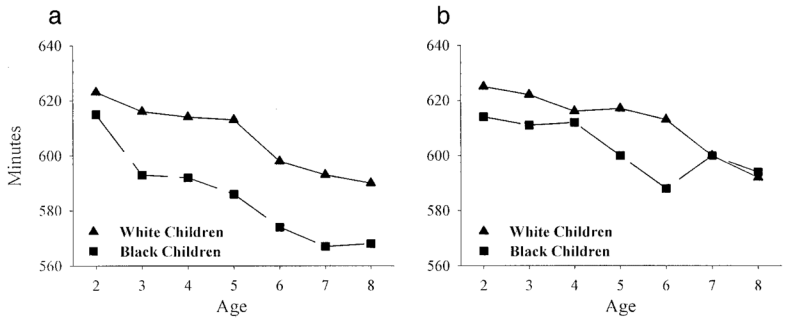

Fig 2.
Weekday (a) and weekend (b) sleep duration for 2- to 8-year-old children.

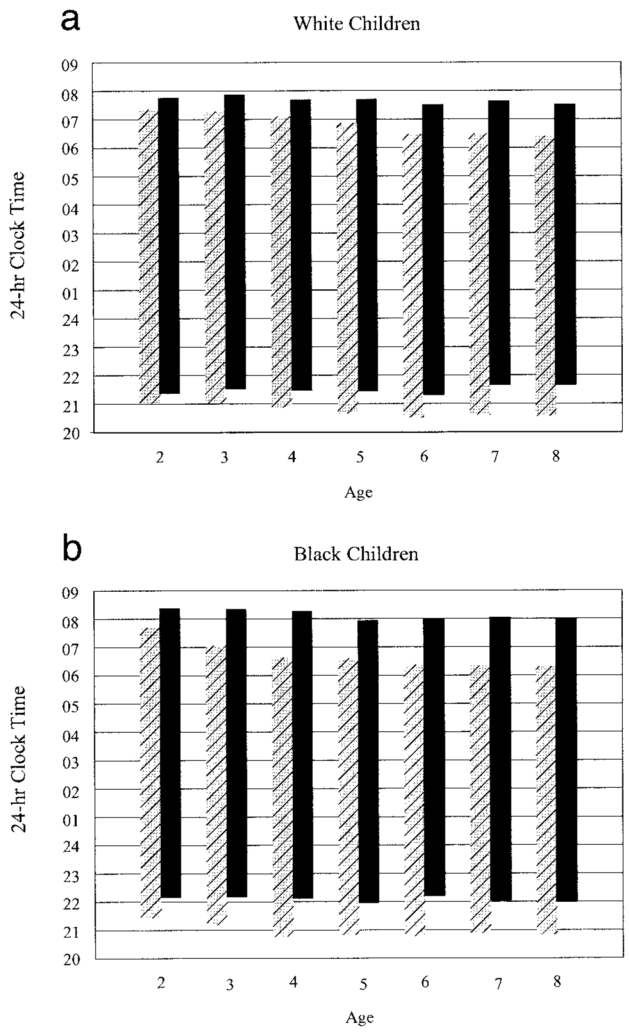

Fig 3.
Mean weekday (□) and weekend (■) bedtimes and wake times for 2- to 8-year-old children.

TABLE 1

Characteristics by Racial Group (N = 1043)

Characteristics	White (n = 767), n (%)	Black (n = 276), n (%)	P Value*
Age, y			
2	105 (13.7)	45 (16.3)	
3	171 (22.3)	51 (18.5)	
4	151 (19.7)	62 (22.5)	
5	146 (19.0)	52 (18.8)	
6	60 (7.8)	22 (8.0)	
7	73 (9.5)	21 (7.6)	
8	61 (8.0)	23 (8.3)	
Gender (female)	366 (47.7)	151 (54.7)	.05
First born	373 (48.6)	140 (50.7)	
Only child	182 (23.7)	89 (32.2)	.006
Medications			
Stimulant	27 (3.5)	12 (4.3)	
Depressant	23 (3.0)	9 (3.3)	
Other	42 (5.5)	18 (6.5)	
Chronic illnesses	70 (9.1)	39 (14.1)	.02
Psychiatric disorders	17 (2.2)	4 (1.4)	
Developmental disabilities	2 (0.3)	2 (0.7)	
Learning disabilities/speech and language problems	5 (0.7)	1 (0.4)	
Single mother	219 (28.6)	171 (62.0)	<.001
SES level			<.001
I (highest)	81 (10.6)	1 (0.4)	
II	267 (34.8)	51 (18.5)	
III	191 (24.9)	70 (25.4)	
IV	98 (12.8)	54 (19.6)	
V (lowest)	9 (1.2)	21 (7.6)	

*Differences in characteristics between white and black participants from the χ^2 test.

TABLE 2

Hierarchical Logistic Regression of Demographic Variables and Napping ≥1 Days per Week

Predictor	*β*	Wald χ^2	*P*	Odds Ratio
Step 1				
Gender	.06	0.15	.700	1.06
Only child	−.78	13.78	<.001	0.46
Single mother	−.27	1.63	.202	0.76
Mother's age	−.06	31.32	<.001	0.94
Medical problem	.178	0.513	.474	1.20
SES	.007	0.89	.347	1.01
Step 2				
Age	−.87	157.74	<.001	0.42
Race	1.98	43.36	<.001	7.24
Step 3				
Age by race	.29	3.11	.08	1.33