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Original Article

Single-parent family structure and sleep problems in black and white adolescents

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ABSTRACT

Objectives: Sleep is critical for adolescent health and is influenced by the family environment. In our study, we examined if family structure defined as single- vs two-parent households affected adolescent sleep.

Methods: Participants were 242 (57% black; 47% boys) healthy adolescents (mean age, 15.7 years). Sleep was measured using self-report and wrist actigraphy over seven consecutive nights. Outcomes were actigraphy-assessed sleep duration and sleep efficiency (SE) for the full week and weekends and weekdays separately, as well as self-reported sleep–wake problems and variability in bedtimes. Linear regression examined the relationship between family structure and sleep, after adjusting for age, sex, race, body mass index, and depressive symptoms, parental education, family conflict, and financial strain. Race and sex were examined as potential moderators.

Results: After adjusting for covariates, adolescents from single-parent households had poorer SE across the week and shorter sleep duration on weekends. White adolescents from two-parent households had fewer sleep–wake problems and lower bedtime variability, whereas black adolescents from single-parent households had the lowest weekend SE. There were no significant differences in family structure–sex interactions.

Conclusion: Our findings are the first to demonstrate that single-parent family structure is an independent correlate of sleep problems in adolescents and they highlight the moderating role of race.

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1. Introduction

Sleep disturbances are highly prevalent among children and adolescents and are associated with a wide variety of adverse health outcomes, including increased risk for the development of depression [1], anxiety [2], and substance abuse [3], as well as physical health problems, such as obesity [4] and cardiovascular outcomes [5–7]. Among adults, single or divorced marital status is associated with an increased risk for sleep symptoms and clinically notable sleep disorders such as insomnia [8,9]. In a similar vein, several decades of research have shown that family structure most often defined by parental marital status also has profound effects on children's mental and physical health, with an almost exclusive emphasis on waking life [10,11].

With two notable exceptions, few studies have investigated the association between family structure and children's sleep. Among preschool-aged children, single-parent status was associated with less consistent parent-reported bedtime routines [12] and a greater likelihood of parent-reported sleep problems among children ages 8–9 years [13]. Taken together, these studies are consistent with the hypothesis that single-parent status may confer risk for parent-reported child sleep problems, at least in childhood, by influencing the timing and regularity of sleep. It is unknown if similar associations would be observed in adolescents. It also is unknown if these findings would extend to behavioral measures of sleep such as actigraphy, which reduce reporting bias and provide objective estimates of sleep quantity and efficiency (an indicator of sleep disruption). Therefore, the primary aim of our study was to examine the association between family structure (defined as single- vs two-parent households) and subjective and objective indicators of sleep in a sample of healthy adolescents.

Examining the relationship between family structure and sleep is particularly salient during adolescence, as this is a developmental period characterized by increasing autonomy from parents and an increasing importance of extrafamilial social relationships in the context of dramatic biologically determined changes in sleep timing, architecture, and quality [14]. In turn, these changes in

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sleep put adolescents at increased risk for a host of sleep problems, including reduced sleep duration, increased risk for insomnia-related symptoms, and circadian phase delay [14,15]. These sleep problems often times represent the nonclinical range of symptoms characterized by disrupted, delayed, or irregular sleep patterns; however, they may portend increased risk for clinically notable sleep problems for some adolescents.

Adolescents from single-parent homes may have higher rates of sleep problems, due to feelings of insecurity about the stability of their home environment. As articulated by Dahl [16], insecurity in the home environment may heighten vigilance, which is antithetical to the sleep state. A small but growing literature also has demonstrated that family processes which are associated with family structure including family or parental marital conflict and parental marital stability [17–19] are critical for the development of healthy sleep behaviors in infants and school-aged children. For instance, Gregory et al. [20] found a modest but significant longitudinal association between family conflict and self-reported insomnia symptoms at the age of 18 years.

It also is possible that single-parent status serves as a proxy for other known risk factors for sleep problems which are known to covary with family structure. The vast majority of single-parent households in the United States are led by mothers, and black children are considerably more likely to grow up in single-parent homes than their white counterparts [21]. Studies of the economic impact of divorce demonstrated that girls experienced a dramatic and disproportionate decrease in income following marital dissolution relative to boys [22,23]. Concurrent with the substantial income decline, custodial mothers experienced increased psychosocial stress and financial strain from heavy workloads; high rates of job instability; and relocation to less desirable neighborhoods, with high crime rates, poor schools, and inadequate services [24]. Black race, lower parental education, and higher levels of financial strain are each in turn associated with higher increased rates of sleep problems in children and adults, as measured through self-report [25–28]. Therefore, it is important to determine if there is an independent association between family structure and adolescent sleep problems or if family structure is merely a proxy for these known risk factors.

Previous research on single parenthood and child and adolescent outcomes suggests that not only are there race differences in the likelihood of growing up in a single-parent home [29], but there also are race differences in the magnitude of the effects of single parenthood on child and adolescent outcomes [30]. For instance, several studies have shown that differences in adjustment in children from divorced and nondivorced families are less marked in black families than in white families [24,30,31]. Researchers have suggested that single parenthood may be less detrimental for black families, as black families more often are embedded within extended family networks than white families [32], which provides access to a broader set of parenting resources beyond that provided by traditional marriage. Consistent with these findings, we hypothesized that observed associations between family structure and adolescent sleep measures would be more pronounced in white adolescents than in black adolescents.

In summary, the purpose of our study was to examine the association between family structures and sleep problems during adolescence. We examined sleep using objective (i.e., actigraphy) and subjective sleep parameters that have previously been linked with waking health and functioning in adolescents and may be differentially related to family structure. Specifically, given our interest in examining subjective sleep problems associated with disrupted or delayed sleep schedules, we utilized a well-validated self-report instrument, which has been extensively used in adolescents and has previously been associated with adolescent risk-taking behavior. We also included actigraphy-assessed sleep efficiency (SE), which provided an objective measure of sleep fragmentation and sleep duration, as these sleep outcomes are most reliably associated with diverse health outcomes [7,33–35]. These sleep measures were evaluated according to school nights and weekend nights, in addition to the overall week. Finally, we assessed night-to-night variability in bedtimes (using sleep diaries), given that family structure may influence adolescents' sleep habits through the influence of the regularity of daily routines (e.g., bedtimes). Recent evidence further suggests that variability in sleep timing is associated with a host of negative adolescent outcomes including truancy and substance use [36]. To determine the independent association between family structure and adolescent sleep, we adjusted analyses for variables known to covary with family structure or sleep. In particular, we examined if observed associations between family structure and sleep persisted after adjusting for adolescent age, sex, depressive symptoms, and body mass index, as well as parental education, family conflict, and financial strain. Recognizing the considerable variability in the effects of family structure on adolescent outcomes [29], we examined the degree to which adolescent race moderated any observed associations. Given previous reports of sex differences in adolescent sleep, we also explored the moderating role of sex. However, we made no a priori hypotheses concerning the moderating role of sex, given that previous research on sex differences in the effects of family structure on child and adolescent outcomes have yielded inconsistent findings [37,38].

2. Methods

2.1. Participants

A sample of 250 adolescents between the ages of 14 and 19 years were recruited from a single public high school near Pittsburgh, PA to participate in a study of stress, sleep, and cardiovascular risk factors. Start time for the school day was approximately 7:30 am, which is consistent with data showing that the majority of high schools in the United States begin between 7:30 and 8:00 am [39]. Approval of the research project was obtained from the school district superintendent, school principal, and the University of Pittsburgh Institutional Review Board. Participants or parents/legal guardians for students under the age of 18 years provided written informed consent prior to any research procedures. Exclusionary criteria were treatment of cardiovascular disease or diabetes mellitus; and medication use for emotional or psychologic disorders, blood pressure, or any medication known to affect the cardiovascular system or sleep. Our study included 242 participants who had complete data available for sleep assessments, demographic characteristics, and covariates.

2.2. Measures

2.2.1. Sleep

Actigraphy data were collected over a period of 7 consecutive days and nights using the Mini-Mitter actiwatch model AW-16 (Phillips Respironics, McMurray, PA). Actigraphy has been extensively validated as a measure of sleep–wake behavior in samples ranging from infants to older adults [40,41]. Actigraphs were configured to collect data over a 1-min epoch. Stored data were downloaded into the Actiware software program (version 5.57) for processing and analysis. The medium threshold (default) was selected to detect nocturnal sleep periods that occurred within the time interval reported in the diary of time attempted to go to sleep and time awake (see below). Sleep onset was defined as having at least 10 min of sleep at the beginning of the sleep period when there was at least 3 h of sleep, and sleep offset was defined as

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