The Sleeping Habits of Preschool Children Are Related to Temperament, Behavior, and Social Responsiveness

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Background and Objective

Children's sleep habits are important for their health and development. Here, we investigated the relationship between sleep habits, behavior, personality, and social responsiveness in children.

Methods

A total of 38 preschool children were assessed using the Korean Child Behavior Checklist (K-CBCL), Junior Temperament and Character Inventory (JTCI), Children's Sleep Habit Questionnaire (CSHQ), and Social Responsiveness Scale (SRS).

Results

Harm avoidance according to JTCI was positively correlated with bedtime resistance ($r = 0.34; p = 0.04$) and sleep anxiety on the CSHQ ($r = 0.43; p < 0.01$). Emotional lability on the K-CBCL was significantly associated with parasomnias ($r = 0.38; p = 0.02$), while lower social cognition and social communication scores on the SRS were associated with sleep anxiety ($r = -0.34; p = 0.03$) and parasomnias ($r = -0.38; p = 0.01$). Path analysis showed that among the JTCI subscales, both harm avoidance and persistence were significantly associated with social cognition.

Conclusions

Clinicians should pay particular attention to psychological components as potential contributors to sleep habits when managing sleep problems in preschool children.

Key Words

Preschool children, Sleep habits, Temperament, Harm avoidance.

INTRODUCTION

Proper sleep is an important factor associated with the physical and mental health of children. Numerous studies have reported poor sleep quality to be related to school performance, physical/mental development, behavior, and cognition.1,2 Children's sleep may be influenced by a variety of factors, such as health status, stressful events, home sleeping environment, sleeping conditions, parental relationships, and usage of media devices.3-5 Psychological factors, including the child's mood state, anxiety, depressive symptoms, and psychiatric illnesses such as generalized anxiety disorder, oppositional defiant disorder, and attention deficit hyperactivity disorder can also negatively affect the quality of children's sleep and sleep problems.6,7 Temperament is a characteristic of an individual's nature, and its use originates from the ancient psychobiological concept of the four humors. Temperament can affect a child's mood, emotional regulation, adaptability, activities, and inhibition.8-10 In addition, various mental and physical illnesses have been reported to be predisposed or predicted by temperament.11,12 However, few studies have evaluated the association between temperament and sleep problems in children. When a child's emotions, mood status, or physical condition affects sleep problems, we can only speculate that the temperament of the child is related to the sleep problem.

Sleep problems can impact behavior and social relatedness. It is well known that sleep disturbances, such as sleep-disordered breathing, can make children hyperactive or inattentive.13 Good sleep can help children to improve their social skills and peer acceptance.14 We hypoth-
esized that a child’s temperament may influence sleep disturbances and sleep problems, and that in turn, sleep problems may change the behavior and social relatedness of the children. However, these associations remain uncertain. The aim of this study was to investigate the association between temperament, sleep problems, and behavioral problems in a cohort of children.

METHODS

Participants
This study was a continuation of our previous study that investigated parenting stress, and specifically focused on the sleep habits of preschool children. Written informed consent was obtained from the parents of all the children who participated in this study, and the protocol was approved by the institutional review board of the Asan Medical Center. In total, 38 preschool children between 3–6 years of age were enrolled. Children who met the following criteria were excluded: 1) currently using any psychotropic agents or sleeping pills; 2) diagnosed with any major psychiatric disorders, such as major depressive disorder, anxiety disorder, or any behavioral problems; and 3) the presence of any sleep disorders, including primary insomnia, circadian rhythm sleep disorder, restless legs syndrome, periodic limb movements during sleep, or sleep-disordered breathing. All developmental and psychiatric histories were examined by a child psychiatrist. The presence of sleep disorders was assessed using parental reports according to the diagnostic criteria of the International Classification of Sleep Disorders-2nd edition.

Measures
Temperament was assessed using the children’s adjusted Junior Temperament and Character Inventory (JTCI). In the present study, the parent-reported version of the JTCI was used. Using this scale, the child’s personality consists of two major constructs: temperament and character. Temperament is broken down into four dimensions: novelty seeking, harm avoidance, reward dependence, and persistence. Character consists of the following three dimensions: self-directedness, cooperativeness, and self-transcendence. The validated Korean version of the JTCI was used herein. Children’s sleep disturbances and sleep problems were assessed using the Children’s Sleep Habits Questionnaire (CSHQ). The CSHQ is a sleep questionnaire for children between 4–12 years of age that was originally developed to screen for the most common sleep problems. The CSHQ focuses on sleep problems in terms of bedtime resistance, delays in sleep onset, sleep duration, sleep anxiety, night wakings, parasomnias, sleep-disordered breathing, and daytime sleepiness. A high total score on the CSHQ indicates poor sleep quality.

The Korean Child Behavior Checklist (K-CBCL)–the Korean version of the Child Behavior Checklist–was used to assess each child’s behavior as reported by their parents. The K-CBCL consists of various subscales: withdrawal, somatic complaints, anxiety, depression, thought problems, social problems, attention problems, delinquent behaviors, aggressive behaviors, internalizing problems, externalizing problems, and the total score. In addition, the emotional lability subscale was also included on the K-CBCL. The Social Responsiveness Scale (SRS) was also used to assess social interactions. This includes social awareness, social cognition, social communication, social motivation, and autistic mannerism.

Statistical Analysis
The Student’s t-test was used to compare clinical characteristics and rating scale scores between boys and girls. Pearson’s correlation analysis was performed to determine the associations between rating scale scores. Statistical significance was set at p < 0.05 for two-tailed tests. The Statistical Package for the Social Sciences (SPSS, version 12.0K, IBM; SPSS Inc., Chicago, IL, USA) was used to conduct all statistical tests. The SPSS Amos (version 7.0, IBM) was used to perform the path analyses.

RESULTS
Among the 38 enrolled preschoolers, the mean age was 4.4 ± 0.7 years and 20 participants were boys (53%). There were no significant differences between boys and girls in terms of age and the various items on the JTCI, K-CBCL, CSHQ, and SRS rating scales, except for night wakings on the CSHQ (boys: 3.3 ± 0.6; girls: 3.9 ± 0.8; p = 0.01) and social cognition on the SRS (boys: 51.3 ± 6.3; girls: 56.6 ± 7.9; p = 0.03). Among the temperament and character domains, a high level of harm avoidance was correlated with bedtime resistance (r = 0.34; p = 0.04) and sleep anxiety (r = 0.43; p < 0.01) on the CSHQ (Table 1). High emotional lability on the K-CBCL was significantly related with parasomnia on the CSHQ (r = 0.38; p = 0.02). Among items related to social responsiveness, low social cognition on the SRS was correlated with sleep anxiety on the CSHQ (r = -0.34; p = 0.03), and low social communication on the SRS was associated with parasomnia on the CSHQ (r = -0.41; p = 0.01) (Table 2).

After careful consideration of the previous results and the construction of several models, we decided to include the following subscales/items in our structural equation model: harm avoidance, self-directedness, persistence, novelty seeking, sleep anxiety, social cognition, autistic mannerisms, and delinquent behavior. All JTCI subscales were arranged as covariates to each other. Harm avoidance and self-directedness were considered as indicators of sleep anxiety, while self-directedness, persistence, and novelty seeking were considered as indicators of autistic mannerisms. Sleep anxiety and persistence were considered to be indicators of social cognition, which in turn, along with autistic mannerisms, was considered as an indicator of delinquent behavior (Fig. 1).
The overall applicability of a path model can be assessed according to its goodness-of-fit indexes. Although there are no clear-cut indications, the chi-square value, Comparative Fit Index (CFI), Normed Fit Index (NFI), and Root Mean Square Error of Approximation (RMSEA) are some of the most widely acknowledged values; moreover, insignificant chi-square values, CFI > 0.9, NFI > 0.95, and RMSEA < 0.08 are usually considered as adequate cutoffs.22 The indices for the current study were calculated as follows: $\chi^2 = 7.85$, df = 13, $p = 0.85$, CFI = 1.00, NFI = 0.86, and RMSEA < 0.08, all of which were considered as adequate cutoffs.22 The indices for the current study were calculated as follows: $\chi^2 = 7.85$, df = 13, $p = 0.85$, CFI = 1.00, NFI = 0.86, and RMSEA < 0.08, all of which were considered as adequate cutoffs.22

Harm avoidance was associated with sleep anxiety (β = 0.18; $p < 0.01$), which in turn demonstrated a comparatively strong association with social cognition (β = -1.50; $p = 0.01$). Persistence was also strongly associated with social cognition (β = -1.69; $p = 0.03$). The association between social cognition and delinquent behavior, on the other hand, was insignificant. Because these results were based on information obtained using a cross-sectional survey, the associations described in this paper are only theoretical at this stage.

**DISCUSSION**

In the current study, we observed sleep habits and sleep problems in preschool children to be associated with harm avoidance, emotional lability, and social cognition or communication. Path analysis showed that harm avoidance, sleep anxiety, and social cognition may be sequentially associated with each other, and that both persistence and sleep anxiety may be important factors determining social cognition. Harm avoidance is a temperament trait that is associated with aversion to non-rewarding stimuli, high anticipation of threats, and negative emotions during stress. It has also been reported to be related to anxiety disorders in children.23 In the current analyses, harm avoidance was found to be related to bedtime resistance and sleep anxiety. According to our previous study on adult patients with psychophysiological insomnia, harm avoidance is also significantly associated with the severity of insomnia, anxiety, and dysfunctional sleep-related cognitions.24 Individuals with high levels of harm avoidance tend to internalize their feelings and emotions and re-
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Fig. 1. Path analysis of the relationships in children between various temperament and character subscales, sleep anxiety, social cognition, autistic mannerisms, and delinquent behavior. Model Indices: \( \chi^2 = 7.85, \text{df} = 13, p = 0.85 \), Comparative Fit Index (CFI) = 1.00, Root Mean Square Error of Approximation (RMSEA) < 0.01, and Normed Fit Index (NFI) = 0.86. Rectangles represent observed variables. Numbers next to the single-headed arrows correspond to standardized regression weights. \( *p < 0.05 \), \( p < 0.01 \). The Junior Temperament and Character Inventory (JTCI), Children’s Sleep Habits Questionnaire (CSHQ), Social Responsiveness Scale (SRS), and the Korean Child Behavior Checklist (K-CBCL) were used, and only the subscales/items presented in this figure were entered and analyzed as variables. All JTCI subscales presented here were arranged as covariates of each other, which is not shown in this diagram.

press conflicts.\(^{25}\) This internal stress can influence both sleep problems and sleep disturbance.

In the present study, emotional lability on the K-CBCL test was significantly related to parasomnia. Emotional lability is a subscale only on the K-CBCL, and refers to rapid, often exaggerated changes in mood, where strong emotions or feelings occur. In children, it pertains to those who easily cry, become jealous, and throw temper tantrums. It is widely known that parasomnia may be related to anxiety, traumatic injury, stress, and the loss of loved ones.\(^{26-27}\) Strong emotional tension can trigger non-rapid eye movement parasomnia in children. Here, social cognition and social communication were found to be associated with sleep anxiety and parasomnia. Although we cannot yet confirm a causal relationship, some studies have reported that sleep can influence or be affected by social relationships.\(^{14}\) It can be speculated that sleep disturbance may affect social relationships, but it is more feasible at this stage that emotional stress due to decreased social competence may influence sleep.

The structural equation model herein revealed a relationship between harm avoidance and social cognition that may be mediated by sleep anxiety. Previous studies have reported high harm avoidance in autistic patients,\(^{26,29}\) but we were unable to find any previous studies specific to harm avoidance and social cognition. As mentioned above, individuals with a high degree of harm avoidance are prone to internalizing their feelings, which in turn may influence sleep problems. It can also be hypothesized that repetitive sleep problems, particularly sleep anxiety, may decrease self-confidence. Because social cognition can be thought of as an ability which requires experience and at least some level of self-confidence—i.e., the correct interpretation of social situations would be impossible if one repeatedly second-guessed oneself—it could be inferred that children with high harm avoidance tend to demonstrate more sleeping problems, especially sleep anxiety, and that harm avoidance and repeated sleep anxiety together cause a decline in social cognition.

Persistence was also found to be associated with social cognition in path analysis. Although we were unable to find any earlier studies that directly assessed persistence and social cognition, we did find one that reported persistence in association with substance use disorders in autistic patients.\(^{30}\) If social cognition is considered as a thought process, then it can be argued that persistence is needed to follow that process to its conclusion. As already mentioned, these results are theoretical, but we believe sleep anxiety plays a role that deserves further attention, as this was somewhat unexpected.

This study had several limitations of note. First, our patients did not undergo nocturnal polysomnography in order to evaluate their current sleep status. This means that we could not completely exclude the presence of sleep-disordered breathing or periodic limb movements. Second, the sample size of this study may have been too small to detect significant differences in groups. Finally, the subjects enrolled in this study were 3 to 6 years, and we used the parent-rated JTCI for analysis, which can be applied to those 5 to 14 years old.\(^{31}\) The discrepancy may have affected the results. In addition, we could not use the validated Korean version of the CSHQ and SRS in this study, as the scales have not yet been validated in Korean.

In conclusion, we observed herein that temperament, social relations, and behavior are associated with sleep problems and sleep disturbance in children.

Conflicts of Interest

The authors have no financial conflicts of interest.

REFERENCES
