Sleep patterns and insomnia among internationally adopted adolescents

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Abstract

Objective

Sleep is essential for adolescent development. We aimed to investigate sleep patterns and insomnia among internationally adopted adolescents compared to their non-adopted peers.

Design

Cross-sectional.

Setting

Data stem from the population-based youth@hordaland-survey, conducted during winter/spring 2012, in Hordaland, Norway.

Participants

Of the 9846 adolescents who responded to the sleep measures in the youth@hordaland-survey, 44 were identified as international adoptees by linkage to the Central Adoption Registry.

Measures

The adolescents provided self-report information on demographic characteristics, mental health problems and a range of sleep measures.

Results

There were no significant differences between the adoptees and non-adopted peers regarding how much time they spent in bed, but the internationally adopted adolescents reported significantly shorter sleep duration, both on weekdays (d=0.37, p=.014) and weekends (d=0.37, p=.015). The difference was due to the adoptees spending longer time awake after

sleep onset (d=0.78, p>.001). Further, 32% of the adopted adolescents fulfilled the DMS-5 criteria for insomnia, compared to 18% of their non-adopted peers (odds-ratio 2.06, 95% CI 1.09-3.90). However, this association was no longer significant after adjusting for symptoms of depression. Adolescents adopted after 12 months of age reported more sleep problems than those who were adopted earlier.

Conclusion

The short sleep duration and high occurrence of insomnia among the internationally adopted adolescents suggests both a problem area that should receive more focus and a potential avenue for intervention. The results further suggest that assessing both mental health problems and sleep problems among internationally adopted adolescents who are experiencing difficulties could help target interventions.

Keywords: sleep; insomnia; adolescence; adoption

Introduction

Sleep is a vital aspect of healthy adolescent development (1) and insufficient sleep is associated with important functional outcomes, such as reduced academic performance (2, 3) and absence from school (4). During adolescence, sleep duration becomes shorter (5, 6), though the sleep need remains stable and many adolescents sleep less than recommended (7). Adolescent sleep is characterized by a long sleep onset latency and a delayed sleep phase (8, 9). Insomnia is also highly prevalent during adolescence (7, 10), entailing difficulties with initiating or maintaining sleep and tiredness or sleepiness during the daytime that disturbs normal functioning (11). While sleep problems are common in the general population, they might be even more prevalent in at risk populations, such as international adoptees (12). While international adoptees are known to have more sleep problems than their peers early in life, little is known about sleep problems in the adolescent years.

In the months immediately following adoption, sleep is one of the most commonly reported worries of adoptive parents, and about half of all newly adopted children are reported to have sleep difficulties (13, 14). The most common difficulties include need of extensive help to fall asleep, displaying separation anxiety at bedtime, and frequent awakenings during the night (13). Studies indicate that these are also present later in childhood, though the extent of the problems identified varies between studies. A study comparing international adoptees to the norms on the Child Behavior Check List (CBCL) in young children (aged 2 to 6 years) found slightly more sleep problems among adoptees (effect size d=0.12) (15). A small and uncontrolled pilot study of adopted children aged 2 to 10 years, found that sleep difficulties, assessed with the Children's Sleep Habits Questionnaire, were present in 71% of the adoptees (16).

There are several reasons why internationally adopted adolescents could experience sleep problems. First, international adoptees have experienced adverse life events that could disrupt sleep, including at least one change of primary caregiver early in life, and many experience stress, malnutrition, neglect and being placed in institutions in the time before adoption (17-19). Adverse childhood experiences have been related to insomnia in adolescents (20), poor sleep quality (21) and self-reported sleep problems (22) in adults in the general population. Although there is seldom available information on the experiences of international adoptees in the time before adoption, age at adoption can be used as a proxy to indicate early adversity (19). Previous studies indicate that higher age at adoption is related to poorer cognitive development (23, 24) and increased mental health problems (25), suggesting that such an effect could also be present with regards to sleep problems. Second, international adoptees report more depressive symptoms and internalizing problems in adolescence compared to their peers (26-28). Previous studies of adolescents in the general population suggest that depressive symptoms and mood disorders are related to both short sleep duration and insomnia (29, 30). Indeed, sleep problems are a common symptom of depression in adolescence, and are related to the severity of diagnosable depression (31, 32). Thus, it is important to account for the presence of depressive symptoms when assessing sleep among internationally adopted adolescents.

Previous studies on sleep among international adoptees have assessed sleep problems with either a single item (14), a single item with follow up questions (13) or the limited sleep items of the CBCL (15). To our knowledge, no previous studies have assessed this group using a more detailed and validated battery of sleep instruments, including both sleep patterns and symptoms of insomnia. Further, many of the previous studies did not include a control group (13, 14, 16), and given the high rate of sleep problems in the general population, conclusions regarding additional risk for adopted children are therefore limited. It would be an important

contribution to the literature to investigate sleep among adoptees using more detailed sleep measures, including specific sleep problems that are prevalent in adolescence, such as insomnia and short sleep duration.

Based on the above considerations, the aim of the present paper was to investigate sleep patterns in internationally adopted adolescents compared to their non-adopted peers. Further, we aimed to investigate the proportion of adopted adolescents who fulfilled the diagnostic criteria for insomnia, and the possible influence of depressive symptoms. We further aimed to investigate whether age at adoption was related to sleep problems in the group of international adoptees.

Participants and methods

Procedure

Data for the current article stem from the youth@hordaland-survey, conducted in the County of Hordaland, Western Norway during winter/spring 2012, in collaboration between the Regional Center for Child and Youth Mental Health and Child Welfare (RKBU Vest) and Hordaland County Council. The main aim of the survey was to investigate mental health problems, lifestyle factors and service use among adolescents. The questionnaire utilized in the survey covered information on demographic background factors, familial socio-economic status, lifestyle factors and several validated measures investigating mental health problems. Examples of included measures are the Short Moods and Feelings Questionnaire (SMFQ), the Strengths and Difficulties questionnaire (SDQ), the Adult ADHD Self-Report Scale (ASRS) and the Resilience Scale for Adolescents (READ).

All adolescents born between 1993 and 1995 who were residing in Hordaland at the time of the survey were invited to participate. For adolescents enrolled in school, information about

the survey and a link to participation was sent to their school e-mail address. Adolescents not in school received the information by postal mail to their home address.

The schools allocated one school hour (approximately 45 minutes) for completion of the questionnaire. School personnel were present to organize the data collection and ensure confidentiality. Survey staff were available via telephone during the project period to answer questions by students or teachers. Adolescents who were not in school on the day of the data collection could complete the questionnaire at their own convenience during the data collection period.

Sample

Of the 19 430 adolescents invited to participate in the youth@hordaland-survey, 10 257 (53%) responded to the questionnaire. The sample for the present study was limited to participants with valid answers on the sleep variables. Sleep variables were checked for validity by analyses identifying clearly erroneous answers including negative sleep duration and negative sleep efficiency. 374 participants were deleted due to invalid responses and the remaining sample consisted of 9846 adolescents.

Adoption sample

The internationally adopted adolescents who responded to the youth@hordaland-survey were identified by linking the survey to the Norwegian Central Adoption Registry. The registry is administered by the Norwegian Directorate of Children, Youth and Family Affairs and contains information on all adoptions that have taken place in Norway since 1917. In addition to type of adoption (i.e. international, national or stepchild adoption), the registry contains information on age at adoption and country of origin. Of the 9846 adolescents in the current sample, 44 were identified as internationally adopted.

The majority of the adoption sample (54.6%) were adopted from Korea, while 31.8% were adopted from other Asian countries. Only 13.6% were adopted from countries in Africa and South America. These numbers deviate from the statistics of the total number of children born between 1993 and 1995 who were adopted to Hordaland in the period of interest, where 28% were adopted from Korea, 19% from other Asian countries and 34% from Africa and South America. In addition, 19% of the children were adopted from countries not represented in the present sample (for instance Eastern European countries). Concerning age at adoption, a total of 61.4% of the adolescents in the present sample were younger than one year old at the time of adoption, while 22.7% were between one and two years of age and 16% were older than two years. These percentages also deviate from the statistics, where 42% of the children adopted to Hordaland were younger than one year old at the time of adoption, 29% were adopted between one and two years of age and 29% were adopted after they were two years old. Thus, the adoptees in the present sample were adopted at an earlier age compared to the available statistics on international adoptees in Hordaland. However, these numbers are not directly comparable as the available statistics only include information on the children who were adopted into Hordaland county. We do not know whether they still resided in the county at the time of the survey.

Instruments

Demographic information

The age and gender of the participants were derived from the personal identification number from the Norwegian National Registry. The socio-economic status (SES) of the family was assessed by parental education and perceived economic wellbeing. The adolescents were asked to report the education of their mother and father, with the response alternatives: 'primary school', 'secondary school', 'college or university: less than 4 years', 'college or

university: 4 years or more', and 'do not know'. For the purpose of the present study, the two categories pertaining to college or university education were collapsed into one category. Perceived economic wellbeing was assessed by asking how well off the adolescents deemed their family to be compared to others, with the response alternatives: 'better than others', 'equal to others', and 'poorer than others'.

Sleep measures

Self-reported bed time and rise time was reported separately for weekdays and weekends in hours and minutes using a scroll down menu. Time in bed (TIB) was calculated by subtracting the bedtime from rise time. Sleep onset latency (SOL) and wake after sleep onset (WASO) were similarly indicated in hours and minutes, but not reported separately for weekdays and weekends. Sleep efficiency was calculated by subtracting SOL and WASO from TIB, and calculating the percentage of the time in bed that was spent sleeping.

The adolescents responded to a statement that they had difficulties initiating and/or maintaining sleep (DIMS) rated on a three-point Likert-scale with the response alternatives 'not true', 'sometimes true', and 'certainly true'. If confirmed (i.e., 'somewhat true' or 'certainly true'), adolescents were asked how many days per week they experienced problems either initiating or maintaining sleep. Adolescents also provided information on the duration of DIMS.

The adolescents reported if they experienced daytime sleepiness or tiredness with the response alternatives 'not true', 'somewhat true' and 'certainly true'. If the adolescents confirmed tiredness or sleepiness by either of the two latter alternatives, they were asked to report the number of days per week they experienced these problems separately for tiredness and sleepiness.

In the present study, insomnia was operationalized according to the DSM-5 criteria (11). The adolescents fulfilled these criteria if they experienced DIMS at least three nights per week, reported daytime sleepiness and/or tiredness at least three days a week, and had a duration of sleep problems of at least 3 months. This operationalization has been applied previously (7).

Depression

Symptoms of depression were assessed by the Short Moods and Feelings Questionnaire (SMFQ) (33). The SMFQ consists of 13 items concerning the emotional and cognitive aspects related to depressive symptoms. Each item is rated on a 3-point Likert-scale pertaining to experiences during the past two weeks. The Norwegian translation of the response alternatives corresponds to the original wording: 'not true', 'sometimes true' and 'true'. The SMFQ has been found to have high internal consistency and strong unidimensionality both in early and late adolescence (34, 35) and in a study based on the sample from youth@hordaland (36).

As one of the SMFQ items is directly related to sleep problems ('I felt so tired I just sat around doing nothing'), the analysis was conducted both with and without this item included in the scale.

Statistical analyses

Differences between internationally adopted adolescents and their peers regarding demographic variables were investigated using chi-square tests. Independent samples t-test were used to examine differences in sleep patterns between the two groups and between international adoptees adopted before and after 12 months of age. Between-group effect sizes were calculated using the Cohen d formula. The effect sizes can be interpreted according to Cohen's guidelines (37), with d's of about 0.20 representing small effect sizes, d's of about 0.50 medium effect sizes, and d's above .80 representing large effect sizes. The proportion of internationally adopted and non-adopted adolescents who fulfilled the criteria for insomnia

were investigated by a Pearson's chi-squared test. Logistic regression analyses were conducted to investigate differences in insomnia in adopted versus non-adopted adolescents, and to what extent symptoms of depression could explain potential differences. Stata 15 was used for all analyses (38). Results were considered statistically significant at the 0.05 level. Two-tailed tests were used for all analyses. Missing values were handled using listwise deletion.

Compliance with ethical standards

The study and the linkage between the youth@hordaland-study and the Norwegian central adoption registry were approved by the Regional Committee for Medical and Health Research Ethics in Western Norway. All participants gave their informed consent prior to their inclusion in the study. In accordance with Norwegian regulations, adolescents aged 16 years and older can make decisions regarding their own health (including participation in health studies), and thus gave consent themselves to participate.

Results

Study sample

Of the 9846 adolescents in the sample, 44 had been adopted internationally in childhood. There were no significant differences between the adoptees and the non-adopted adolescents regarding age, gender or any of the variables measuring SES (see table 1).

--- Please insert Table 1 about here ---

Sleep patterns

There were no significant differences between the internationally adopted adolescents and their non-adopted peers regarding how much time they spent in bed on neither weekdays nor weekends (see Table 2 for details). There was, however, a significant difference in the sleep duration of the two groups, with adoptees reporting a mean sleep duration of 5 hours and 48 minutes compared to 6 hours and 25 minutes among the non-adopted adolescents in the weekdays (d=0.37, p= .014). Both groups reported longer sleep duration on the weekends, but the difference between the groups remained; internationally adopted adolescents reported 41 minutes shorter sleep duration (d= 0.37, p = .015).

--- Please insert table 2 about here ---

SOL and WASO

The internationally adopted adolescents reported a slightly longer SOL of 55 minutes, compared to 47 minutes among the non-adopted adolescents, but the difference was not statistically significant (d = 0.13, p = .385, see Table 2). In contrast, the adoptees reported being awake after sleep onset on average 44 minutes, compared to 14 minutes among the non-adopted adolescents (p<.001). The effect size for the difference was medium to large (d = 0.78).

Insomnia and depression

A greater proportion of internationally adopted adolescents fulfilled the DSM-5 criteria for an insomnia disorder compared to their non-adopted peers (32% compared to 18%, respectively, $chi^2(1) = 5.20$, p = .023). Logistic regression analyses showed that internationally adopted adolescents had an odds-ratio (OR) of insomnia of 2.06 compared to their non-adopted peers (95% CI 1.09-3.90, p = .026). When symptoms of depression were included in the analysis (using the total SMFQ-score), the OR was attenuated and no longer statistically significant

(OR = 1.55, 95% CI 0.75-3.18, p = .234). The results were similar when omitting the item assessing tiredness from the SMFQ (OR = 1.58, 95% CI 0.77-3.22, p = .213).

The influence of age at adoption

Analyses of differences in sleep patterns between internationally adopted adolescents who were adopted before and after they were 12 months old are presented in table 3. Adolescents who were adopted after 12 months of age reported significantly shorter sleep duration on weekdays, with a large effect size (d = 1.25, p = .003). There was no significant difference between the two groups regarding SOL (d = 0.09, p = .758), but the adolescents who were adopted after 12 months reported being awake after sleep onset significantly longer (1 hour and 39 minutes compared to 12 minutes, p = .004, d = 1.38).

---Please insert table 3 about here---

A greater proportion of the adolescents who were adopted after 12 months of age fulfilled the DSM-5 criteria for an insomnia disorder compared to those who were adopted before 12 months (41% compared to 26%, respectively), but the difference was not statistically significant (chi^2 = 1.12, p = .290).

Discussion

The present findings indicate that internationally adopted adolescents have shorter sleep duration both on weekdays and weekends compared to their non-adopted peers, though they spend similar lengths of time in bed. The differences were mainly related to the adoptees reporting longer WASO than their peers, with an average of 44 minutes wake time during the night. Further, a greater proportion of the internationally adopted adolescents fulfilled the criteria for insomnia, which could partly be explained by the adopted adolescents also reporting higher levels of depressive symptoms. Adolescents who were adopted after they

were 12 months old reported significantly more sleep problems compared to those adopted earlier.

The internationally adopted adolescents reported significantly shorter sleep duration than their non-adopted peers, though there was no difference between the groups regarding the time spent in bed. While no previous studies have investigated the sleep duration of international adoptees, these findings are in line with studies of adoptive children indicating that many adoptees experience sleep difficulties (13, 14, 16). The short sleep duration of the international adoptees was mainly related to spending more time awake after they had fallen asleep, as there were no significant differences in sleep onset latency or time spent in bed. This is consistent with parent reported problems of adopted children, where frequent awakenings is one of the most commonly reported problems (13). The mechanisms behind these sleep difficulties are likely different for the adolescent adoptees, but the present findings suggest that they still experience difficulties many years after adoption.

There is evidence from the general population of continuity of sleep problems in general (39) and sleep maintenance problems specifically (40) from childhood to adolescence. Although no previous studies have investigated the trajectories of sleep problems among international adoptees, a Dutch longitudinal study found that the impact of early adversities on mental health problems remained stable from childhood to adulthood (17). It is possible that a similar continuity is present for sleep problems, and this could be due to early adversity. As there are no differences regarding time spent in bed, it does not seem likely that different routines in adoptive families underlie the short sleep duration among the adoptees.

Nearly one in three of the internationally adopted adolescents fulfilled the DSM-5 criteria for insomnia in the present study, which was significantly more than the non-adopted peers. Although insomnia has not been investigated among international adoptees previously, a

study of adopted children indicate that while many parents express concerns about minor sleep problems, few report more serious sleep problems (9%) (14). It could be that international adoptees experience more severe sleep problems in adolescence than in childhood, in line with the developmental pattern of sleep problems in the general population (7).

As the adoptees reported significantly longer WASO, but not SOL, compared to their non-adopted peers, they are more likely to experience sleep maintenance insomnia than sleep onset insomnia. Among adults with insomnia, those who reported adverse childhood experiences had more awakenings during the night and more movement arousals than those without such experiences (21). Thus, it is possible that problems with sleep maintenance could be related to adverse experiences in the time before adoption. This assumption is strengthened by the importance of depression for the increased rate of insomnia among the adoptees in the present study. Rumination and worrying are known risk factors for sleep disturbances (41), and may be part of depressive symptomatology and more frequent among those who have experienced negative life events. This may be one route through which early adversities may inflict later sleep. Cortical hyper arousal may be the physiological mechanisms accounting for the nighttime awakenings (42), but this needs to be investigated in this specific group. Nightmares may be another reason underlying nighttime awakenings, and they are more common among children with early life adversities (43). This is an interesting avenue for future research.

The association between adoption status and insomnia was attenuated when accounting for depression. This could indicate that the high levels of depressive symptoms among adopted adolescents (26) could be an important contributing factor for insomnia. Although this is the first study to investigate the association between insomnia and depressive symptoms among internationally adopted adolescents, the finding is in line with studies on the general

adolescent population (29, 30). It has also been suggested that sleep problems could be a precursor for depression (41), but analyses of the temporal association between sleep problems and depression are precluded in the present study due to its cross-sectional nature. The results could further indicate that sleep problems and depressive symptoms more often co-occur among international adoptees.

As both sleep problems and depression are related to functional impairment also in adolescence, it is important that such problems are detected and that treatment is available for those presenting with more severe difficulties. Since there were no significant differences regarding time in bed between international adoptees and their peers, and the problems seem to be related to being awake after sleep onset, it can be difficult for adoptive parents to detect these problems. It is therefore important that adoptive parents are given information about the increased risk of sleep problems in adolescence.

Interestingly, there were large differences according to age at adoption, where adolescents adopted after they were 12 months old reported more sleep problems than adolescents who were adopted earlier. This is in line with previous studies investigating other outcomes in international adoptees (23-25), but in contrast to studies on sleep in younger adoptees (13, 16). The discrepancy might be due to the age compositions in the studies. It is possible that other factors are more important in the first years in the adoptive family, when the adoptees are adjusting to their new situation and the parents are establishing new routines. Further, Rajaprakash and colleagues (16) emphasized that the adoptees in their study were exposed to similar degrees of preadoption adversity. It is possible that the effect of age at adoption in the present study could be related to the experiences before adoption, as age at adoption is related to the length of time spent in unfavorable conditions. Indeed, a previous study on adults from the general population identified a graded relationship between adverse childhood experiences

and self-reported sleep problems (22), and such experiences are also related to sleep disturbances among adolescents (21).

Strengths of the present study include the broad assessment of sleep problems and sleep duration and the inclusion of a measure of depression. Further, the adoptees who participated in the survey were identified by use of the Central Adoption Registry, ensuring correct identification. As adoption status was not a topic in the survey, the adoptees were invited on the same grounds as their non-adopted peers. The possibility to compare the adolescents who had been adopted with peers from the same population, extends on previous studies and is a major strength of the present study.

The use of self-reported data is an important limitation. Sleep duration was measured by self-report, and although self-reported sleep parameters, including SOL and WASO typically differ from those obtained from objective assessments (44, 45), recent studies have showed that such self-report sleep assessments can be recommended for the characterization of sleep parameters in both clinical and population-based research (46). Further, the accuracy of self-reported sleep is in general good for adolescents (47). The inclusion of both time in bed, SOL and WASO is a significant study strength, as most population-based studies rarely provide these detailed measures. While time in bed was reported separately for weekdays and weekends, SOL and WASO was reported jointly, indicating a typical night. It is possible that these vary, with for instance shorter SOL associated with later bed times on weekends. Reporting these separately would give a more accurate picture of the actual sleep patterns on weekdays and weekends.

A limitation concerning the adoption sample is the small number of internationally adopted adolescents who participated in the youth@hordaland-survey, limiting the statistical power to detect differences between the adoptees and their non-adopted peers. Further, the response

rate of the adoptees is not known. The linkage to the Central Adoption Registry was performed after the study was conducted, and we do not know how many adoptees were invited to participate. Comparing the number of participants to the total number of children born from 1993 to 1995 and adopted to Hordaland, suggests that the participation rate might be lower among adoptees compared to non-adopted adolescents. However, we do not know how many of these adoptees still resided in Hordaland at the time of the survey.

The composition of the adoptive sample regarding age at adoption and country of origin deviated somewhat from the statistics of children born from 1993 to 1995 and adopted to Hordaland County. This could influence the representativeness of the sample as the majority of participants were adopted from Korea and at an early age, both of which are associated with less problems among adoptees (48). This suggests that adoptees with a more favorable background were more likely to participate in the survey, and therefore the problems faced by internationally adopted adolescents in general could be underestimated in the current study. This is especially likely as the adoptees who had been adopted after they were one year old showed significantly more sleep problems compared to those adopted earlier in life.

A limitation regarding the entire sample of the youth@hordaland-survey is the school-based nature of the survey. Though all adolescents born from 1993 to 1995 and residing in Hordaland at the time of the survey received information about the survey and log on details, it is likely that adolescents who were present at school during the data collection are overrepresented in the study. As sleep problems have been related to absence from school (4), adolescents with sleep problems could be more likely to be absent from school on the day of the survey, and sleep problems might therefore be underreported in the present study. Still, this limitation is likely to affect the internationally adopted participants and non-adopted participants in the same manner, and not influence the differences identified between the two groups.

Conclusion

The present study suggest that internationally adopted adolescents sleep substantially shorter, are awake longer during the night, and have higher rates of insomnia compared to their non-adopted peers. Of note, the sleep duration of the adoptees on school days is much shorter than the recommendation for this age group, and is likely to have important consequences given the already established associations between sleep and school functioning. In the present study, symptoms of depression could explain parts of the increased odds of insomnia among the international adoptees, suggesting that both sleep problems and depressive symptoms should be considered when choosing interventions for this group. The finding that higher age at adoption is related to more sleep problems is especially noteworthy, as the age of adoption among international adoptees has increased during the past decade following international regulations. It is therefore possible that international adoptees entering into adolescence today are at higher risk for sleep problems compared to the adolescents in the present study, but further research is necessary to investigate such assumptions.

Acknowledgements

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