



## Too tired for school? The effects of insomnia on absenteeism in adolescence

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### ABSTRACT

**Objectives:** Sleep has important consequences for a person's daytime functioning. Numerous studies have shown that insomnia predicts work absenteeism and work disability in adults, but only a few studies have examined this association in adolescents. This study aims to explore whether symptoms of insomnia in adolescents predict school absenteeism 1 year later, over and above known psychological risk factors for absenteeism.

**Design:** The study used a longitudinal design with 2 measurement points over 1 year.

**Setting:** The students completed questionnaires during school hours at baseline and again at follow-up.

**Participants:** Students in the 10th to 12th grades in a Swedish upper secondary school were followed prospectively for 1 year (age, 16–20 years; N = 353; 48.1% girls).

**Measurements and results:** We used logistic regression analyses, controlling for the known effects of psychological factors, and arrived at a model elucidating the role of insomnia. That is, besides symptoms of insomnia, the model included previous absenteeism, alcohol intoxication, school-related social phobia, social anxiety, depressive symptoms, somatic symptoms, and bully victimization. Symptoms of insomnia predicted school absenteeism 1 year later, over and above known risk factors for absenteeism. Adolescents reporting severe symptoms of insomnia were almost 3 times more likely than adolescents reporting no or low symptoms to report problematic absenteeism 1 year later. We did not find any gender difference.

**Conclusions:** Our findings underscore the importance of sleep problems on adolescents' daytime functioning as measured by school absenteeism. Therefore, sleep may be an important target for preventive interventions with adolescents.

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Insomnia is a prevalent problem that affects approximately 10% to 15% of adults<sup>1</sup> and 7% to 24% of adolescents.<sup>2–4</sup> Adolescence is a particularly sensitive period for sleep, due to a combination of biological and psychosocial changes.<sup>5</sup> During this period, adolescents develop a preference for later bedtimes, which, in turn, can lead to difficulties falling asleep and shorter sleep duration.<sup>5,6</sup> The average adolescent likely suffers a significant sleep deficit,<sup>5,7</sup> may have difficulties falling asleep,<sup>6</sup> and can have an irregular sleep schedule.<sup>8</sup> These kinds of sleep disturbance are often associated with a variety of poor health outcomes, including physical illness, such as obesity,<sup>9</sup> mental health difficulties, such as depression and anxiety,<sup>10,11</sup> and behavioral problems, such as substance abuse and aggression.<sup>11</sup>

The impact of insomnia upon adults is relatively well-studied; for example, sleep difficulties have been shown to predict work absence.<sup>12,13</sup> However, the impact of insomnia upon adolescent functioning has received less attention despite the fact that impairment in

important areas of functioning (eg, academic, behavioral, and occupational) is an important component of the diagnostic criteria for insomnia.<sup>14</sup> Given that insomnia has been shown to predict work absenteeism in adults, it is surprising that the potential relationship between insomnia and school absenteeism in adolescents has not been investigated more thoroughly.

To our knowledge, only 2 studies to date have investigated the relationship between insomnia and school absenteeism.<sup>15,16</sup> One longitudinal study examined parental reports of the sleep of children and adolescents (age, 9–16 years) and found that students who had more trouble falling asleep and staying asleep were more likely to be absent from school in comparison to students who did not present such problems.<sup>16</sup> One cross-sectional study found that insomnia significantly increased the probability of students reporting school absenteeism in a sample of 8347 (age, 16–19 years).<sup>15</sup> While both of these studies demonstrated an association between adolescent insomnia and school absenteeism, interpretation of these findings is difficult due to a number of methodological limitations. The choice of study design may have been problematic. For example, Hysing et al<sup>15</sup> used a cross-sectional design, which limits the ability to draw

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conclusions about any potential causal relationship between insomnia and absenteeism. The measurement of sleep has also been problematic. For example, Egger et al<sup>16</sup> relied upon parental report as a measure of adolescent sleep despite the fact that the reliability of parental estimates of children's sleep decreases when children enter adolescence.<sup>17</sup> Furthermore, it was not clear in this study how sleep difficulties were operationalized, making comparison with insomnia criteria difficult.

Another central issue is whether sleep has an effect on function above and beyond psychological variables. A solid literature base shows that sleep difficulties are both symptoms and risk factors for depression, anxiety, somatic complaints (eg, stomachache, headache, neck and back pain), and alcohol use in adolescents.<sup>18</sup> In turn, these are also among the major risk factors for school absenteeism.<sup>16,19,20</sup> Specifically, it is well-established that 1 reason for pupils to skip school is that it may be anxiety-provoking. School-related social phobia refers to the fear of attending school and school-related activities, such as oral presentations, riding the school bus, or eating with other classmates.<sup>21</sup> School social phobia is sometimes related to poor relationships with peers and even being victim of bullies.<sup>16</sup> Moreover, adolescents who fear school often report somatic symptoms, such as headaches and stomachaches, often without a confirmed physical illness.<sup>16,22</sup> In general, students who skip school often present other problems, such as depression, social phobia, substance use, and difficulties with peer relationships.<sup>16,21</sup> To further develop our understanding of the relationship between adolescent insomnia and school absenteeism, it is important that any study design incorporates these potential confounding factors in the same model.

Taken together, more studies about the relationship between sleep and school absenteeism are needed, preferably using standardized measures of sleep, following participants over time in a longitudinal design, and controlling for already established predictors of school absenteeism. In practice, a longitudinal design is very important because it can provide important information about possible targets for preventive interventions.

This study aimed to investigate prospectively the impact of insomnia on school absenteeism. Using a sample of Swedish upper secondary school students (aged 16–20 years), this study assessed the relationships between insomnia and school absenteeism over a 1-year period. Measures of social anxiety, school social phobia, depression, alcohol use, somatic complaints, and being the victim of bullying were included so that the unique contribution of insomnia toward school absenteeism could be assessed. We predicted that insomnia would make a significant contribution in explaining the development of school absenteeism.

## Method

This study used a longitudinal design to collect data from a health survey in a Swedish upper secondary school. The survey included standardized questionnaires and questions developed or adapted for this specific study and also included additional areas to those analyzed for this study. All students in the first through third year answered the survey for 3 consecutive years, from 2006 to 2009. The sample for the present report is drawn from the first 2 years of the survey, school year 2006–2007 (time 1) and 2007–2008 (time 2). We chose to use the first 2 waves for this study because of the additional attrition and consequent decrease in sample size when including the third wave.

### Participants

Students in 10th to 12th grades (age range, 16–20 years) took part in the study. A total of 967 students (48.2% girls and 51.8% boys) in

grades 10, 11, and 12 participated at the first data collection. Most of the students were born in Sweden (92%) and had at least 1 biological parent born in Sweden (91%). The majority lived with both biological parents (70%), whereas 22% lived in a single parent household. Of the total 967 pupils, 673 attending grades 10 and 11 were followed prospectively when they attended grades 11 and 12, respectively, from time 1 to time 2. The sample at time 2 included 516 students. Response rate was 80% on both occasions. The total number of students eligible for our analysis with complete data on the variables of interest was 353 (48.1% girls).

### Attrition analysis

To test whether the participants who were lost to follow up (time 2) were significantly different from the remaining participants, we ran logistic regression analysis using all study variables at time 1 as predictors and a dummy-coded attrition variable as the outcome (1, attrition; 0, retained in study). Only 2 of the study variables were significantly related to attrition over time. Specifically, students who tended to be absent (odds ratio, 1.82) and those who had higher levels of somatic back pain (odds ratio, 1.23) at time 1 were more likely to be absent during data collection at time 2. Overall, due to low Nagelkerke  $R^2$  (0.06), we expect that attrition would have minimal impact on the study's findings.

### Procedure

Participation in the study was voluntary and confidential. Students received in advance a letter informing about the study. According to Swedish law, high school students (age > 16 years) do not need parents' permission for surveys approved by the school and done in conjunction with the school health services. Therefore, in the present study, verbal consent was given by the students at data collection. The students completed the questionnaire during school hours and then placed it into an anonymous envelope, to ensure confidentiality. The survey was administered by the school's nurse for students in grade 10 and by the teachers for students in grades 11 and 12.

### Measures

#### Absenteeism

School days missed were evaluated with a single item: "Have you been away a whole day from school in the last 3 months?" (no, I haven't [1]; 1 time [2]; 2–3 times [3]; 4–10 times [4]; more than 10 times [5]). In the analysis, the variable was dichotomized into high (4–10 times; more than 10 times) and low (no, I haven't; 1 time; 2–3 times) absenteeism. This is in line with Kearney's recommendations for defining "problematic absenteeism." Specifically, a minimum of 15% days absent from school or, in other words, missing at least 10 days in a 15-week school period.<sup>23</sup> This is in line with the Swedish school systems, where independently of whether the student has permission from the parents, missing 15% or more of school is a reason for concern.<sup>24</sup>

#### Insomnia symptoms

Four items investigating sleeping patterns were taken from the Basic Nordic Sleep Questionnaire<sup>25</sup> and the Uppsala Sleep Inventory.<sup>26</sup> The items read: "Have you had a problem sleeping in the last three months?" (yes [2] or no [1] response), "If yes, how often in the last three months?" (less than 1 time per week [1]; 1–2 days per week [2]; 3–5 days per week [3]; daily/almost daily [4]), "How long do you lie in bed before falling asleep?" (less than 10 minutes [0]; 10 minutes [1]; 20 minutes [2]; 30 minutes [3]; 40 minutes [4]; 50 minutes [5]; 60 minutes [6]; more than 1 hour [7]), and/or "If you wake up during night, how long do you usually stay awake?"

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