

# Improvements of adolescent psychopathology after insomnia treatment: Results from a randomized controlled trial over one year

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Many adolescents experience sleep problems, which can be caused by hormonal changes during puberty, and social changes with increasing complexity of daily life while growing up. The interplay of these biological and social factors can lead to inadequate sleeping behaviours and can disturb the biological clock. When troubles with initiating and maintaining sleep or inadequate sleep quality become chronic they can result in insomnia disorder.

Insomnia has a bi-directional relationship with psychopathology, which implies that it can be caused by or exacerbate other mental disorders, such as depression, anxiety, and ADHD. For adolescents there appears to be little evidence that depressive symptoms predict the development of sleep disturbances, whereas prior insomnia in adolescents is associated with a four times higher risk of subsequent depression. Moreover, adolescents with a sleep problem have a two times higher risk for any other psychiatric disorder. Because of the accumulating evidence of the bi-directional relation of insomnia with other mental disorders, in the Diagnostic and Statistical Manual Fifth edition (DSM-5) insomnia is regarded as a mental disorder per se (i.e. not necessarily comorbid with, and/or caused by, another mental disorder) and a target for intervention in itself.

Cognitive behavioural therapy for insomnia (CBTI) consists of a set of techniques that in combination have been shown to be the most effective treatment for insomnia, and is recommended as first-line treatment for adults for over ten years. CBTI consists of psycho-education sleep hygiene, stimulus control, cognitive therapy, restriction of time in bed (also known as 'sleep restriction'), and relaxation exercises. Sleep hygiene consists of aspects of behaviour and the sleep environment that influence sleep, such as diet, exercise, substance use, light (including light from devices), noise, and bedroom temperature. Sleep hygiene advice is usually combined with psycho-education on sleep-need, sleep-regulation, and functions of sleep. Stimulus control is aimed at dissociating the conditioned response of insomnia from cues that are normally associated with sleep, such as the bed and bedroom, and re-associating these cues with rapid sleep onset. In practical terms, a person is instructed to use the bed and bedroom only for sleep, to go to bed only when sleepy, and to get up for a short period of time when unable to fall asleep or return to sleep for longer than 15-20 minutes.



Relaxation exercises are aimed at decreasing (physiological and cognitive) arousal that interferes with sleep. Cognitive therapy is aimed at altering dysfunctional beliefs and cognitions that interfere with sleep, such as “I have to sleep now otherwise I won’t be able to do well at my exam tomorrow” or “I need at least 9 hours of sleep”. And finally, restriction of time in bed consists of curtailing the time spent in bed to the amount the person actually sleeps. By restricting time in bed a mild state of sleep deprivation is induced that facilitates a rapid sleep onset.

Recently, CBTI has also been shown to be effective for insomnia in adolescents in individual internet-therapy and in group-therapy formats. Besides improvements in sleep, CBTI also leads to improvements in other mental health problems, such as depression. However, it is still largely unknown whether these improvements in other mental health problems are caused by the CBTI directly, or are related to mitigation of insomnia.

In a study published in the Journal of Child Psychology and Psychiatry we investigated CBTI for adolescents aged 12-19 using internet-therapy (39 participants) and group therapy (38 participants), and compared the results to a waiting list control group (39 participants). Adolescents received six weekly sessions of CBTI, and a booster-session two months after the sixth session. We measured psychopathology with the Youth Self-Report (YSR), and sleep with a questionnaire on insomnia symptoms, and daily sleep-logs and actigraphy (an accelerometer that measures movement and is worn like a wrist-watch on the non-dominant hand) for a week at each measurement.



Actigraphy are considered to be a reliable and objective measurement of sleep parameters, such as sleep onset latency (SOL), total sleep time (TST) and sleep efficiency (SE). From multilevel regression analyses we found that after CBTI both treatment-groups improved with large effect sizes for SE and SOL, and a small effect size for TST. Insomnia symptoms decreased with a large effect size after CBTI. Regarding psychopathology, we found medium effect size improvements for Affective, Somatic and ADHD problems, for both treatment groups. Anxiety problems decreased in the group treatment and Oppositional defiant problems decreased in the internet-treatment after CBTI. All improvements were sustained over one year or showed further improvements.

To investigate whether improvements in psychopathology could be attributed to improvements in insomnia, we conducted mediation analyses for both groups with measurements of insomnia and psychopathology at baseline, directly after treatment, and at 2-months follow-up. These analyses indicated that the decrease of affective and anxiety symptoms at 2-months follow-up after CBTI were fully mediated by the decrease of insomnia symptoms directly after treatment. The decrease of ADHD symptoms was partially mediated.

These findings indicate, first, that sleep problems play an important role in causing and maintaining psychopathology in adolescents, and, second, CBT for insomnia may be an effective additional instrument in treating certain types of psychopathology. Common neural and behavioural mechanisms underlying insomnia and psychopathology may explain the effectiveness of CBTI in treating psychopathology.

Concerning the bi-directional relationship between insomnia and psychopathology, an important question is whether it is best to (a) treat the insomnia first and then to assess the effect of that treatment on the psychopathology (and only treat the latter if still necessary), (b) to treat the psychopathology first and then to assess the effect of that treatment on the insomnia (and only treat the latter if still necessary), or (c) to combine both treatments from the outset. In our present study we have shown that CBT for insomnia can improve adolescent psychopathology, so treating insomnia first appears to be a viable and feasible alternative to other treatment options.

The results of our study are also important for clinical practice. Research shows that though prevalence of psychopathology is high among adolescents, many adolescents do not get the mental healthcare they need. Our study shows that a relatively short treatment programme for insomnia can have a strong positive influence on mental health problems in the young. Moreover, we have found broadly similar results for Internet and group therapy.

To conclude, our study shows the importance of sleep for healthy adolescent functioning and the ability to improve both sleep and psychopathology through a relatively short and accessible treatment program.

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### Implications

- Clinical practice: In case of adolescent comorbid disorders including sleep problems/insomnia, treating the sleep problems first can be considered. Treating sleep problems regardless of other mental health problems is always indicated, and can lead to mitigation of other mental health problems.
- Service development/delivery: Internet-delivered behavioural sleep treatment is equally effective in treating insomnia in adolescents as face-to-face group therapy.
- Gaps and recommendations for further science: Further research into models of adolescent insomnia, and common underlying mechanisms of insomnia and other psychopathology is warranted