

Should kids be ‘sleeping their life away’?

By Courtney Miskell

After hustling through a daunting checklist of daily duties we peek up and see a sleepy adolescent emerging from their bedroom after sleeping well into the afternoon; ‘You are just getting up? You’re going to sleep your life away!’ Children could be much more productive if they started their daily earlier, right? On the contrary, modern researchers are suggesting that due to the body’s internal time clock that regulates the sleeping cycle, the Circadian rhythm, adolescents are not as cognitively inclined in the earlier hours of the morning leading to a lack of focus, inattentiveness and an increase in anxiety disorders in today’s youth.

With many neurobiological disorders on the rise, we’ve kept our thumb on the pulse of the rapid diagnosis of Attention Deficit Hyperactive Disorder (ADHD) and the associated academic and social deficiencies linked to those affected by this disorder. To better understand what is happening on a chemical level researchers often look at cortisol, a steroid hormone produced by the adrenal glands that regulates stress as it plays a key role in this disorder. In adolescents and adults diagnosed with ADHD there is often an increased level of cortisol levels in the brain, which can lead to disturbed sleeping patterns (Bush & Hudson, 2010), disruptive behavioral disorder (DBD), depression, anxiety disorders and inattentiveness (Corominas et al, 2012).

While cortisol is a key player with ADHD, it is also an integral chemical contributing to the circadian rhythm. During sleep, cortisol levels are extremely low and spike just before waking up (Chan & Debono, 2010). These levels decrease throughout the day, but not in a linear fashion. An article in the *Journal of Child Psychology & Psychiatry* outlines research conducted by Lindita Imeraj and colleagues; that work investigated cortisol levels of adolescents aged 6-12

with ADHD and oppositional defiant disorder (ADHD + ODD) compared to a normal unaffected group. Although the cortisol levels among each group show negligible variation, we observe from Figure One the highest level of cortisol before noon, where levels then steadily decrease through the evening (Imeraj et al, 2012).

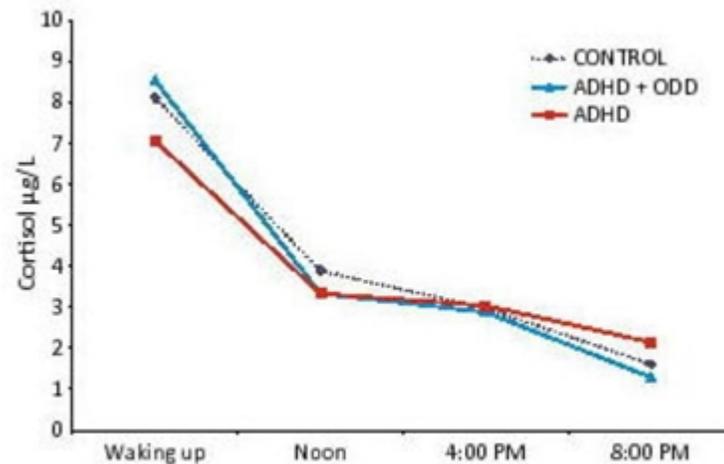


Figure 1 Group differences in cortisol concentrations across the day, averaged across 5 days

The circadian rhythm regulates cortisol levels during sleep in a wavelike pattern. At the lightest level of sleep, level one, the body is easily jostled and awoken. At the lowest level, level five, the body is in a deep sleep experiencing Rapid Eye Movement (REM). This oscillation between stages is essential for a healthy sleeping pattern and brain function. In a normal brain, cortisol levels increase in a wavelike function about 2-3 hours before waking up, usually about 9 o'clock in the morning. However, high levels of cortisol bind to glucocorticoid receptors (GRs) in the ventricular nucleus (VN), a brain structure essential in sleep regulation. The VN stimulates the release of Corticotropin-releasing hormone (CRH), which is responsible for the release of hormones into the bloodstream to regulate sleep and maintain homeostasis. Too much CRH

stimulation due to high cortisol levels is responsible for causing hormone imbalance, and a disturbed-sleeping pattern resulting in frequent waking (Bush & Hudson, 2010).

Correspondingly, many adolescents with ADHD have disrupted sleeping patterns, influenced by this imbalance of cortisol levels. While the teens and early 20s are marked as the golden age for sleep, a shift or decrease in the recommended hours of sleep can have a negative impact on the body's Circadian rhythm. Adolescents through their mid twenties are recommended to get extra hours of sleep as their clock is programmed from the late afternoon through the evening; the clock shifts earlier as they progress into adulthood. Disrupting this time clock cannot only result in the grumpy discombobulated young child, but also increases the likelihood of behavioral disorders and diseases (Hyoiby, 2014).

The circadian rhythm also controls when the brain will be most attentive to complete cognitive tasks such as academics. Currently, the average American public school starts before nine o'clock in the morning (Fischetti, 2014). In both ADHD and normal children, children engaging in early morning activities are disrupting their body's Circadian rhythm, healthy sleeping pattern and increasing the likelihood of anxiety and behavioral disorders associated with high levels of cortisol before the early afternoon.

While the entire basis and causes of ADHD are still not known, there exists a very strong correlation between adolescents with ADHD and disrupted Circadian rhythms and sleeping patterns. Currently, sleep is one primary method of treatment of ADHD (Hyoiby, 2014) to better regulate cortisol levels. With the research presented as well as a better understanding of the shift in Circadian rhythms into adulthood, our society may better benefit from shifting academic and social obligations of adolescents from early morning into early afternoon. Observing the data from Imeraj and colleagues, the cortisol levels of adolescents the time of initially waking up to

noon were the highest with the most aggressive decline and a steady decline thereafter through the evening (Imeraj et al, 2012).

With high levels of cortisol contributing to many disorders associated with ADHD and referencing the similarity in these levels in normal and diagnosed children before noon it begs the question, could allowing adolescents the extra hours of shut eye, parallel to the Circadian rhythm, decrease diagnoses of disorders and behavior associated with ADHD, or ADHD itself? With the overwhelming correlation between disrupted circadian rhythms and diagnoses of ADHD, we as a society are responsible to embody this knowledge in governing establishments responsible for cognitive attentiveness and success of our youth.

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Image:

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