Adolescent Sleep Deprivation

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At this stage of adolescence, several environmental and biological factors may affect both circadian and homeostatic regulation of sleep. A large part of this population does not experience adequate sleep, leading to chronic sleep restriction and/or disrupted sleep-wake cycles.

adolescence sleep loss health learning

1. Introduction

In recent years, there has been a growing interest in examining the relationship between sleep patterns and school performance in adolescents. Insufficient sleep in the teenage years has been tied with a wide range of adverse outcomes affecting their lifestyle.

2. The Effects of Sleep Deprivation on the Adolescent Population

Three main areas of daytime functioning are affected by chronic sleep restriction: mental and physical health, cognitive and academic performance, and risk-taking behaviors.

There is a solid body of literature pointing to a strong link between sleep quality and physical health. The main physical health consequences of adolescent sleep loss refer to metabolic dysregulation and cardiovascular morbidity. For example, an increase in body weight ^[1], a higher risk of obesity ^{[2][3][4]}, and a reduced physical activity ^[5] in association with low sleep were observed in the teen population. Furthermore, sleep loss in adolescents is likely to lead to increases in blood pressure ^{[6][7]} and high cardiometabolic risk ^[8]. Poor sleep in adolescents is also positively associated with other somatic outcomes, such as headache ^[9], persistent fatigue ^[10], and lower back, neck, and abdominal pain ^[11].

Given the well-established relation between sleep and many psychiatric disorders such as depression or anxiety ^[12], the side effects of adolescent sleep debt on mental health are not surprising. More specifically, empirical studies showed high odds of depressive symptoms among adolescents with insufficient sleep duration ^{[13][14][15][16]}. Another serious source of concern is represented by the elevated rate of suicidal ideation ^{[17][18][19]} or suicidal attempts ^[20] in sleep-deprived adolescents. A possible explanation for the key role of sleep in the onset of mental disorders could be the physiological alteration of mood and emotional regulation as a result of acute or chronic sleep deprivation ^{[21][22]}.

Experimental studies applying sleep restriction protocols demonstrated the worsening of several neurocognitive functions, such as memory, attention, and executive functions, as a consequence of sleep loss ^{[23][24][25]}. In particular, the major impediment referred to circumstances requiring multi-tasking skills ^[26] frequently faced by young people.

Naturally, these harmful effects on cognitive functioning impair their academic performance. Several prospective and cross-sectional studies supported the notion of a strong correlation between scarce sleep quality and low school achievement ^{[27][28][29][30][31]}. However, the modulatory effect of individual and environmental factors could explain some negative findings ^{[27][32][33]}. As previously described, adolescents have a natural circadian preference for evening chronotype. A recent study on a large sample compared the two extreme chronotypes and found lower school grades in "evening type" compared to "morning type" adolescents ^[34].

Several studies described a positive relationship between inadequate sleep and engagement in risk-taking behavior in adolescents, especially with regards to substance abuse ^[35]. Insufficient sleep was linked to greater tobacco smoking and marijuana use ^[36], alcohol consumption ^[37], and abuse of other illegal drugs ^[19]. Sleep loss was further associated with unhealthy behavioral strategies ^[38], bullying ^[39], physical violence ^[14], and unsafe sexual activity ^[40].

Excessive sleepiness due to sleep restriction represents the main reason for motor vehicle accidents in the adolescent population, especially in the context of late-night or early-morning driving ^[41]. A growing number of studies report increased car crashes in sleep-deprived adolescents ^{[42][43][44][45]}. Since motor vehicle accidents represent the principal cause of mortality among youths in the United States ^[46], the high crash rate in this age group constitutes a matter of great concern.

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