Assessment and Treatment of Delayed Sleep Phase Disorder in Adolescents

Recent Innovations and Cautions

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KEYWORDS

• Delayed sleep phase disorder • Delayed sleep phase syndrome • Adolescence
• Daytime sleepiness • Sleep-onset latency • Melatonin • Dim-light melatonin onset
• Bright-light therapy

KEY POINTS

- Delayed sleep phase disorder (DSPD) is prevalent in sleep-disordered adolescents seeking treatment; its consequences include comorbid affective, academic, and behavioral dysfunction.
- Diagnosis of DSPD includes sleep monitoring (diary, actigraphy) and clinical sleep history interview, although a clinical assessment of dim-light melatonin onset is also possible. Polysomnography and questionnaires can offer additional and valuable information.
- Bright-light therapy and pharmaceutical melatonin are the most validated and clinically effective treatments for adolescents with DSPD. Novel portable light-emitting diode devices can now be used for bright-light therapy.
- Clinicians should exercise caution with the use of prolonged-release melatonin (eg, Circadin) and chronotherapy for adolescents experiencing DSPD.

INTRODUCTION

There have been many reviews and articles that fully or partly describe the treatment of delayed sleep phase disorder (DSPD),[1–5] including articles in this journal[6] and by the authors.[7,8] Therefore, a challenge is presented: what can this article bring forth that is unique to this topic? First, most of the previous literature has been tailored primarily to young adults, so the focus herein is on adolescents living in the "iEra" and the subjective experience of the adolescent with DSPD. Second, new assessment methods of circadian misalignment, in addition to new medications and devices intended to advance sleep timing, are now available, and these are discussed. Finally, preliminary evidence for the use of psychological therapies to augment classic chronobiological treatments for DSPD is presented.

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"WHY CAN'T I SLEEP?… LEAVE ME ALONE, I JUST WANT TO SLEEP-IN"

Various descriptions of DSPD have been provided in the literature,[5,9] but few from the adolescents' perspective.[10] Over the course of adolescent development, a tendency for sleep timing to gradually delay becomes evident, with the onset often occurring around the time of pubertal development rather than being linked to chronologic age.[1,11] With increasing autonomy and relaxed parent-set bedtimes on weekends,[12,13] adolescents typically go to bed later on weekend nights (Friday and Saturday).[1,11] When weekend morning commitments are lacking, there is potential for the adolescent to "sleep-in" (**Fig. 1**, We [in red]). A weekend of sleeping-in can delay adolescents' circadian rhythm timing by as much as 1.5 hours.[14] A late rise time on Sunday means sleep homeostatic pressure has less time to accumulate and fails to peak by parents' prescribed Sunday-night bedtime,[13,15] leading to difficulty initiating sleep (see **Fig. 1**, B and S [in red]). School-night sleep is further restricted when the adolescent has to rise early for school (see **Fig. 1**, Wd [in red]), and daytime sleepiness ensues for the better part of the school morning. If this cycle persists over months, it may cause significant distress and impairment that warrants a diagnosis of DPSD.[16,17]

ASSESSMENT

Although specific protocols may vary across clinical settings, the diagnosis of DSPD in adolescents usually involves a combination of clinical interviews, sleep monitoring in the home environment, and a selection of questionnaires. Not all are needed to diagnose DSPD, but collectively they provide valuable information to inform treatment. The description given here is based largely on the authors' own clinical experience, but is also applicable to other practice settings. Before the clinic visit, adolescents and families are asked to complete sleep monitoring for a least 1 week along with a set of questionnaires, which are then used to inform and supplement the in-person clinical sleep history interview.

Misaligned Sleep Timing

Sleep diaries

Although a detailed clinical history can estimate delayed sleep timing, prospective measurement is desirable and essential for a formal diagnosis.[17] A sleep diary is a simple, validated, and inexpensive method for collection of these data (**Fig. 2**). Completion of a sleep diary over 1 week can provide evidence of (1) stable delay in sleep timing that conflicts with societal norms (eg, starting school), (2) normal sleep when free of social obligations (eg, weekends), and (3) associated sleep-onset insomnia (ie, lengthy sleep-onset latencies). Sleep diaries are less able to demonstrate difficulty in waking or daytime sleepiness, although ratings of these may be inserted into the diary at the clinician's discretion.

Actigraphy

Wrist actigraphy is another prospective measurement of sleep timing, which may complement sleep diaries. Worn like a wristwatch, an actigraph measures gross motor movement, often recorded continuously, yet with data binned into 1-minute epochs.[18,19] Accompanying software usually applies a computerized algorithm to automatically score each minute over the week as "wake" or "sleep" in the resulting actogram (**Fig. 3**). The clinician can manually select bedtimes and rise times for each night based on the sleep diary. Discrepancies between the sleep diary and actigraphy should be discussed with the adolescent (eg, actigraphy shows the adolescent is active, yet the diary shows still being asleep in bed) to ensure the validity of the data. A wrist actigraph worn on the

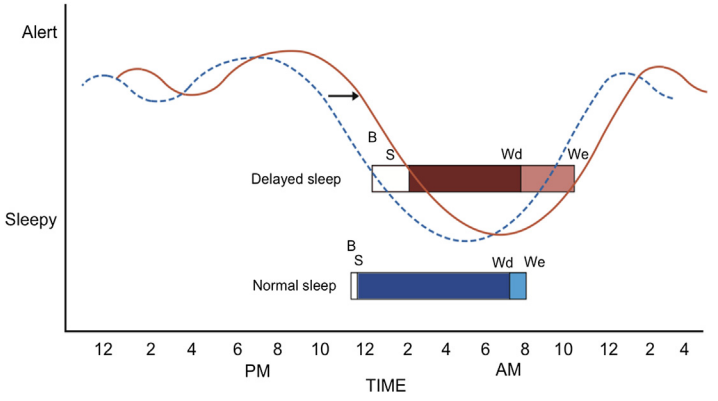

Fig. 1. The delayed circadian rhythm of alertness and sleep (*red*) relative to a normal rhythm and sleep (*blue*). B, bedtime; S, sleep onset; Wd, wake-up time on weekdays; We, wake-up time on weekends. This figure can be used in the first treatment session as psychoeducation for the adolescent.