



LETTER TO THE EDITOR

Toward an individual differences approach to habitual short sleep duration: a reply to Massar and Chee

Paula G. Williams^{1,*}, Brian J. Curtis¹, and Jeffrey S. Anderson²

¹Department of Psychology, University of Utah, Salt Lake City, UT and ²Department of Radiology, University of Utah, Salt Lake City, UT

*Corresponding author. Paula G. Williams, Department of Psychology, University of Utah, 380 S. 1530 E., BEHS 1301a, Salt Lake City, UT 84112. Email: paula.williams@psych.utah.edu.

In an insightful Letter to the Editor (this issue), Massar and Chee elaborate on one interpretation of the findings of our recent report indicating that self-reported habitual short sleep duration is associated with increased delay discounting [1]. They accurately note that habitual short sleep duration may result from a tendency to choose instant gains over long-term benefits, in addition to or as an alternative to short sleep leading to increased delay discounting. We greatly appreciate their thoughtful elaborations on the mechanistic and clinical implications that result from a greater understanding of the directional association between sleep and impulsivity/self-control.

In general agreement with Massar and Chee, we believe that there is almost certainly a reciprocal feed-forward association between cognitive individual differences (including delay discounting/impulsivity) and habitual short sleep. Indeed, the discussion can be broadened to highlight other possible (and related) cognitive-motivational tendencies underlying individual differences in habitual short sleep. An individual differences perspective would allow for more precise explication of mechanisms—an endeavor that, in turn, has implications for targeted intervention. Importantly, these “subtypes” of habitual short sleepers may all exhibit delay discounting, but the direction of effect, as well as the mechanisms underlying the association may be quite different.

The distinction between habitual short sleepers who do not report daytime dysfunction and those that do is a critical one. In the case of the former, there is reason to believe that behavioral

motivation characterized by high reward drive—along with impulsivity—may underlie the development and perpetuation of short sleep. Indeed, there is evidence that these habitual short sleepers are higher in extraversion [2], thought to reflect individual differences in the dopamine incentive reward system [3]. Related, these short sleepers exhibit tendencies consistent with a vigilance regulation model of ADHD and mania [4] whereby routinely seeking out stimulating activities may be both a behavioral strategy to override underlying daytime fatigue and sleepiness, as well as a manifestation of high reward drive and activity level. Further, there is a hypothesized feed-forward, reciprocal association—high activity, high reward-related impulsivity, and lack of perceived negative consequences (i.e., no subjective daytime dysfunction) drive habitual short sleep, which, in turn, leads to further decrements in cognitive functioning. Critically, as cognitive functioning declines, these habitual short sleepers may be increasingly inaccurate in their judgment of functional abilities. This is a variation of the Dunning-Kruger effect—that individuals with demonstrably poorer cognitive or intellectual functioning tend to erroneously assess their abilities as greater than they are [5]. For this reason, self-report measures of functionality, including trait measures of self-control, may be inaccurate. Massar and Chee refer to empirical work characterizing people who report “needlessly and voluntarily delaying going to bed, despite foreseeably being worse off as a result,” a behavioral tendency termed “bedtime procrastination [6].” For this subgroup of habitual short sleepers, there may be the appearance of bedtime procrastination,

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however the lack of foreseeable dysfunction means there are fewer intervention targets. That is, a focus on the negative outcomes that will result from inadequate sleep would not likely be effective because these individuals do not experience the fatigue or dysfunction that most other short sleepers experience. Indeed, our experience phenotyping short sleepers not reporting dysfunction [7] suggests that if these individuals come for sleep assessment and intervention at all, it is often at the insistence of concerned family members rather than out of distress over their lack of sleep. Given the hypothesized behavioral motivation tendencies and the lack of perceived negative consequences, intervention for this group of habitual short sleepers would likely require regimented, structured removal of access to stimulating nighttime activities.

On the other hand, habitual short sleepers who experience the expected daytime dysfunction are likely a heterogeneous group. Some may routinely get short sleep for purely environmental reasons (e.g., multiple jobs, small children) and would, left to their own devices, get more sleep. For these short sleepers, associations with impulsivity are likely a consequence rather than a predictor of short sleep duration. Other habitual short sleepers with reported dysfunction, however, may have trait tendencies that predict and perpetuate short sleep duration over time. In particular, these short sleepers are likely prone to anxiety (i.e., high in neuroticism), sensitive to punishment cues (i.e., behavioral inhibition), and have high interoceptive awareness (i.e., feel fatigue and poor restoration resulting from short sleep). These individuals may meet criteria for insomnia and are at higher risk for the development of depression. Importantly, this collection of individual differences is also related to delay discounting/impulsivity but for different reasons than their high reward-drive counterparts. Impulsivity is hypothesized to be driven by negative affect, is worsened under conditions of life stress, and is sometimes termed “urgency” (see ref. [8]). Indeed, clinical depression is associated with delay discounting [9]. In individuals with these tendencies, bedtime procrastination and/or behaviors characteristic of poor sleep hygiene may be (maladaptive) efforts to manage anxiety. Intervention along the lines of those suggested by Massar and Chee may be useful for these short sleepers, given that they experience the negative consequences of short sleep duration. However, strategies to lower anxiety and presleep arousal may also be needed.

In summary, we believe an individual differences framework would inform our understanding of the development and perpetuation of habitual short sleep duration. As others have described [10], careful examination of habitual short sleeper

phenotypes would fill an important gap in the study of short sleep duration which has been studied predominantly through either experimental manipulation or large-scale epidemiology research. Given the growing list of adverse outcomes prospectively associated with short sleep duration, understanding the mechanisms underlying habitual short sleep seems imperative. Most crucially, is it the case that habitual short sleepers who do not report dysfunction are at the same risk as those that do? Can some people “get away” with less sleep than everyone else? Only by differentiating these groups, examining objective indicators of functioning in longitudinal studies, and as suggested by Massar and Chee, implementing mechanism-informed intervention studies, will we achieve clarity on this issue.

Conflict of interest statement. None declared.

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