

## Letter to the Editor

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# The Price of Love: how sleep, and dysregulated clocks may account for its obsessive-compulsive related behaviors?

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Love and sleep are both universal requirements for the human existence. Emotional brain, from which derives most of the life expression is tightly related to important circadian-regulated sleep centers determining critical neurobiological and behavioral oscillations. From that, we are quite aware of the great impact of geophysical dynamics in affective behavior even in the most well-controlled scenarios.<sup>1</sup> As so it becomes apparent that indeed we may experience different feelings of being in love depending on the time of the day, with weekly, monthly, yearly, and seasonal variations. Likewise, such dynamics clearly affect sleep as the most conspicuous circadian rhythm dictating human physiology in about one-third of each day. While is perfectly established that sleep is an important roller in the mediation of mood and emotional well-being, obsessive-compulsive disorder (OCD) was shown to relevantly interact with either physiological or pathological sleep. Moreover, the romantic love status may predict several sleep changes possibly affecting general internal milieu and particularly reason, emotion, and their complex crosstalk within a specific context either in health or disease.

Based on the results from an interesting study with a large sample of clinical patients primarily diagnosed with OCD, McLaughlan and colleagues have recently pointed out that romantic love does shape some important traits of the psychoemotional imbalance contributing to such obsessive-compulsive physiology and related clinical features. Following this great achievement which will certainly impact both scientific and clinical domains (including public health), some additional considerations would probably benefit derived interpretations and further conclusions: we should be aware that we keep in love while asleep. In fact, not only molecular correlates of being in-love while awake persist in the sleeping brain but also such love-related neurochemical dynamic influence sleep health as well as psychoemotional stability.<sup>2</sup> For instance, 2 important molecular mediators of well-known behavioral states related to romantic love, oxytocin, and dopamine, significantly affect, and are affected by sleep. In this context, oxytocin was shown to influence sleep-wake as well as sleep-related behavior and neurobiology. Despite some conflicting conclusions coming out from preclinical vs clinical studies,<sup>3</sup> increased levels of oxytocin are often observed in sleep-deprived and insomniac patients. Also of interest, is the fact that oxytocin was even suggested to benefit some obstructive sleep apnea-related adverse events, suggesting a plausible pathway for a therapeutic effect of love in this highly prevalent sleep disorder. Even “passionate dreams” seems to involve addictive molecular and functional dynamics driven by dopaminergic pathways among brain reward system. This is probably related to the process leading to the creation of false memories, associated dreams, and subsequent recollection of anxious-provoking imagery. On the other hand, OCD patients tend to ruminate on intrusive thoughts, increasing the possibility of dreaming with threatening events potentially leading to an increased state of anxiety which plausible contribute to an exacerbation of OCD symptoms. Interestingly enough, lucid dreams were suggested to play a role in improving some obsessive behaviors.

In younger children, excessive daytime sleepiness because of impaired or insufficient sleep may present with paradoxical symptoms like hyperactivity, inattention, and impulsiveness. Those symptoms are frequently overlapping with obsessive-compulsive<sup>4</sup> and passionate love-related behaviors.<sup>5</sup> Still, there are moments in life where physiological changes demand great challenges to an integrated function of different systems. For instance, mainly in adolescents and older adults, critical chronobiological updates would possibly interfere with all those already challenging interactions. Normal phase delays and advances often observed in circadian clocks during adolescence and elderly, respectively, will also dictate both temporal changes and sleep-related changes which will impact mood, affective behaviors, and being in love sensations ultimately leading to different patterns of obsessive-compulsive expressions which of course should vary according to the individual mental and psychosocial status. Fortunately, the paper from McLaughlan and colleagues will open some important doors for the better understanding of how physiologically drive addictions would contribute to clinically important obsessive-

compulsive behaviors. We should however be aware that clocks and sleep would necessarily integrate the puzzle as a matrix in which different phenotypes occur and clinically express.

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