Author response to: Sleep and beverage drinking among Thai college students

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Dear Editor:

We appreciate the thoughtful comments by Dr. Wiwanitkit on our article [1], in which we evaluated the patterns of sleep quality in relation to caffeine use among Thai college students. His commentary raises important issues. In the commentary, Dr. Wiwanitkit raised the importance of considering body mass index (BMI) and its relationship to sleep quality among college students. We agree that BMI is an important risk factor of poor sleep quality [2] and that BMI may be related with the consumption of energy drinks [3]. For this reason, we a priori considered BMI as a potential confounder in our statistical analysis. However, as shown in Table 1 of our published article, we found no evidence of an association between sleep quality and BMI; hence, the covariate was not a confounder in our study population.

Dr. Wiwanitkit raised another interesting point about considering female students' menstruation. We agree that menstrual cycle might play an important role in sleep physiology. The menstrual cycle of young healthy women is characterized by fluctuations of hormone levels and temperature control [4]. Changes in hormonal levels such as go-

nadal steroids, pituitary hormones, melatonin, and cortisol are likely to affect sleep quality. Although, there is an emerging literature suggesting that the effect of the menstrual cycle phase on sleep quality results has been inconsistent [4]. Moreover, it is also not clear if, and to what extent, menstrual cycle phase is related to energy drink consumption. Perhaps, this is an important area that warrants future research.

Dr. Wiwanitkit raised the importance of considering psychological problems among college students. We agree. To evaluate the possible role of confounding by underlying psychological problems, we completed analyses controlling for underlying psychological problems. Results from these analyses were not materially different from the results reported in our published article.

Finally, as Dr. Wiwanitkit pointed, we agree that considerable attention is needed to understand sleep quality among college students.

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