

# Playing a violent television game affects heart rate variability

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**Conclusions** Violent gaming induces different autonomic responses in boys than non-violent gaming – during playing and during the following night – suggesting different emotional responses. Subjectively perceived sleep quality is not influenced after a single gaming experience. Future studies should address the development of the autonomic balance after gaming over longer time than a night, physiological adaptation to frequent gaming and potential gender differences.

**Objective** To investigate how playing a violent/non-violent television game during the evening affects sympathetic and parasympathetic reactions during and after playing as well as sleep quality during the night after playing.

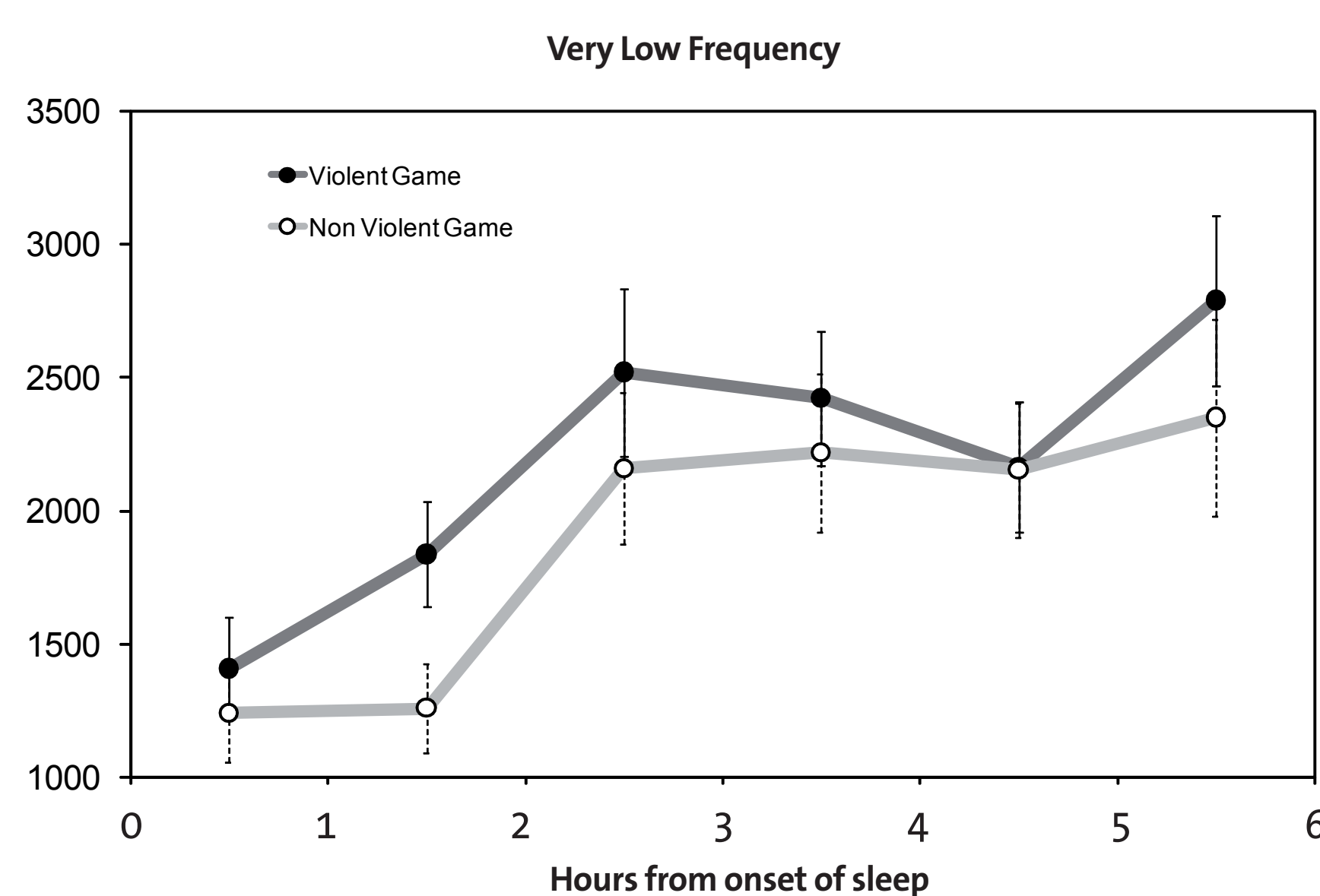
**Subjects and methods** 19 boys, 12–15 years of age, played television games on two occasions in their homes and participated once without gaming. Heart rate, heart rate variability and physical activity were measured during gaming/participating and the night to follow using a portable combined heart rate and movement sensor. A sleep diary and questionnaires about gaming experiences and session specific experiences were filled in. Criteria for selection of games: Violent game involves/rewards direct physical violence (no handguns) against another person and non-violent game no violence; same game design (“third person game”); conducted in the same manner; no differences concerning motor activity; similar sound and light effects; no sexual content, violence against women or racial overtones.



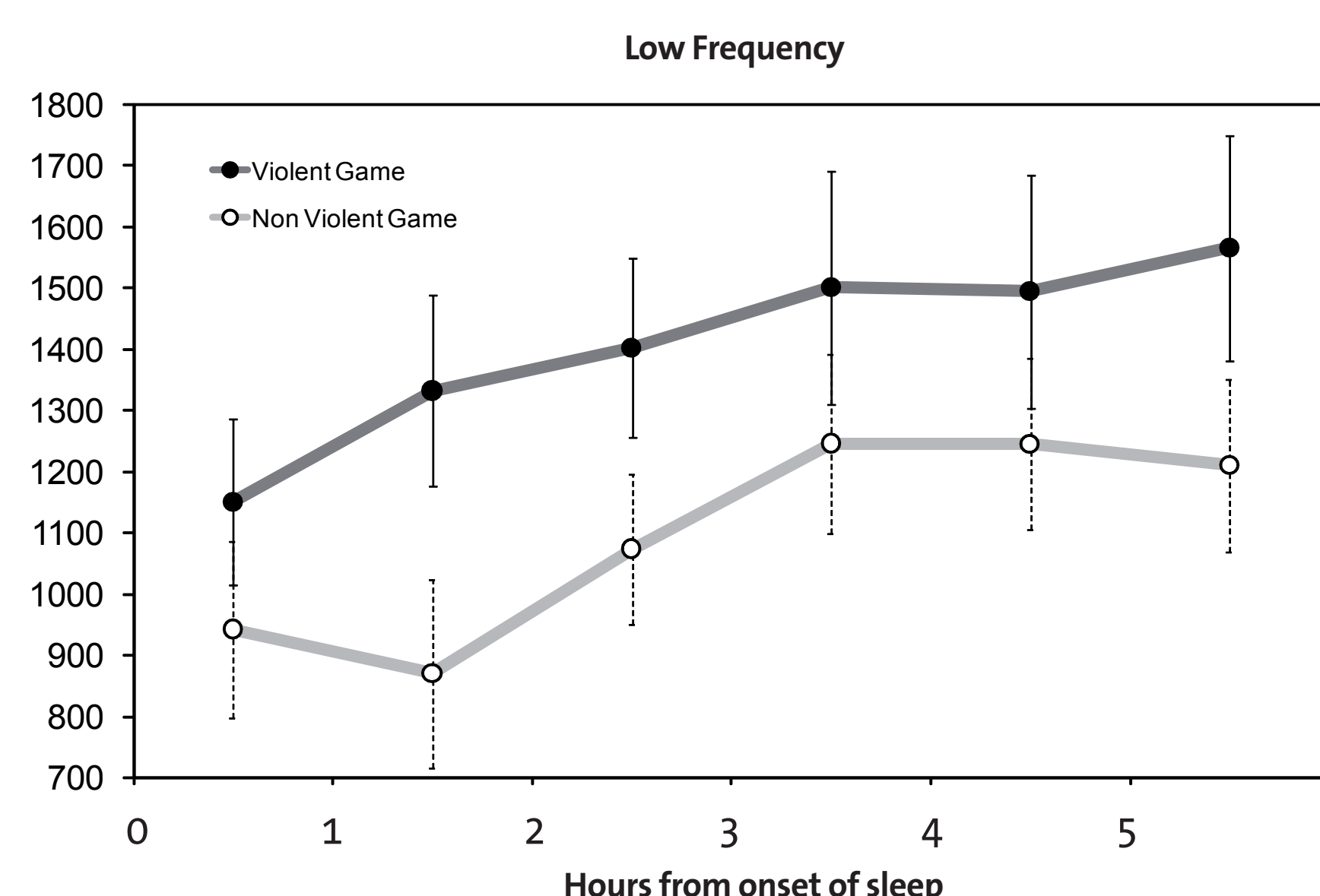
## Results

During violent (versus non-violent) gaming, there was significantly higher activity of the Very Low Frequency component of Heart Rate Variability and of total power. During the night after playing, Very Low Frequency, Low Frequency and High Frequency components were significantly higher during the violent (versus non-violent) condition just as total power. There were no significant differences between the three conditions (violent/non-violent/no gaming) with respect to an index reflecting subjectively perceived sleep difficulties. Neither was there any difference between violent and non-violent condition for any single sleep item.

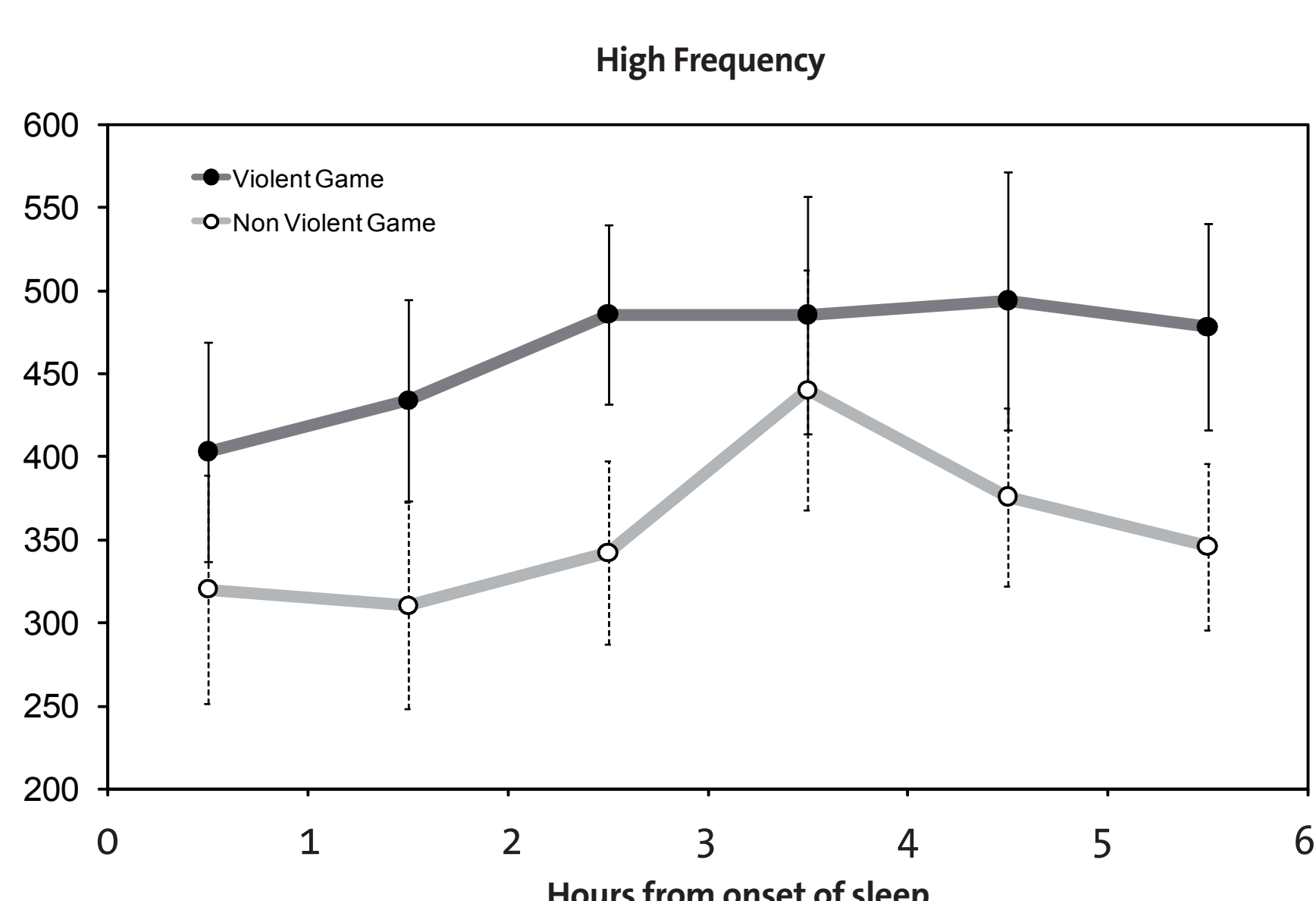
### Results from the night after playing



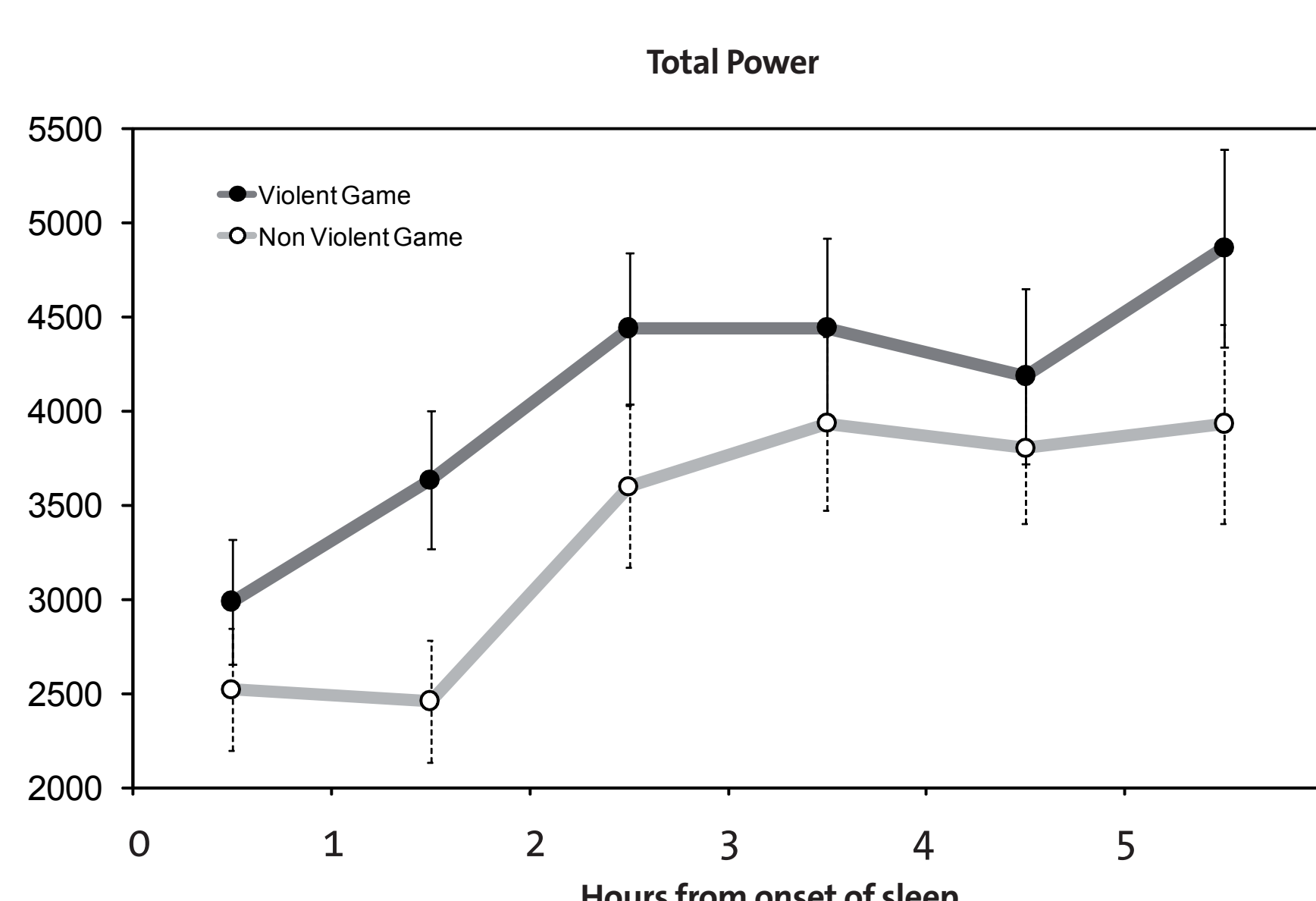
Power in VLF in ms<sup>2</sup> during night hours presented as mean and standard error for the game conditions for each hour of the sleep period. Game F = 10.28, p = 0.005, df = 1,18; hour F = 11.69, p = 0.000, df = 5,14; game x hour F = 0.91, p = 0.501, df = 5,14.



Power in LF in ms<sup>2</sup> during night hours presented as mean and standard error for the game conditions for each hour of the sleep period. Game F = 9.75, p = 0.006, df = 1,18; hour F = 4.30, p = 0.014, df = 5,14; game x hour F = 1.69, p = 0.201, df = 5,14.

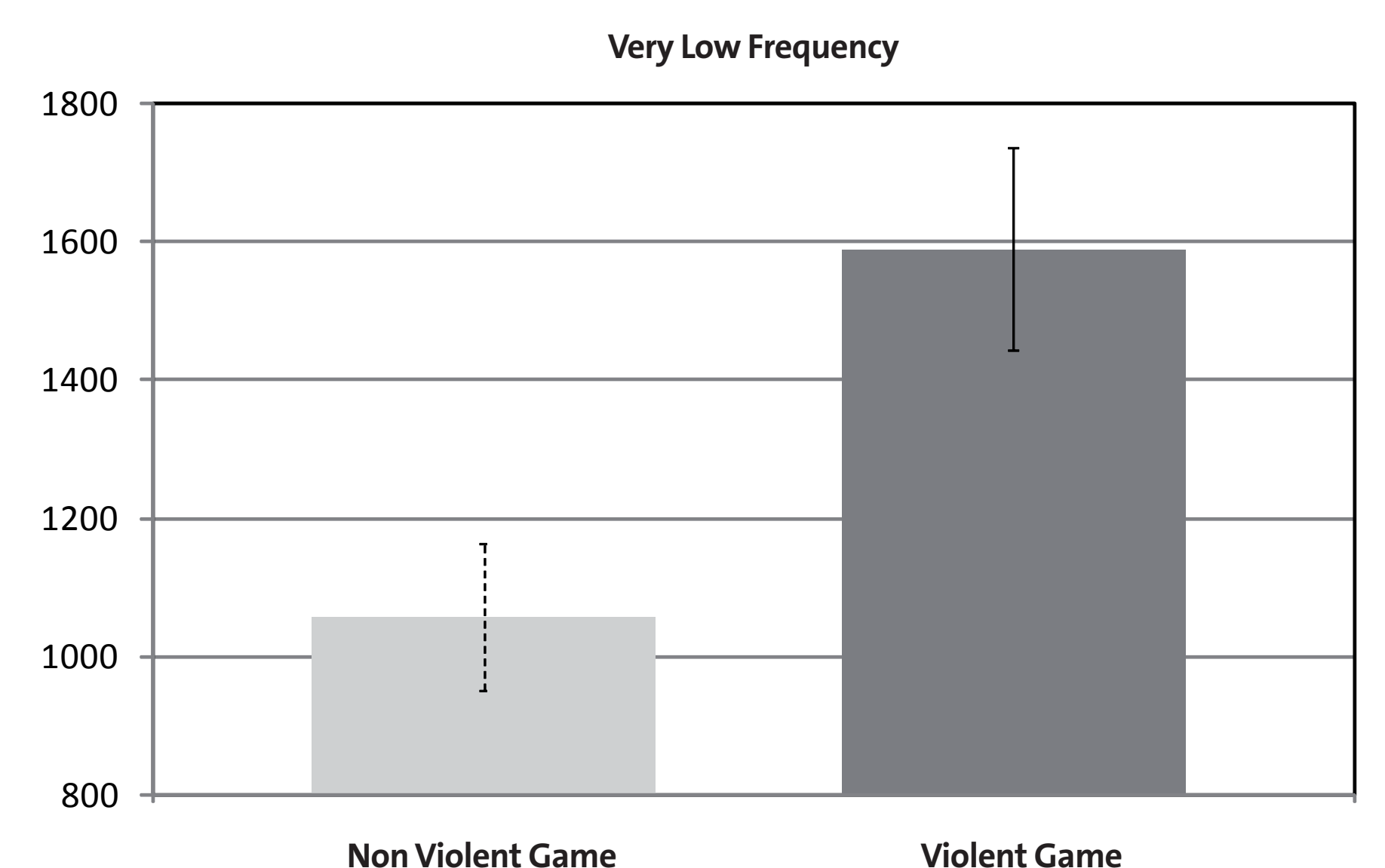


Power in HF in ms<sup>2</sup> during night hours presented as mean and standard error for the game conditions for each hour of the sleep period. Game F = 12.42, p = 0.002, df = 1,18; hour F = 2.93, p = 0.052, df = 5,14; game x hour F = 1.25, p = 0.338, df = 5,14.

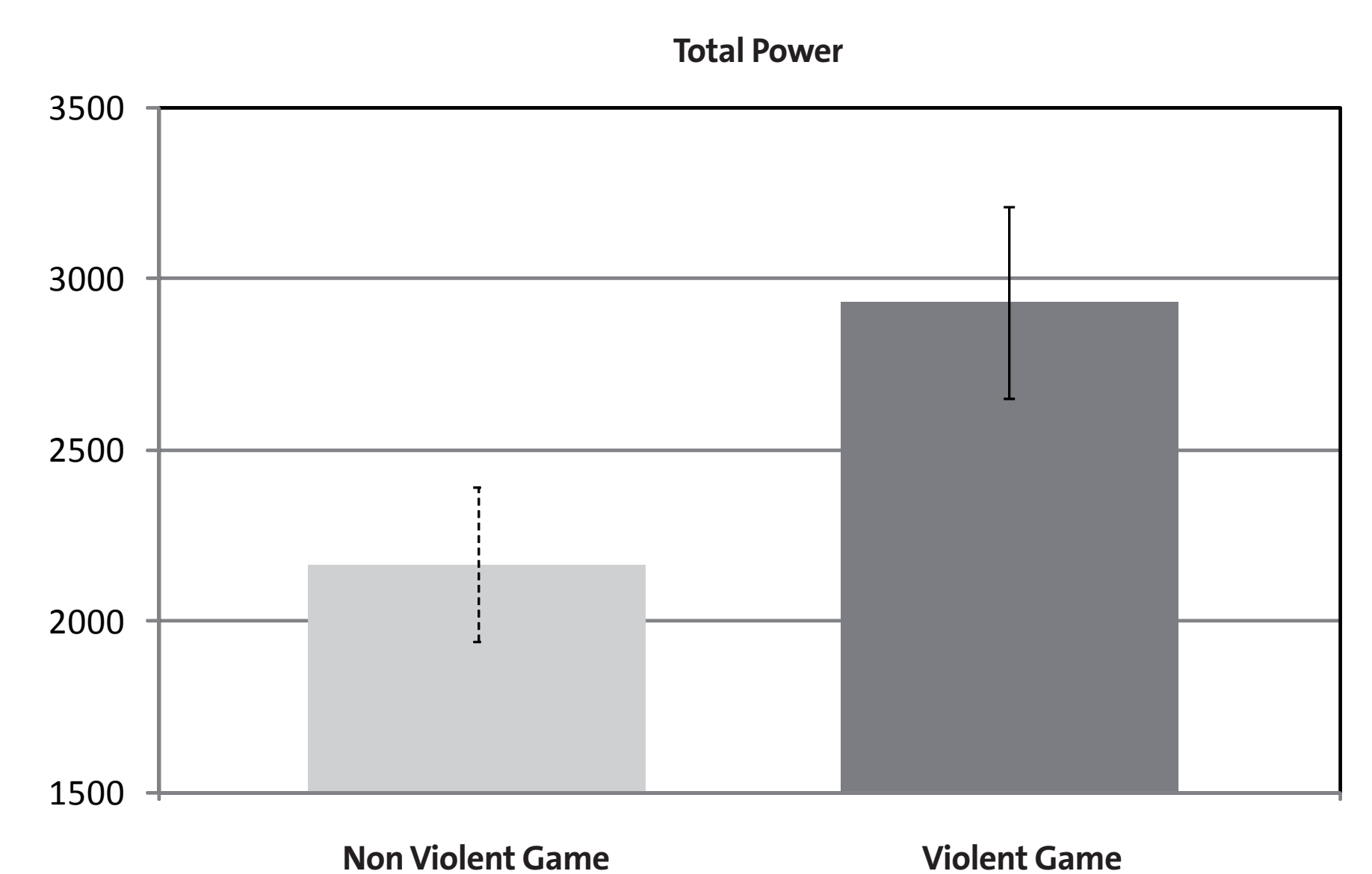


Total Power in heart rate variability in ms<sup>2</sup> during night hours presented as mean and standard error for the game conditions for each hour of the sleep period. Game F = 10.96, p = 0.004, df = 1,18; hour F = 7.82, p = 0.001, df = 5,14; game x hour F = 1.18, p = 0.368, df = 5,14.

### Results from gaming



Power in VLF in ms<sup>2</sup> during playing presented as mean and standard error, t = 4.70, p = 0.000.



Total Power in heart rate variability in ms<sup>2</sup> during playing presented as mean and standard error, t = 3.36, p = 0.003.

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