Determining the Impact of Increased Physical Activity on Improving Sleep Quality in Young Adults

Ashley Darling  
*Virginia Commonwealth University*

Alex Chiu

Eric Henderson

*See next page for additional authors*

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Authors
Ashley Darling, Alex Chiu, Eric Henderson, Aaron Autler, Jennifer Weggen, Kevin Decker, and Ryan Garten

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Disturbed sleep, defined as any alteration to normal sleep patterns, has been linked to poor cardiovascular health and an increase in cardiovascular disease (CVD) risk. These negative sleep patterns are highly prevalent with 35% to 41% of individuals in the United States reported some form of disturbed sleep. Although high amounts of physical activity (PA) are often associated with high sleep quality, little is known about PA's effectiveness to improve different aspects of sleep (e.g. duration vs quality) and the mechanisms to which it can improve sleep quality. PURPOSE: The study sought to determine the ability of increased PA to improve sleep efficiency in healthy young adults. METHODS: Nineteen young adults (25.4 ± 4 yrs) were recruited for this study. Subjects wore an accelerometer (Actigraph GT3x-BT) for a total of three weeks to record daily physical activity (step count; moderate-to-vigorous physical activity [MVPA]) and sleep variables (total time in bed [TTB], sleep efficiency, wake after sleep onset [WASO], and total sleep time[TST]). Subjects maintained normal physical activity levels for the first week (BL), then increased their step count by an average of 5,000 steps/day across the next two weeks (W1 and W2). Heart rate variability (HRV) and venous blood draws were collected weekly to assess sympathetic activity and inflammation, respectively. RESULTS: The physical activity intervention resulted in significant increases ( \( p < 0.001 \)) in MVPA and step-count for both W1 (13163 ± 3184) and W2 (12168 ± 3619) compared to BL (8648 ± 2615 steps/day). No significant differences from BL were observed when examining sleep efficiency (BL: 83.8 ± 6.4; W1: 85.5 ± 6.0; W2: 84.2 ± 6.1%), sympathetic-vagal balance, and inflammatory marker concentrations in W1 and W2. A significant correlation was revealed when assessing the change in sleep efficiency from BL to W2 ( \( r = 0.81, p < 0.001 \)) when compared to initial sleep efficiency (CONCLUSION: This study revealed that although young healthy individuals appear to lack improvements in sleep efficiency with an increase in physical activity, those who reported the lowest sleep quality had the greatest improvements in sleep efficiency following an increase in physical activity. Therefore, the findings of the study suggest that although increasing physical activity can improve sleep quality, a potential "ceiling effect" may occur, as when sleep quality is adequate, augmenting physical activity no longer has a substantial effect.