



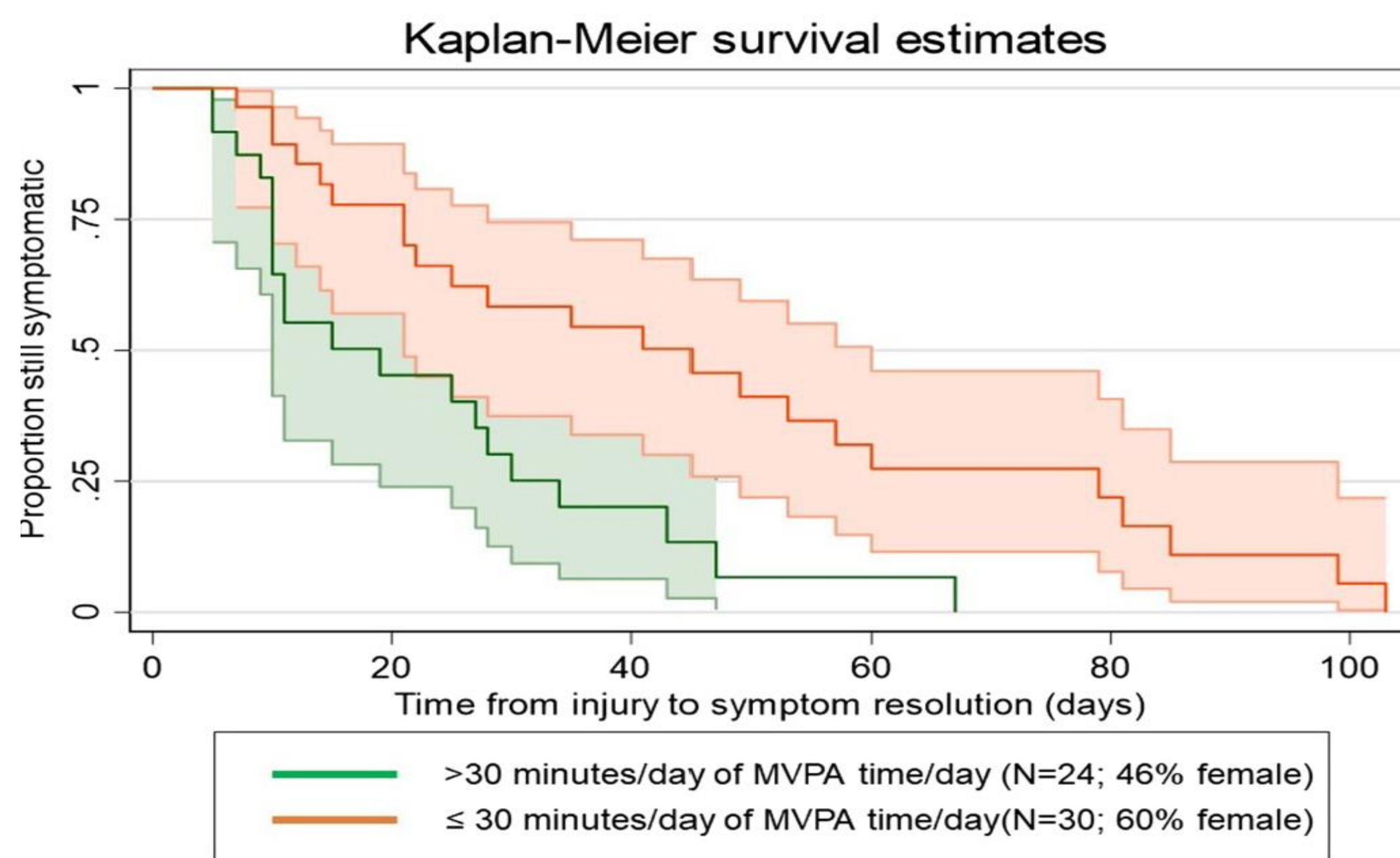
Sleep and Exercise: Longitudinal associations throughout recovery from adolescent concussion

Mathew Wingerson, Carson Keeter, Katherine Smulligan, Samuel Messenger, Samantha Magliato, Stacey Simon, Julie Wilson, David Howell.



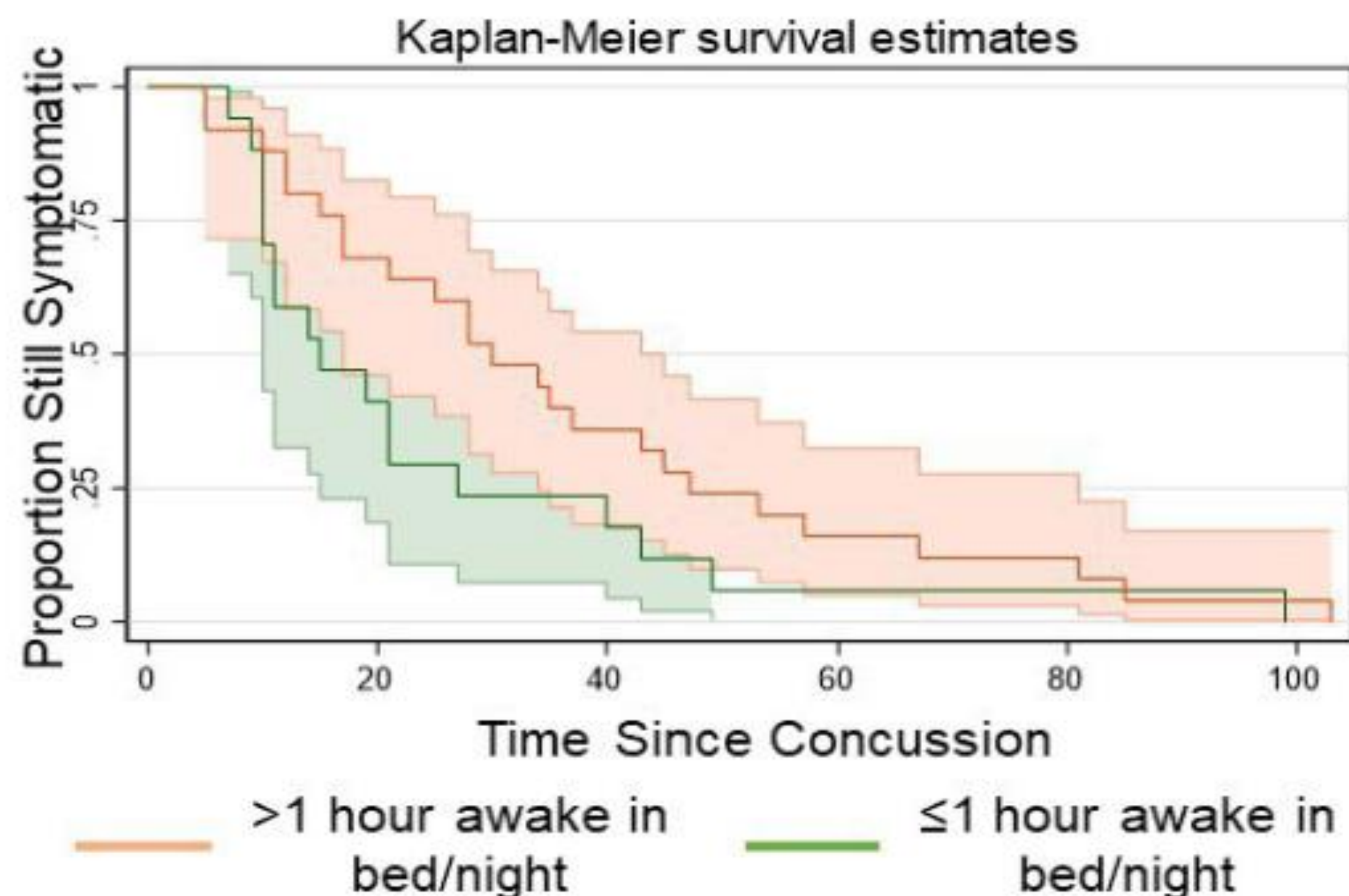
Exercise as Medicine

Moderate-to-vigorous physical activity (MVPA), a higher intensity exercise than typically prescribed after concussion, shows efficacy for treating post-concussion symptoms (Figure 1).



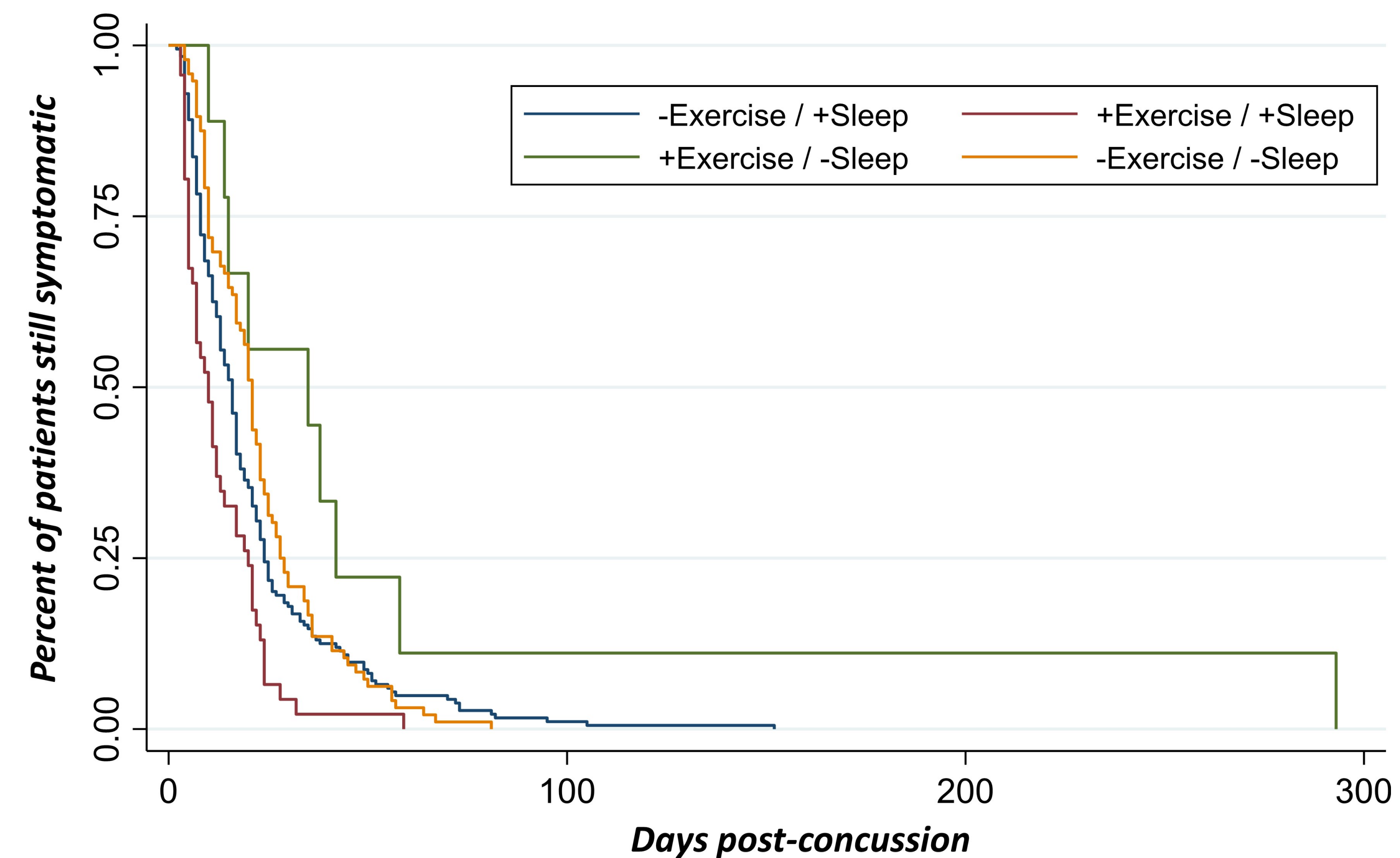
Post-concussion Insomnia

Insomnia, or greater time in bed awake throughout the night, is associated with slower time to post-concussion symptom resolution (Figure 2).



Combined Effects: Exercise & Sleep

Adolescents engaging in exercise and reporting quality sleep within 14-days of concussion recover faster than adolescents performing one or neither of these behaviors (Figure 3).



What is Unknown?

Prescribing exercise and improving sleep after concussion are important strategies for recovery both individually and in combination.

However, the relationship between sleep and exercise is bidirectional in healthy children. Greater volumes of daily exercise facilitate higher-quality sleep, and, inversely, improved sleep quality promotes daily exercise behaviors.

How does sub-acute post-concussion moderate-to-vigorous physical activity (MVPA) and insomnia (time in bed awake) affect subsequent MVPA and insomnia later in recovery?

Methods

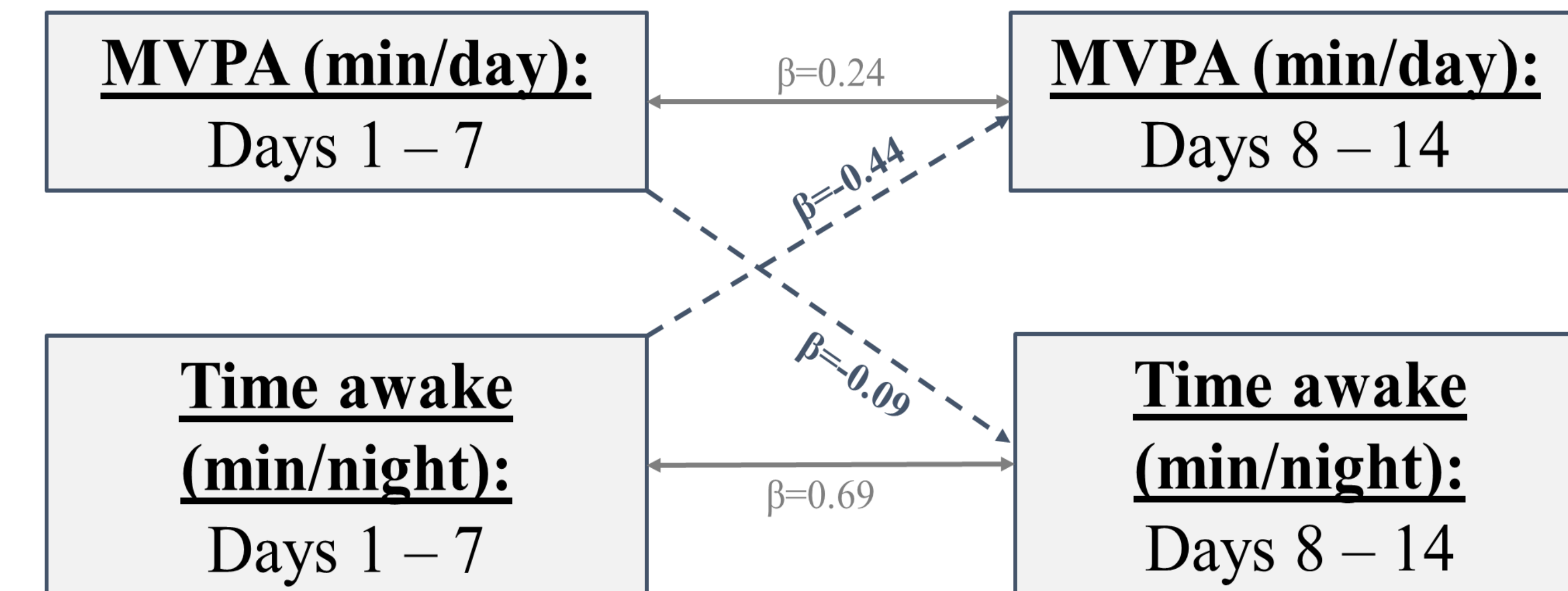
Sample: 10–18-year-olds (n=49; 15.01±1.6 years old, 55% female) diagnosed with concussion and enrolled within 14-days of injury (7.63±3.7 days).

MVPA & Insomnia: Acquired via wrist-worn actigraphy for 14 days and nights after study enrollment. Quantified as minutes/day spent performing moderate-to-vigorous intensity exercise and minutes/night spent awake while in bed.

Data Processing: Daily MVPA and nightly time in bed awake (in minutes) were averaged for days 1-7 and 8-14 of the monitoring period.

Statistical Approach: Cross-lagged panel modeling of associations between early MVPA (days 1-7) and later insomnia (days 8-14), compared to the inverse relationship – early insomnia (days 1-7) and later MVPA (days 8-14).

Results



Greater insomnia during days 1-7 post-concussion is associated with lower volumes of MVPA during days 8-14 (β=-0.44; p<0.001).

Early MVPA is not associated with insomnia later in recovery (β=-0.09; p=0.58).