Pros and Cons of Wearables and Sleep-Tracking Technology to Assess Sleep

Main Points:
- Most wearables and sleep-tracking technologies have not been compared to polysomnography to determine if valid method to assess sleep
- Useful for looking at trends in sleep patterns but not useful for exact numbers or to determine sleep stages

Positives/Pros:
- Opens the opportunity to have a conversation about sleep
- Increasing awareness of the importance of sleep for health and well-being
- Wearables are decent at detecting sleep when you should be sleeping (good sensitivity) in “good” sleepers
- As technology continues to advance, will likely be more accurate in the (near) future
- Wearable trackers are usually more accurate than smartphone or other “nearable” trackers

Negatives/Cautions:
- Most wearables and sleep-tracking technologies have not been compared to polysomnography (PSG; overnight sleep study) to determine if they are a valid method to assess sleep
  - Wearable devices that have been compared to PSG or actigraphy tend to overestimate total sleep time and sleep efficiency and underestimate awakenings and the time it takes to fall asleep
  - Those that have been compared to polysomnography or actigraphy are now likely outdated models/versions
- Wearables have difficulty detecting wake when you should be sleeping (low/moderate specificity)
  - Means less accurate on nights with poor/disrupted sleep and in people with sleep disorders
  - Also less accurate in older adults
- Accuracy of determining sleep stages by wearables ranges from 55-81% in measuring “light” sleep, 49-98% in measuring “deep” sleep, and 47-92% in measuring REM sleep
- If device/technology says sleep is fine, could keep individuals from seeking medical advice when their sleep is in fact poor.
- Using wearables and sleep-tracking technology can make people attend too much to their sleep which can further negatively impact their sleep

The Good News:
- With newer generation wearables collecting information about other biomarkers (i.e. heart rate, heart rate variability, etc.) and incorporating this information into their algorithms, there is promise that consumer targeted wearable devices and mobile
technologies might be a valid alternative to estimate sleep/wake outcomes in the near future
  o Keeping in mind that some consumer sleep-tracking devices are more accurate than others

Clinical Use:
- Initiate a conversation about sleep
- Observe trends in sleep patterns (i.e. consistency of sleep and wake times, variations in sleep duration, napping, long periods of wakefulness in the middle of the night); not useful for exact numbers or to determine sleep stages
  o Ask probing questions about sleep patterns with attention to musculoskeletal, cardiovascular, or neurological impairments that may or may not have been previously identified
- Consider the individual’s wearable sleep information in context of subjective complaints (i.e. pain)
- Assess sleep in an individual with cognitive impairment or is unable to provide their sleep history

References

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