A Descriptive Analysis of Shift Start-Time and Schedule by Industry

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Introduction: Work schedule characteristics such as number of hours worked per week and the time a work shift begins can affect an individual's health. The American Community Survey (ACS), a large nationwide survey conducted by the U.S. Census Bureau, provides information on characteristics of an individual's work schedule. Understanding work schedule characteristics by industry would provide insights on which industries are more prone to unhealthy work arrangements and schedules. **Methods:** This descriptive analysis used 11 years of survey data (2007-2017) from the ACS to summarize certain work schedule characteristics by detailed industry and observe how these characteristics changed over time. Specifically, the average number of hours a worker worked per week by industry and distributional properties of shift start times by industry were analyzed across wage/salary income class. The ACS is a nationally representative survey conducted annually by the U.S. Census Bureau. The person-level information provided by the ACS, the survey's rolling sample design, and its large sample size provide a unique opportunity to take a detailed look at separate industries' work schedule characteristics. Additionally, the ACS has been used very little in occupational safety and health research. **Results:** Weights provided by the U.S. Census Bureau were used to estimate annual statistics at a nationally representative level, and the statistics were then appended to form a panel of industries using the Bureau's 2012 Industry Code (267 industries, comparable to North American Industry Classification System industries at the 4-digit level). **Discussion:** Not only does this descriptive analysis provide robust and detailed industry estimates, it also observes year-to-year change within each industry. Results enable researchers and decision-makers to identify industries that are experiencing - or trending toward - relatively unhealthy work schedules. This, in turn, points to opportunities for prevention.

Creating a Standardized Procedure for Measuring Sleep by Actigraphy in Aviation Field Studies

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Introduction: The Actigraph is a wrist-worn device containing an accelerometer that can detect changes in activity to measure sleep within individuals and quantify sleep across populations. While there is some literature comparing actigraphy with other sleep scoring methods, the exact nature of data-cleaning procedures for actigraphy is not well defined, and varies from laboratory to laboratory. There is a need for a standardized data-cleaning procedure. We have developed such a procedure and showcase it's use when monitoring the sleep of commercial aviation pilots. **Methods:** Our standardized actigraphy data cleaning procedure is a two-step process. The first step is to identify in the actigraph report by self-report, event marker, and activity level periods of time that are highly likely to be wake. The second step is to take the remainder of the report and determine which, by the same criteria, periods of time that are possibly sleep are in fact sleep. This method was compared to auto-generated sleep only and self-report only (applied to data collected from pilots) to demonstrate that our procedure more accurately measures actual sleep. **Results:** We have found the two-step procedure renders a more accurate and reproducible sleep/wake history, compensating for mistakes made by pilots when self-reporting sleep and eliminating most inaccuracies made when only actigraph sleep algorithms are used. **Conclusion:** In light of what our data shows, and the overall lack of literature surrounding actigraphy cleaning procedure, we highly recommend a standardized data cleaning procedure. While we apply the cleaning procedure to pilot's sleep data and believe it should be implemented for all aviation studies, this procedure may also be useful across multiple population types.

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Phase Relationships between Dim Light Melatonin Onset and Sleep Markers Determined by Actigraphy and the Munich ChronoType Questionnaire

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Introduction: Measurement of body clock timing (circadian phase) is often required for diagnosis and treatment of circadian rhythm disorders. Measurement of Dim Light Melatonin Onset (DLMO), the gold standard measure of circadian phase, is

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Keynotes

When Can You Start Trusting an Awakening Brain?

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The awakening period is often characterized by grogginess and impaired performance. These effects, referred to as *sleep inertia*, have been reported to last everything from a few minutes up up to several hours. It is at present a poor understanding of how fast one can expect an awakening person to make swift and accurate decisions. The presentation will focus of how fast the brain wakes up, and factors affecting the awakening process. The audience can expet a review of the literature, and to see data from a series of recent experimental and field studies that have determined how different cognitive functions return to normal in abrubtly awakened individauls. The results are important since on-call duty is common in the modern society, and staff is often expected to make safety critical decisions immediately upon awakening.

Health and Safety Risks Related to Specific Characteristics of Shift Work Scheduling

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It is well documented that shift work particularly when including night shifts is associated with shorter and disturbed sleep, increased fatigue, poorer work performance, and higher work-life interference. Furthermore, many studies suggest that shift workers have increased risk of cardiovascular disease, breast and prostate cancer, diabetes, and gastrointestinal disorders, although the causal relationship between night work and adverse health outcomes remains to be established. Night work can be organised in many ways e.g. as part of a rotating or permanent schedule, few or many consecutive night shifts (speed of rotation) and short or long time between shifts. The choices have consequences