How Access to Physiological Data Informs Student-Athlete Behavior

White Paper by
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Introduction

Athletics departments face a similar reality that any successful organization must navigate: how to sustain a level of “excellence in spite of fierce competition” while continuing to define and take advantage of opportunities moving forward. As athletics departments seek to fully maximize potential, they must systematically recalibrate their definition of success.

Providing student-athletes with access to their own physiological data is the first step to signaling an unapologetic desire, interest, and commitment to pushing the boundaries of what they are capable of and challenge the current definitions of success. Providing students with access to their own physiological data around sleep, recovery, and strain will enable an institution to tangibly differentiate itself among competing institutions in the eyes of the coaches and student-athletes they recruit. The end goal, in addition to attracting the very best student-athletes, is to provide the education, resources, and roadmap for student-athletes to cultivate their talents in a conscious progression that maximizes their long-term potential.

Insufficient and Inconsistent Sleep

College is a period of uncertainty for most young adults, leaving home for the first time and learning how to manage an unlimited number of stressors. Some of the changes and challenges college student-athletes face are reduced parental oversight into routines and habits, increased athletic strain, dangerous stress/rest imbalances, various extracurricular activities, and increased academic workload. A detrimental shift in sleep habits and routines is one of the first challenges facing the college student (Pilcher J, Huffcutt, 1996). Approximately 70% of college students report “poor sleep,” which includes comments around quality, duration, and irregular sleep patterns (DeMartini and Fucito, 2014).

In a study by Lund et al., 2009, college students classified as “poor-quality sleepers” reported significantly more problems with physical and psychological health than did good-quality sleepers. Students overwhelmingly stated that emotional and academic stress negatively impacted sleep (Lund et al., 2010). In fact, evidence suggests that mental health issues on college campus are correlated to sleep debt (Gilbert et al., 2010).
These facts demonstrate that insufficient sleep and irregular sleep–wake patterns, which have been extensively documented in younger adolescents, also exist at troubling rates in the college student population. Given the correlations between sleep quality and physical and mental health in this population, interventions such as education in combination with biofeedback should be considered.

**Sleep and Performance**

Despite a significant body of literature to suggest a positive relationship between sleep and general well-being (Czeisler, 2015), sleep regularity and college academic performance (Phillips et al., 2016), students have low sleep quality and quantity, and poor sleep habits (Brown et al., 2002). Insufficient sleep among college students may be due to scheduling constraints and not prioritizing sleep relative to other demands. Realms of athletic performance (e.g., speed and endurance), neurocognitive function (e.g., attention and memory), and physical health (e.g., illness and injury risk, and weight management) (Goel et al., 2009, 29: 320–339) have all been shown to be negatively affected by accumulated sleep debt or sleep restriction (Pilcher and Huffcutt, 1996).

To compound the issue, healthy individuals are incapable of self-assessing the extent of the effect of sleep loss (Alhola and Polo-Kantola, 2007). Consequences of inadequate sleep extend into every facet of the student’s life; students who get insufficient sleep are more likely to use medication/alcohol as sleep aids and use stimulants to increase alertness and focus (Taylor and Bramoweth, 2009). The continued rise in sleep issues on college campuses suggests that institutions are failing at communicating the role of sleep in optimizing mental, emotional, and physical health (Campsen and Buboltz, 2016) and have to date offered no meaningful solution to address the growing insufficient sleep epidemic.

These facts highlight the need for a response beyond what is currently being done on college campuses. Researchers suggest that students will perform and learn better when they are analyzing their own data (Freeman et. al., 2014). This differs from the current modus operandi which includes hypothetical scenarios played out in seminars or health recommendations posted on flyers around college campuses. WHOOP introduces a tangible solution that has shown to improve sleep quantity of Division 1 NCAA student-athletes (Figure 1).
Fig 1. Student Athletes dedicate 41 more minutes in bed the first 4 months on WHOOP. Time dedicated to sleep per night over 129 days. The blue trend line shows each day’s average time in bed across the NCAA Division I collegiate athletes who joined WHOOP on 9.15.2015. The dashed red line shows the trend generated using a standard least square linear t across the entire available data set (Breslow, June 2016).

Overview of WHOOP Technology

WHOOP provides a performance optimization system that combines a wrist-worn hardware device with an innovative cloud-based analytics system. Combined, the system offers students the ability to harness physiological data to inform their decision-making around Sleep (quality, duration, and regularity), Strain (cardiovascular load), and Recovery (capacity to adapt to stimulus). The relationships between sleep, resting heart rate, and heart rate variability on athletic performance and their positive correlation with performance have been well-documented in the literature. WHOOP has quantified the correlation between Recovery and various metrics in performance (Figure 2, 3, 4, 5). WHOOP has also quantified the powerful behavioral modifications students experience while on the platform.

As a result, WHOOP is uniquely positioned to inform decision-making to facilitate optimal Sleep performance, speed Recovery, and promote general health and wellness. In addition to student-athlete insight, long-term and short-term responses to exercise can be monitored and shared with coaches, athletic medicine, and strength staff through a web-based portal (Figure 6) that helps enable data-driven training decisions. Data from this setting provides the groundwork for the selection of exercise appropriateness and the facilitation of overall mental and physical readiness.
Figure 2. Field goal % correlates with WHOOP Recovery
A difference of 50 Recovery percentage points predicts about a 35% difference in field goal shooting accuracy compared to their season’s average (Breslow, 2015).

Figure 3. Free throw performance correlates with the WHOOP Recovery
A difference in 50 Recovery Score percentage points predicts about a 50% difference in free throw shooting accuracy compared to their season's average (Breslow, 2015).
Figure 4. Baseball athletes shows a positive trend for WHOOP Recovery and Fastball Velocity (Breslow, September 2016).

Figure 5. All individual athletes shows a positive trend for WHOOP Recovery and Exit Bat Velocity (Breslow, September 2016).
Access to Data Drives Behavior

Drawing on Peter Drucker’s “if-you-can’t-measure-it, you-can’t-improve-it” theory, educators at the collegiate level must consider how wearable technology may help students better understand the factors that influence their ability to perform on any given day.

Visibility into one’s own physiology gives the insight necessary to make choices that support a “performance lifestyle” in step with the academic and athletic goals of the student-athlete and team. WHOOP has shown that students who can see the performance cost of behaviors (e.g., alcohol and WHOOP Recovery, Sleep Debt and Strain, quality Sleep and focus) make incredible behavior modifications.

After just four months on the WHOOP Platform, student-athletes, on average,

- Dedicate 41 more minutes to sleep per night.
- Consume 79% less alcohol.
- Drink 89% less caffeine.
- Engage in screen time 20% less prior to bed.
- Report 60% fewer injuries.
Not surprisingly, these behavior changes have led to substantial physiological improvements,

- A decrease in RHR by 4.4 BPM
- An increase in HRV by 8.3 ms.

(Breslow, 2015)

**Alcohol and the Student-Athlete**

Student-athletes often underestimate the impact of alcohol on performance. As mentioned, student-athletes report consuming 79% less alcohol when on the WHOOP platform (Figure 7). This evidence suggests that visibility into how alcohol consumption impacts next-day WHOOP Recovery (Figure 8) encourages positive actions around choices of when and how students drink.

![User-Reported Nighttime Alcohol Consumption By Date](image)

Figure 7. Distribution of the incidences of athletes reporting consuming at least two alcoholic drinks within two hours of bedtime over their first 129 days on WHOOP (Breslow, June 2015).
Figure 8. Distribution of Return to team average Recovery after drinking. The blue bar shows the number of drinking events after which the users’ Recovery was immediately greater than or equal to his/her team’s average. The data in red show the cumulative number of users who on 1 through 5 days after drinking had Recoveries below their team average, such that the athletes on day 4 had Recoveries that were lower than their teams’ average 1, 2, 3, and 4 days post drinking (Breslow, 2016).

**Conclusion**

Many regard consistent, high-level performance as something magical (e.g. “the zone”). Yet from an objective standpoint, there are three factors that, when considered together, unveil the mystery behind any given level of performance; 1) Biological potential, 2) Skills/expertise (information, know-how) and 3) “performance lifestyle” management. The factors that include biological potential and skills/expertise (factors 1 & 2), are generally well understood and/or accounted for by individuals and teams who perform at a high level in any field. The 3rd factor (performance lifestyle) is largely in the hands of the student-athlete.

**WHOOP helps deliver insight directly to the student so they have the ability to account for, measure, and subsequently manage the variables, internal or external, that influence their performance.**

The extent to which the student identifies and manages these factors effectively determines the quality of their effort and the ability to sustain long-term, consistent outcomes. Helping student-athletes manage Sleep and balance Strain and Recovery is the key to a solid foundation of mental and physical wellness.
At WHOOP, we believe in a future where everyone will have access to their physiological data to make more informed, intelligent decisions about their body. In this context, “Performance” no longer is a mystery but a “choice”. Athletic departments, with unprecedented, quantified insight into athlete well-being, now have the opportunity to blaze a trail of leadership in the advancement of human performance education.

References

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