Editorial: Beyond the ABC of Consulting: Understanding the Impact of Nutrition, Sleep, and Recovery on Performance

Stewart T. Cotterill
University of Winchester and Think Performance

Many sport psychologists in training are taught the importance of understanding Affect (A), Behaviors (B), and Cognition (C). They learn to consider key environmental and individual (psychological) factors that impact both well-being and performance. However, at times, there can be a tendency to neglect physical/physiological factors that invariably affect athletes’ psychological well-being and performance.

For example, hydration levels are a key factor when considering how efficiently the brain is working. On a daily basis, the human body requires between one and seven liters of water to function normally. This demand is increased significantly when undertaking exercise, and varies depending upon environmental temperature and humidity. Failing to meet the body’s water consumption needs can lead to dehydration, described as “a complex condition resulting in a reduction in total body water” (Thomas et al., 2008). A decrease in body weight through dehydration of only 1% can lead to reduced concentration, a less effective memory, increased tension, feelings of anxiety, and an increased experience of fatigue (Ganio et al., 2011). If dehydration reaches 2%, visuomotor, psychomotor, and general mental performance begin to become impaired (Szinnai, Schachinger, Arnaud, Linder, & Keller, 2005).

It is not only water that is of fundamental importance to brain function, but also the food that athletes consume. Nutrition delivers four main classes of functional compounds to the brain that are required for normal functioning (Schmidt, 2010). Specifically, food provides (a) energy for the brain (glucose), (b) building blocks (e.g., lipids and amino acids), (c) micronutrients for enzymatic and endocrine processes (e.g., iron, zinc, B vitamins, iodine), and (d) bio- or psychoactive molecules that can exert a multitude of brain-relevant actions (e.g., caffeine) (Gomez-Pinilla, 2008). The main source of energy for the brain is glucose, and a number of studies have demonstrated that an inadequate supply of glucose can result in a significant reduction in mental function (Amiel, Archibald, Chusney, & Glae, 1991). It is not only what athletes eat that is important, but also when they eat it. Research exploring early morning food consumption suggests that the absence of breakfast can lead to a reduction in reaction time and short-term memory (Smith, Kendrick, Maben, & Salmon, 1994). This psychological effect is most profound in studies of more mature adults (Kaplan, Greenwood, Winocur, & Wolever 2001). In addition, studies focusing on school populations suggest that breakfast omission may detrimentally affect children’s cognitive performance (Murphy et al., 1998). These findings shed light onto potential cognitive impairment in athletes who do not follow an appropriate nutrition protocol.

In addition, there is increasing evidence that some specific nutritional supplements can have a positive impact upon cognitive performance (Dye, Lluch, & Blundell, 2000). It is important to clarify at this point that evidence only supports this claim for diets that are nutritionally deficient. Deficiencies in select micronutrients, mainly certain B vitamins, have been linked to depression and a number of other mental health issues. As a result, micronutrient supplementation, especially in individuals with overt or marginal deficiencies, has the potential to improve overall mood state and psychological well-being.
This is important evidence as adequate mental health is normally a prerequisite for optimal performance in sport, particularly in high-pressure situations. The practical implication of which could be the sport psychologist working closely with a sport nutritionist to optimize brain functioning for performance.

The quality and duration of an individual’s sleep, including the quality of recovery, has also been identified as an important factor influencing brain performance (Cotterill, 2012). Indeed, the restorative nature of good quality sleep has been suggested to be important for successful training and performance (Tuomilehto et al., 2017). One of the main reasons for this is that high-quality sleep can help athletes cope with, and adjust to, the emotional immunological, neurological, and physical stressors that they experience during the day (Morin et al., 2006). Evidence suggests that one night of sleep deprivation can diminish waking regional brain activity in the areas that are responsible for alertness, attention, and higher-order cognitive processes (Thomas et al., 2000). Further to this point, poor sleeping patterns and insufficient rest have been associated with higher levels of anxiety and depression (Griffin & Tyrell, 2004). Building upon this relationship, Griffin and Tyrell further highlighted a link between excessive dreaming, poor sleeping patterns, and depression. One of the explanations for this relationship is that when individuals are stressed, they spend more time in dream sleep and not enough time in slow-wave sleep (Vandekerckhove & Cluydts, 2010). This is important for athletes, as slow-wave sleep is when physical regeneration and recovery predominantly take place. The reason why dreaming can be unhelpful to recovery is that the brain is in a similar state to when it is awake. Dreams are real to your brain, and, as such, can be hormonally and emotionally draining, resulting in feelings of fatigue the following day (Cotterill, 2017). Unfortunately, often little consideration is given to achieving optimal sleep to facilitate optimal performance (Cotterill, 2012). Like most people who are generally habitual creatures, athletes have preferred environments and routines to gain the maximum amount of quality sleep. Changes to these routines can disrupt the quality and duration of sleep (Savits, 1994) and, consequently, physical, psychological, and emotional recovery (Samuels, 2008). Athletes and teams who travel and stay in hotels need to consider the impact of these changes upon their ability to recover effectively. For example, changes in the firmness of mattresses, level or type of ambient noise (Bader & Engdal, 2000), as well as heat and humidity (Okamoto-Mizuno, Tsuzuki, & Mizuno, 2005) can influence sleep.

In conclusion, it is important to understand the range of factors that have the potential to either optimize or limit brain functioning and cognitive performance, which can, in turn, impact athletes’ well-being and athletic performance. Effective sport psychology interventions should address factors pertaining to nutrition, sleep, and recovery, in addition to traditional components targeting affect, behaviors, and cognitions. Failing to consider the broader range of factors underpinning brain functioning could limit the effectiveness of our work as sport psychologists. As a result, working with nutrition and sleep specialists to inform our interventions could be critical to overall success. Finally, it is important to note much of the evidence cited relates to the general population. There is therefore a need for greater research exploring the links between nutrition, sleep, and performance specifically within a sporting context.

References


