

Lying to Win—Placebos and Sport Science

Shona L. Halson and David T. Martin

The early history of placebos reveals how lies have been used by credentialed professionals to achieve desired outcomes.¹ de Craen and colleagues¹ introduce an intriguing Thomas Jefferson quote from 1807 addressing “pious fraud”: “One of the most successful physicians I have ever known has assured me that he used more bread pills, drops of colored water, and powders of hickory ashes, than of all other medicines put together” (quote from reference 6).

When it comes to winning at the highest levels of sport, it may be the case that many “sport scientists” have either stretched the truth or simply blatantly lied to an elite athlete in hopes of improving sporting performance. If research is correct and belief effects are indeed powerful, should lying to an athlete in hopes of improving performance be considered an acceptable practice? What should we think of sport science “gurus” who confidently administer dubious ergogenic aids they barely understand if the outcome is a victorious athlete? As suggested by Thomas Jefferson, history reveals that physicians have been prescribing placebos for more than 200 years in an attempt to make patients feel better.

For the uninitiated, it is easy to overlook how powerful a belief effect can be and thus the importance of this topic. But consider for a moment the insightful paper published in 1954 by Professor Walter B. Cannon from the Harvard Medical School titled “Voodoo Death.”² Professor Cannon writes, “When subjected to spells or sorcery or the use of ‘black magic’ men may be brought to death.” A series of examples from Africa, Australia, New Zealand, and South America were reviewed by Cannon, supporting the hypothesis that when belief is strong a voodoo curse can lead to lethal consequences, even in healthy individuals.

When it comes to sport science, there are many interesting studies that document placebo effects or belief effects associated with popular and well-accepted ergogenic aids such as carbohydrate drinks,³ caffeine,⁴ bicarbonate,⁵ and altitude training.⁶ At the 2013 annual meeting of the American College of Sports Medicine, Dr Trent Stellingwerff addressed an inconvenient truth in sport science; when it comes to performance-enhancing effects of popular ergogenic aids, marginal gains do not aggregate. The 1% to 3% improvements observed with many ergogenic aids are rarely additive.⁷⁻⁹ Why might this be the case? One possible explanation is that many ergogenic aids ultimately act on a central mechanism that regulates performance. As a result, most evidence-

based supplements merely allow an athlete to “dig a little deeper.” Sport scientists have often observed that just believing in a novel and exciting performance-enhancing treatment can produce improvements in performance regardless of introducing a real treatment effect.

For scientists who investigate the performance-enhancing effects of different interventions (training, recovery, altitude, heat, supplements) there is the strong likelihood that research participants’ beliefs and expectations noticeably shape their performance. As discussed in the early 1940s, if belief effects can make sick patients feel better and in some cases actually cause death, it makes sense that belief can also be a powerful modulator of exercise performance.

Placebos have traditionally been considered a means of determining whether the effect of a medical intervention is due to a patient’s imagination rather than its medicinal virtues.¹⁰ For this reason, placebos are often thought of as inactive and thus an essential component for comparison in any randomized controlled trial. However, the role of the placebo is much more complicated than originally suspected. Evidence now supports the concept that improved outcomes for patients and enhanced performance in athletes have a neurobiological basis.

The mechanisms responsible for these favorable outcomes can involve psychological, social, and neurophysiological changes associated with expectation, reward, hope, and reduced anxiety and stress.¹¹ The clinical improvements observed after placebo administration may be attributed to natural history, regression to the mean, cointerventions, experimenters’ and patients’ bias, and psychobiological factors.¹¹ Thus, the notion that a placebo can differentiate between an intervention that enhances patient outcome or elite athlete performance is perhaps biased in itself. We have all heard sport scientists dismissively say “It’s just a placebo,” but can we ever find a true placebo without effects, and, more important, do we want to?

Providing a placebo invites the patient or athlete to believe that the treatment is effective and to expect a clinical outcome. Cognitive and emotional processes related to expectation and Pavlovian conditioning can result in physiological outcomes that can partly explain placebo responses. Early research in this area focused on pain and analgesia. The neurobiology of the placebo response was revealed when placebo analgesia was shown to be blocked by the opioid-receptor antagonist naloxone.¹² The pain

ratings after oral surgery were reduced by 39% when patients were given a placebo, but the placebo effect was not apparent after naloxone administration.¹² Thus, the placebo analgesia can be mediated via the endogenous opioid system. Further research using functional magnetic resonance imaging (fMRI) has supported the role of the opioid system, as well as implicating the dopaminergic system in placebo responses.¹³

A placebo is something that is experienced and in many cases anticipated. Taste preferences for 2 similar beverages (Coca Cola and Pepsi) were examined with fMRI.¹⁴ Sensory information was only involved in part of establishing taste preferences. Brand knowledge significantly biased preferences, and this involved different areas of the brain. Similar research investigating the perceived price of wine also demonstrated that higher-priced wine (whether real or placebo) increases subjective reports of flavor pleasantness, with results supported by fMRI.¹⁵ These studies are some of the first to suggest that marketing can influence perceptions that can be examined neurally and that areas of the brain that are activated are not simply those relating to sensory information. Therefore our perceptions of quality and preference are determined in a complex manner that combines the *actual* experience with the expectation of what we think we *should* experience.

The athlete's or patient's relationship with a sport scientist or physician may therefore be a critical element that can enhance placebo responses and belief effects. Placebogenic influences of the scientist or physician in this relationship include provision of a diagnosis, confidence, empathy, compassion, respect, qualifications, experience, trust, and the provision of hope.¹⁶ Furthermore, these interactions do not occur in a vacuum but in environments influenced by psychology and sociology (beliefs, expectations, previous exposure), the setting (ie, laboratory, treatment room), and of course the nature and type of treatment or intervention.¹¹ The interaction with an athlete or patient can significantly influence the belief the individual has in the outcome or the response. Therefore it is possible that some forms of treatment that may otherwise be considered ineffective may result in enhanced performances in athletes because of the characteristics of the practitioner. For example, "gurus" are often more enthusiastic and optimistic regarding positive outcomes, and this may contribute to the success of the intervention.

Although it is rarely reported in the literature, most would agree that a research participant's expectations and beliefs regarding the scientific intervention can influence results. In addition, the relationship the scientist has with research participants could affect performance tests. For those who have attempted to quantify maximum performances in athletes it is clear that not all "max" efforts are truly inspired and reflective of capacity. As scientists we love to say "Subjects were verbally motivated and encouraged to produce a maximum effort," but what does this really mean? Do we know the subjects' preconceived beliefs; are we aware of their expectations? Because the magnitude of both ergogenic aids and belief

effects are around 1% to 3%, experimental designs and interpretation of results in sport science research require careful consideration.

Experienced coaches and sport scientists intuitively know how important belief effects can be when it comes to sport science interventions. If the athletes are the least bit hesitant or noncommittal when it comes to a novel diet, supplement, warm-up protocol, or equipment prior to important competition, most experienced practitioners will retreat knowing the timing is not right. Thus, the importance of a sport scientist with great intuition and strong relationships with athletes and coaches is critical. In the past, placebo effects were thought of as a "fake" effect, but today the powerful performance-related outcomes associated with improved belief in a training program or novel intervention are seen as real effects that need to be harnessed.

So if belief effects are so powerful and have a biological basis, perhaps lying to win is perfectly acceptable. However, many of us not only work as members of a high-performance team but have also been trained as scientists. As a result we have an obligation not only to make athletes believe but also to advise on practices that are evidence based. For a scientist, *why* something works is as important as *whether* it works. Ideally, ergogenic aids with solid scientific evidence combined with powerful belief effects provide the basis for both optimizing performance and maintaining ethical standards.

The challenge for the sport scientist aiming to better understand how the human body and brain work together in sport is to control for and partition out belief effects from other mechanisms responsible for improvements in performance. If voodoo magic has shown us anything, it is that believing in an expert can be in and of itself a powerful influence.

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