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CURRENT OPINION

Baseless Claims and *Pseudo*science in Health and Wellness: A Call to Action for the Sports, Exercise, and Nutrition-Science Community

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Abstract

The global health and wellness industry has an estimated value of US$4 trillion. Profits derive from heath club memberships, exercise classes, diets, supplements, alternative 'therapies', and thousands of other products and services that are purported to improve health, recovery, and/or sports performance. The industry has expanded at an alarming rate, far outstripping the capacity of federal bodies to regulate the market and protect consumer interests. As a result, many products are sold on baseless or exaggerated claims, feigned scientific legitimacy, and questionable evidence of safety and efficacy. This article is a consciousness raiser. Herein, the implications of the mismatch between extraordinary health and performance claims and the unextraordinary scientific evidence are discussed. Specifically, we explore how *pseudo*science and so-called 'quick fix' interventions undermine initiatives aimed at evoking long-term behavior change, impede the ongoing pursuit of sports performance, and lead to serious downstream consequences for clinical practice. Moreover, *pseudo*science in health and wellness, if left unchecked and unchallenged, may have profound implications for the reputation of exercise science as a discipline. This is a call to action to unify exercise scientists around the world to more proactively challenge baseless claims and *pseudo*science in the commercial health and wellness industry. Furthermore, we must shoulder the burden of ensuring that the next generation of exercise scientists are sufficiently skilled to distinguish science from *pseudo*science, and information from mis- and disinformation. Better population health, sports performance, and the very reputation of the discipline may depend on it.

Key Points

The modern health and wellness industry is characterized by an abundance of baseless or exaggerated claims and widespread *pseudo*science.

This has profound implications for population health, sports performance, and the reputation of exercise science as a discipline.

This article calls upon sports, exercise, and nutrition-scientists to protect the general public, the individuals and groups with whom we work, and the reputation of the discipline by proactively opposing absurdity, falsehood, and error in health and wellness.

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1 Introduction

The global health and wellness industry is worth an estimated US dollars (US$) 4 trillion [1]. Profits derive from the sale of health club memberships, exercise classes, diets, supplements, alternative 'therapies', and thousands of other products and services that are purported to improve health, recovery, and/or sports performance. The industry owes its popularity to several factors, including a cultural emphasis on body/aesthetic ideals [2] and initiatives to improve population health due to overwhelming evidence showing physical activity as preventive of lifestyle-related disease [3]. However, this global interest in health comes at a cost. The industry has expanded rapidly, far outstripping the capacity of federal bodies to regulate the market and protect consumer interests [4–7]. Consequently, marketing regulations are disturbingly lax. Many products and services are sold on baseless or exaggerated claims, feigned scientific legitimacy (i.e., *pseudo*science), and questionable evidence of safety and/or efficacy [6–9]. Furthermore, there is widespread use of placebos among athletic populations [10]. In exercise and health, bad science and low-quality advice are pervasive, disseminated primarily via unqualified social media influencers on unvetted information platforms, where harmful misinformation and disinformation are commonplace [11]. The growing disparity between commercial health and wellness claims and the requisite scientific evidence represents a profound problem for exercise scientists (comprising the subdisciplines of physiology, psychology, nutrition, biomechanics, strength and conditioning, and physiotherapy, among others) whether they work in academia and/or applied practice.

2 Widespread Implications

2.1 Baseless Claims and *Pseudo*science in the Health and Wellness Industry Undermine Initiatives Aimed at Evoking Long-Term Behavior Change

Accomplishing most health and/or wellness outcomes requires not only logic, reasoning, and long-term planning but also an awareness of deceptive information practices that challenge affective and cognitive abilities [12–14]. Health and wellness marketing is designed to exploit innate weaknesses in consumer decision making by promoting short-term, 'quick-fix' products [15]. Such interventions are antithetical to the chronic lifestyle changes, typically advocated by exercise scientists, that are required for lasting and meaningful benefits. By detracting from effective interventions, *pseudo*science in health and wellness may be impinging on the ability of sport, exercise, and public-health practitioners to be successful in their roles. Additionally, by perpetuating the illusion that health can be obtained without investing much time or effort, commercial products nullify opportunities to engage with safe and reliable treatments, thereby increasing the likelihood of harm. By way of example, consider the commercial diet industry, which has estimated annual revenues exceeding US$150 billion in the US and Europe [16]. The data show that fad diets are largely ineffective [16] and have little benefit on heart health [17]. By encouraging 'yo-yo' dieting (i.e., weight cycling), fad diets can lead to increased morbidity [18, 19] and risk of life dissatisfaction and psychopathology (e.g., binge eating, food restriction, anxiety, depression, and sleep disruption) [20–23]. Thus, the ongoing investment of resources in ineffective (unproven) products is harming population health.

2.2 Short-Term, Quick-Fix Interventions may Impede the Ongoing Pursuit of Sports Performance

It is axiomatic that the most meaningful gains in performance will be obtained through evidence-based interventions with documented efficacy. Nevertheless, placebo-mediated products (i.e., those with no active ingredients, whose effects can be attributed solely to the expectation of benefit and attendant psychobiological mediational processes) [24, 25] are used widely in sport as ergogenic aids [24–27]. Despite the apparent utility of so-called 'placebo products' to enhance psychological outcomes (e.g., confidence, satisfaction), many such quick-fix interventions reinforce the notion of treating symptoms rather than causes. For instance, athletes often turn to taping and compression garments to treat their injuries rather than engaging in long-term re/prehabilitation programs; exercisers invest in expensive supplements to facilitate recovery before strategizing to improve their diets through a more sustainable 'food-first' approach; athletes often invest in expensive technologies to fast-track performance instead of optimizing their training programs. By selling strategies that merely *seem* scientific, product manufacturers are able to further exploit the public for profit. Rather than forgo commercial interventions altogether, it has been proposed that individuals invest in health and performance aids that are based on established efficacy *and* powerful expectation/belief effects; scientists and coaches can then optimize health and performance while retaining their ethical standards [24].

2.3 Some Commercial Products and Services are not Only Unproven but Also Potentially Dangerous; This may have Serious Downstream Consequences for Clinical Practice

Complementary and alternative medicine (CAM; e.g., chiropractic, acupuncture, homeopathy, reiki, cupping) is used widely in health, fitness, and sport [26, 27]. Between 50 and 80% of athletes have used alternative 'therapies' [28–31] and 88% of physicians have prescribed them for sports medicine pathologies [32]. However, some CAMs may have demonstrably harmful effects, leading to injury and even death [33–35]. When the anticipated benefits hinge on the placebo effect, the risks become difficult to justify. Of paramount concern is that it is unrealistic to restrict 'placebo products' solely to the domain of exercise and fitness. Inevitably, such widespread use of CAM will extend to the clinical world. Online databases have documented nearly 400,000 deaths and approximately US$3 billion of economic damages due to the use of unproven and unregulated alternative 'therapies', often in place of legitimate medical practice [36]. High-level athletes and so-called fitness "influencers" who use alternative 'therapies' may be compounding the problem by deliberately or inadvertently disseminating dis/misinformation. Indeed, on the basis that they might be perceived as authorities in health and wellness, many revered athletes with large social media followings are considered to have pioneered population trends in the use of CAM [30, 37, 38]. Thus, the broad use of unproven alternative 'therapies' in health and wellness may have critical downstream implications for physicians and clinical exercise professionals working to implement science-based medicine.

2.4 Baseless Claims and *Pseudo*science in Health and Wellness Directly Affect the Reputation of Exercise Science as a Discipline

There is a stark incongruence between the substance of many commercial health and wellness claims and the evidence cited in support of them. Moreover, when studies are presented as evidence for efficacy, they tend to be low quality and at a high risk of methodological bias [9]. Low standards of evidence in the health and wellness industry reflect poorly on the exercise sciences due to a perceived interconnectedness between the two entities. It also suggests that the principles, ethics, and evidence-based practices underpinning exercise science are being poorly translated to the commercial world. In an open letter to science researchers, Nobel Prize-winning psychologist Daniel Kahneman asserted that being associated with a controversial and suspicious discipline may harm graduate and professional employment opportunities in an increasingly competitive job market [39]. Researchers, practitioners, and governing bodies have thus far been apprehensive to challenge *pseudo*science and misinformation in health and wellness, and have even condoned its use (deliberately or inadvertently). By failing to challenge illusory science, the discipline of exercise science commits ethical or logical errors. The phrase *primum non nocere* (first, do no harm) is a well-accepted ethical duty of medical and many scientific professions. The responsibility to act in accordance with this guiding principle not only means dispensing sound, evidence-based advice, but also requires scientists to challenge and prevent bad science and other harmful practices from entering the public and professional environments. A failure in this regard may partly explain the reluctance exhibited by some disciplines (e.g., medical science) to take exercise research seriously. This is a growing problem given the wealth of literature supporting exercise and physical activity as preventive of all-cause mortality.

3 A Call to Action

Clearly, baseless claims and *pseudo*science in health and wellness are not benign phenomena. They are significant barriers to applied practice [40], education and literacy [41], and a healthy society [42]. Moreover, there are numerous and direct implications for the exercise sciences. If allowed to continue unchallenged, *pseudo*science will most likely gain further acceptance and influence in both science and popular culture. Crucially, this is a problem that can only be fixed from the inside. We envisage three ways that exercise scientists can help remedy this critical issue.

First, scientists, academics, and practitioners must be more proactive in vigorously challenging baseless claims and *pseudo*science in the commercial health and wellness industry. This means adopting a more vocal stance in print and digital media (e.g., in scientific journal articles, in the mainstream media, blog posts, and podcasts), on social media, and holding vendors and marketers of health, wellness, and sports products accountable in the 'public square' for disinformation (i.e., making claims that are deliberately misleading and designed to deceive) and misinformation (i.e., inadvertently disseminating false or inaccurate information). In turn, vendors may be incentivized to provide better evidence for efficacy. Exercise scientists must also challenge misinformation when it is unwittingly proliferated by consumers of health products and services. It is important to differentiate between disinformation and misinformation because addressing the latter requires a more sophisticated and subtle approach [7].

Second, the next generation of exercise scientists must be trained - at school, college, university, and in applied practice - to be better at distinguishing science from *pseudo*science and information from mis- and disinformation,

and not just in the domains of health and wellness. While most undergraduate programs teach classes in Research Methods and elementary statistics (designed for future *producers* of scientific information), there are few courses specifically structured to critical thinking and decision making (designed for future *consumers* of scientific information). This is despite data showing that critical thinking classes that addressed *pseudo*science produced large and significant reductions in false beliefs, whereas classes in Research Methods did not [43]. Furthermore, studies show that there is no relationship between *pseudo*scientific beliefs and understanding of scientific concepts [44, 45], and only a weak negative correlation between *pseudo*scientific beliefs and science facts [45], suggesting that improvements in critical thinking are unlikely to occur merely as a byproduct of an exercise science or kinesiology education alone. More specific and targeted approaches are, therefore, required. Given that critical thinking relies on a set of skills that can only be acquired and honed through extensive study and practice (perhaps under expert tutelage), optimal outcomes may only be achieved with explicit and independent vertical integration of critical thinking and critical appraisal into exercise science education [46]. This must begin at school, progress through college, and continue throughout professional development so that graduates and professionals will be better equipped to navigate the world regardless of their field of study or chosen career.

Unfortunately, this may be more difficult than it first appears. Critical appraisal as a requisite skill for kinesiology professionals is notably absent from the core undergraduate curriculum developed by the American Kinesiology Association [47], despite it being a key component of training in other health-related fields [48]. In addition, there is a relative disregard for critical thinking in the school curriculum [49], perhaps because education is often considered a zero-sum game in that there is finite time and resources to teach a predetermined program. Convincing governing bodies and universities of the importance of independent instruction in critical thinking is, therefore, a priority. Current educational priorities must be reassessed.

Finally, it is proposed that exercise scientists increase their awareness and vigilance of, and engagement with, consumer-based health and wellness products. Over thirty years ago, Petr Skrabanek, a physiologist at Trinity College Dublin, noted that the rise of CAM was a reflection that medicine was lacking a clear '*demarcation of the absurd*' [50]. Certainly, the aim of science is not only to pursue discoveries and be amendable to new ideas but also to engage in ongoing error detection and challenge absurdity and falsehood [50–52]. Given that there are strong links between the dissemination of mis- and disinformation and unhealthy or harmful behaviors, it is our professional duty to prevent or remove possible harms in order to protect the general public and the individuals or groups with whom we work. This can be achieved by fostering a culture in which it is commonplace to engage in critical analysis of scientific and commercial claims and services. We, the exercise science community, must shoulder the responsibility of challenging existing paradigms on which the health and wellness industry is based. In turn, this may inform better decisions and policies at all levels therein. Better population health, sports performance, and the very reputation of the discipline may depend on it.

Declarations

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