A critical analysis of the disconnection between science and practice in weight training

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ABSTRACT

Background: Resistance training (RT) has emerged as a powerful tool for health promotion, with substantial scientific evidence supporting its beneficial effects across multiple physiological systems and psychological domains. Despite this robust knowledge base, a significant disconnection persists between scientific evidence and practical implementation in both clinical and everyday settings.

Objectives: This study aims to critically examine this science-practice gap by analyzing common misconceptions surrounding RT and proposing strategies to enhance knowledge translation.

Methods: Through a narrative review of scientific literature from PubMed, Scopus, and Google Scholar, the research synthesizes evidence regarding RT's scientifically validated benefits, prevalent myths, and effective communication approaches.

Results: Findings show a concerning lack of scientific awareness among practitioners and end-users. Persistent misconceptions, such as "RT reduces flexibility" and "plant-based proteins are inferior for muscle hypertrophy," continue to circulate despite contradictory evidence.

Conclusions: Improved scientific communication via targeted educational programs, digital platforms, and collaboration between researchers and policymakers is urgently needed to bridge this gap and maximize RT's public health impact.

Keywords: evidence-based practice, exercise misconceptions, health communication, knowledge translation, resistance training, scientific literacy.

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INTRODUCTION

Resistance training (RT) has surged in popularity over recent decades, driven by a robust scientific foundation that underscores its value for health and performance (Abou Sawan et al., 2023; Westcott, 2012). The World Health Organization advocates muscle-strengthening exercises at least twice weekly to bolster overall health (Bull et al., 2020). RT outperforms sedentary lifestyles and aerobic exercise in promoting muscle hypertrophy (McLeod et al., 2016). This is critical given that muscle mass declines by 3% to 8% per decade after age 30, accelerating to 5% to 10% after 50 (Flack et al., 2011). Beyond muscle growth, RT enhances cardiometabolic health by lowering blood lipids, blood pressure, and type 2 diabetes risk (Lee et al., 2017; Tambalis et al., 2009), reduces fall risk in older adults (Lopez et al., 2018), and mitigates musculoskeletal issues like lower back pain (Fritz et al., 2021). It also supports injury prevention and rehabilitation in sports (Lauersen et al., 2018) while improving mental health outcomes such as depression, anxiety, self-esteem, and cognition (Coelho-Junior et al., 2022; Gordon et al., 2017). Regular RT is linked to reduced all-cause mortality across healthy and clinical populations, including cancer survivors (Momma et al., 2022; Stamatakis et al., 2018). Despite this wealth of evidence (El-Kotob et al., 2020), its integration into clinical and everyday practice remains suboptimal (Ardern et al., 2019; Owoeye et al., 2020).

Previous efforts to address this science-practice disconnect have fallen short of fully resolving it. Ardern et al. (2019) developed a framework for evidence-based decision-making in sports science but overlooked RT-specific misconceptions. Owoeye et al. (2020) examined dissemination barriers in sports medicine yet provided limited actionable strategies for end-users like gym-goers. While these studies highlight the issue, they do not comprehensively tackle the persistent myths—such as RT reducing flexibility or plant-based proteins being inferior—nor their root causes. This study advances beyond these works by critically analyzing common RT misconceptions, tracing their origins, and proposing innovative, multi-faceted solutions, including digital communication and professional training. By synthesizing evidence and offering practical strategies, it seeks to bridge the gap between RT research and practice, enhancing its public health impact in a way prior studies have not.

METHODS

Study Design

This study utilized a narrative review approach to critically examine the disconnection between scientific evidence and practical resistance training (RT) application. The review synthesizes literature from PubMed, Scopus, and Google Scholar, spanning 2000 to 2025, to address RT's validated benefits, prevalent misconceptions, and strategies for knowledge translation. A narrative review was chosen over a systematic review to allow for a broader, contextualized synthesis of the science-practice gap. However, this approach may limit replicability compared to more structured methodologies like PRISMA-guided systematic reviews.

Eligibility Criteria

Studies were included if they were: (1) peer-reviewed articles published in English; (2) focused on RT's health benefits, misconceptions, or communication strategies; and (3) relevant to the study's objectives of analyzing the science-practice gap.

Exclusion criteria encompassed non-peer-reviewed sources (e.g., editorials, opinion pieces), studies not in English, and those unrelated to RT (e.g., focusing solely on aerobic exercise). No restrictions were placed on study design, allowing the inclusion of experimental trials, reviews, and observational studies to capture a comprehensive evidence base.

Search Strategy and Selection Process

The literature search was conducted across PubMed, Scopus, and Google Scholar from November to December 2024, using the following keywords and Boolean operators: "resistance training" OR "strength training" AND ("myths" OR "misconceptions" OR "truths") AND ("health benefits" OR "physiological effects") AND ("knowledge translation" OR "scientific communication"). Filters included publication dates (2000–2025) and English language. Additional sources were identified through manual searches of reference lists from key articles to ensure comprehensive coverage.

The selection process followed a structured approach, though it did not adhere to a formal PRISMA protocol due to the narrative review design. Initially, 782 articles were identified. After the removal of 137 duplicate entries, a total of 645 unique records were subjected to title and abstract screening. This preliminary screening aimed to assess the relevance of resistance training (RT), specifically focusing on its benefits, prevalent misconceptions, and modes of communication. As a result, 121 articles were retained for further analysis. Full-text reviews assessed alignment with eligibility criteria, resulting in 47 articles in the final synthesis. A PRISMA-style flow chart (Figure 1) illustrates this process, detailing the number of studies excluded at each stage.

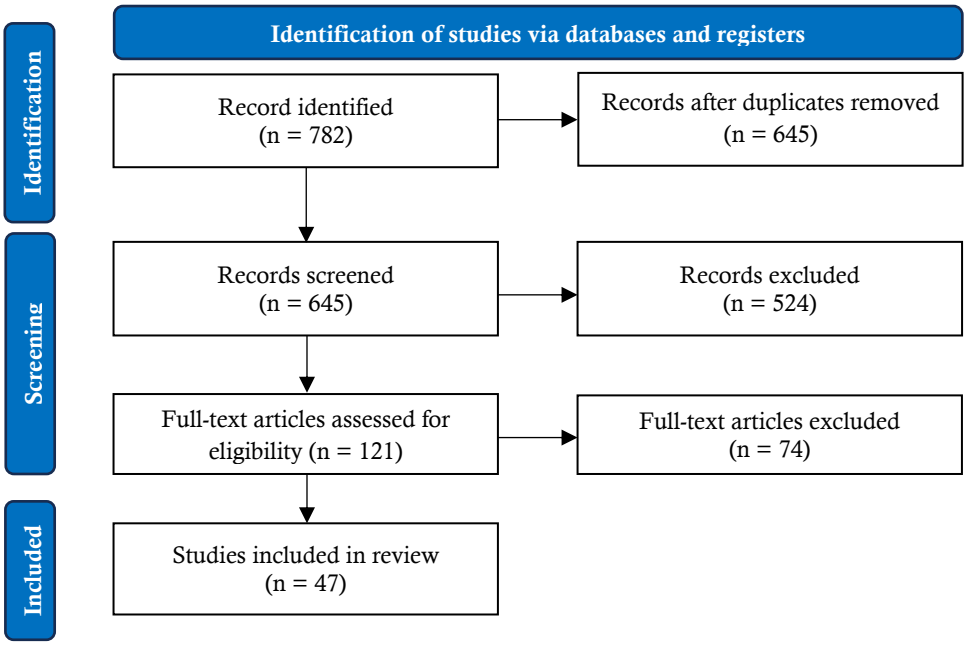

Figure 1. PRISMA flow chart of the study selection process.

Evaluation of Article Quality

Article quality was assessed based on methodological rigor and relevance to the research aims. For experimental studies, criteria included transparent methodology, sample size justification, and statistical robustness. Reviews were evaluated for comprehensiveness and source quality, while observational studies were judged on

representativeness and data validity. No formal scoring system (e.g., GRADE) was applied due to the narrative approach, but preference was given to studies with higher impact factors and peer recognition to ensure credibility.

Data Extraction

Data were extracted manually into a thematic framework with three categories: (1) RT's scientifically validated benefits (e.g., cardiometabolic health, mental well-being); (2) prevalent myths versus truths (e.g., flexibility, protein sources); and (3) knowledge translation strategies (e.g., digital platforms, professional training). Extracted data included study objectives, key findings, and implications for practice. This process facilitated a qualitative synthesis to address the science-practice disconnect, with findings organized narratively rather than statistically aggregated.

RESULTS

Impact on Physical Health

Resistance training (RT) is now widely recognized as a fundamental tool for promoting physical and mental health, enhancing athletic performance, and preventing numerous chronic diseases. Over the past decades, a substantial body of scientific evidence has confirmed that RT facilitates muscle hypertrophy and exerts beneficial effects across multiple physiological systems, contributing to overall well-being. This section explores the principal scientifically validated benefits of RT, emphasizing its pivotal role in disease prevention and healthy aging.

One of the most well-documented advantages of RT is its positive influence on cardiometabolic health. Research has demonstrated that RT significantly reduces blood lipid levels, lowers blood pressure, and enhances insulin sensitivity, decreasing the risk of type 2 diabetes (Lee et al., 2017; Tambalis et al., 2009). These effects are particularly critical in a global landscape characterized by rising obesity rates and metabolic disorders. Moreover, RT has been associated with a reduced risk of cardiovascular disease, primarily due to its ability to improve endothelial function and mitigate systemic inflammation (Saeidifard et al., 2019).

Another crucial aspect of RT is its role in fall prevention and managing orthopedic conditions. Studies have shown that RT significantly enhances muscle strength and balance in older adults, reducing falls and fractures (Lopez et al., 2018). Additionally, RT has proven effective in alleviating chronic lower back pain and osteoarthritis, offering a non-pharmacological approach to improving quality of life (Fritz et al., 2021; Li et al., 2016). These findings are particularly relevant in the context of an aging global population and the increasing prevalence of age-related musculoskeletal disorders.

Effects on Mental Health

Beyond its physical benefits, RT has been shown to exert substantial positive effects on mental health. A growing body of research indicates that RT reduces symptoms of depression and anxiety while enhancing self-esteem and cognitive function (Coelho-Junior et al., 2022; Gordon et al., 2017). These effects are attributed to biological, psychological, and social factors. For instance, RT stimulates the release of neurotransmitters such as serotonin and dopamine, which regulate mood and promote neurogenesis, thereby improving cognitive performance (Wilke et al., 2019). Furthermore, physical activity in general, and RT in particular, fosters social

inclusion and a sense of belonging, both of which are critical for psychological well-being.

Effects on Longevity and Mortality

One of the most compelling findings in recent research is the association between RT and reduced all-cause mortality. Cohort studies have demonstrated that engagement in muscle-strengthening activities is linked to a lower mortality risk from non-communicable diseases, including cardiovascular conditions and cancer (Momma et al., 2022). These results have been corroborated by meta-analyses highlighting that RT can extend life expectancy while enhancing quality of life in later years (Stamatakis et al., 2018). The importance of maintaining adequate muscle mass throughout aging is further underscored by evidence that muscle loss, or sarcopenia, is associated with an increased risk of disability and mortality (Flack et al., 2011).

Practical Considerations

Despite its numerous documented benefits, RT adoption remains limited in certain population groups, particularly among older adults and women. Barriers such as the perceived complexity of RT, lack of specific knowledge, and limited access to appropriate facilities may hinder participation (Rhodes et al., 2017). However, it is essential to emphasize that RT can be adapted to diverse age groups, fitness levels, and individual goals, making it accessible to a broad spectrum of individuals. For example, low-intensity RT programs are equally effective in improving strength and functionality in older adults compared to high-intensity protocols (Carvalho et al., 2022).

RT represents a versatile and highly effective strategy for enhancing physical and mental health, preventing chronic diseases, and promoting active aging. Its scientifically proven benefits include improved cardiometabolic health, reduced risk of falls and orthopedic conditions, positive effects on mental well-being, and an association with increased longevity. However, to maximize RT's impact on public health, it is imperative to overcome barriers to its adoption and ensure that scientific knowledge is effectively translated into practice. This issue will be explored in a subsequent paragraph, with particular attention to the discrepancies between scientific evidence and common misconceptions.

Analysis of misconceptions and truths in resistance training

Resistance training (RT) is often shrouded in popular beliefs that influence gym-goers' practices, yet many of these notions diverge from scientific evidence. This section critically examines prevalent myths about RT, contrasts them with established truths, and explores the scope and origins of this disconnect. The aim is to clarify discrepancies and highlight the need for accurate information to optimize training outcomes.

Origins and prevalence of misconceptions in resistance training

Misconceptions about RT arise from diverse sources and remain widespread despite scientific refutation. For instance, the belief that "RT reduces flexibility" traces back to outdated perceptions of rigid, limited-range movements (Afonso et al., 2021; Alizadeh et al., 2023), yet persists among gym-goers, with Unger et al. (2025) finding only 36% correctly recognized its falsity. However, recent studies have demonstrated that RT can enhance flexibility, mainly when exercises are performed through a full range of motion (ROM) (Favro et al., 2025). Similarly, the notion that

"plant-based proteins are inferior to animal proteins for muscle hypertrophy" endures, fueled by cultural biases and fitness media, despite meta-analyses showing comparable efficacy when amino acid profiles are balanced (Lim et al., 2021; Messina et al., 2018). Empirical data underscore this prevalence: Unger et al. (2025) reported that just 5 of 14 RT statements were accurately identified by most gym-goers. Meanwhile, Rhodes et al. (2017) found that 40% of adults cite a lack of knowledge as a barrier to RT adoption. These misconceptions stem from multiple causes: social media amplifies outdated or exaggerated claims (Krishna & Thompson, 2021), fitness culture perpetuates stereotypes like animal protein superiority, and professionals often lack updated training, with Warneke et al. (2024) noting over 50% of physiotherapists misjudge stretching effects—a parallel issue in RT knowledge.

Scientifically Established Truths

Scientific research has debunked many myths, establishing evident truths about RT. Creatine supplementation, for example, consistently enhances muscular strength and mass across age and sex (Burke et al., 2023; Delpino et al., 2022), yet Unger et al. (2025) found only a significant minority of gym-goers recognized this benefit, suggesting awareness lags. Another truth is the superiority of full range of motion (ROM) over partial ROM for muscle hypertrophy, as evidenced by systematic reviews (Kassiano et al., 2023; Pallarés et al., 2021). These findings counter misconceptions and affirm RT's efficacy when applied correctly.

Ambiguities and Areas of Uncertainty

Not all statements regarding RT can be unequivocally classified as either misconceptions or established truths. Some topics remain contentious even within the scientific community. One such debate concerns the relative efficacy of low-load versus high-load training for muscle hypertrophy. While some meta-analyses suggest that both methods can be effective if training volume is equated (Carvalho et al., 2022; Schoenfeld et al., 2017), findings from Unger et al. (2025) indicate that participants did not reach a clear consensus on this matter. This ambiguity reflects the complexity of the variables involved in RT and underscores the need for further research to elucidate these issues.

Another contested topic pertains to the necessity of training for muscular failure to optimize hypertrophy and strength gains. While some studies argue that reaching failure is not essential for achieving significant improvements (Davies et al., 2016; Refalo et al., 2023), others suggest it may confer additional benefits under specific conditions. Once again, participants in the study of Unger et al. (2025) exhibited no definitive preference, highlighting the lack of a universally accepted understanding of this aspect.

Practical Implications

The discrepancy between misconception and scientifically established truths in resistance training (RT) carries significant practical implications. Gym-goers who base their training practices on misconceptions may fail to achieve their desired results or, in some cases, expose themselves to an increased risk of injury. For instance, the erroneous belief that "RT reduces flexibility" may lead some individuals to avoid exercises that, in reality, could enhance their joint mobility (Alizadeh et al., 2023). Similarly, the perception that "plant-based proteins are inferior" might

discourage those following a vegetarian diet from pursuing hypertrophy goals, thereby unnecessarily restricting their nutritional options (Lim et al., 2021).

To mitigate these detrimental effects, fostering a more comprehensive understanding of scientific evidence is essential. This can be achieved through targeted educational campaigns, accessible informational materials, and the strategic use of digital platforms to disseminate accurate information. As Bardus et al. (2020) suggested, researchers should leverage social media and other online platforms to engage directly with the public, employing visual formats and clear, concise language to enhance accessibility and comprehension.

In summary, the analysis of myths and truths in RT highlights a considerable discrepancy between popular beliefs and scientific evidence. While certain truths—such as the efficacy of creatine supplementation and the significance of a full range of motion—have been widely recognized among gym users, other aspects remain contentious or poorly understood. This situation underscores the pressing need to enhance scientific communication and provide practical tools to translate knowledge into effective training behaviors. The following section will explore concrete strategies to bridge this gap and promote greater awareness among gym users.

Strategies to Enhance Scientific Communication in Resistance Training

The growing popularity of resistance training (RT) has exposed a persistent gap between scientific knowledge and its practical application, affecting not only gym-goers but also industry professionals such as personal trainers, physiotherapists, and sports coaches (Warneke et al., 2024). While research continues to validate RT's benefits (El-Kotob et al., 2020), common beliefs among users often misalign with evidence (Unger et al., 2025). This section proposes concrete, actionable strategies to improve scientific communication, targeting key stakeholders to bridge this divide and promote evidence-based RT practices.

The Role of Fitness and Health Professionals

Fitness and health professionals are critical conduits for translating research into practice, yet many lack up-to-date knowledge. Warneke et al. (2024) found that over 50% of physiotherapists and sports scientists misjudge stretching effects, a knowledge gap mirrored in RT misconceptions. To address this, biennial certification updates with RT myth-busting modules can ensure evidence-based practice (De Lyon et al., 2017). These mandatory refresher courses, offered by professional bodies, should cover topics like flexibility myths and protein efficacy, equipping trainers to dispel misinformation directly with clients. Professional organizations can further support this by hosting workshops and conferences, fostering a culture of continuous learning (Jankauskienė & Pajaujienė, 2018).

The Use of Digital Platforms and Social Media

Digital platforms offer unparalleled reach but are double-edged, often spreading misinformation alongside facts (Krishna & Thompson, 2021; Marocolo et al., 2021). Researchers and experts must harness these tools strategically. Bardus et al. (2020) advocate using platforms like Facebook, Twitter, and Instagram to share concise, evidence-based content—such as infographics on creatine benefits (Burke et al., 2023)—in accessible formats. Podcasts and videos, increasingly trusted by professionals (Shaw & McNamara, 2021), can debunk myths like "RT reduces flexibility" with visual demonstrations, reaching diverse audiences effectively.

Managing misinformation requires proactive engagement, such as partnering with influencers to amplify accurate messages.

Educational and Training Materials

Accessible educational materials are vital for public understanding. Infographics and short summaries in plain language can distill complex findings—like the equivalence of plant-based and animal proteins (Lim et al., 2021)—into user-friendly formats (Bardus et al., 2020). Educators should embed RT science into school curricula using infographics and videos for accessibility, introducing concepts like range of motion (Kassiano et al., 2023) early to build foundational knowledge. Gyms can distribute guides during onboarding, covering practical topics like low-load versus high-load training (Carvalho et al., 2022), ensuring new users start with evidence-based insights.

Collaboration between Researchers and Policymakers

Bridging the gap requires systemic support through collaboration. Researchers and policymakers can integrate evidence into public health guidelines, as exemplified by the American College of Sports Medicine (ACSM) progression models (American College of Sports Medicine, 2009). Policymakers could fund campaigns, leveraging ACSM guidelines, to promote RT's benefits—such as reduced mortality risk (Momma et al., 2022)—and counter misinformation, targeting underserved populations (Pyne & Périard, 2023). Multidisciplinary working groups can develop and disseminate these initiatives, ensuring broad stakeholder buy-in and practical implementation.

Integrated Approach

For trainers, biennial certification updates with RT myth-busting modules can ensure evidence-based practice. Educators should embed RT science in school curricula using infographics and videos for accessibility. Policymakers could fund campaigns, leveraging ACSM guidelines, to promote RT's benefits and counter misinformation. These strategies—training professionals, leveraging digital tools, creating accessible materials, and fostering collaboration—offer a robust framework to align RT practice with science, enhancing health outcomes across populations.

DISCUSSION

This study underscores the multifaceted benefits of resistance training (RT) while exposing a significant gap between scientific evidence and its practical uptake. The findings align with prior work by Ardern et al. (2019) and Owoeye et al. (2020), which identified barriers to evidence-based practice in sports science but extended their scope by pinpointing RT-specific misconceptions—like the belief that RT reduces flexibility (Afonso et al., 2021)—and their practical consequences. The persistence of such myths, as evidenced by Unger et al. (2025), where only five of fourteen RT statements were correctly identified by most gym-goers, reflects a broader challenge in scientific literacy that demands attention.

The proposed strategies—professional training, digital outreach, and policy collaboration—offer a practical framework to address this disconnect. For instance, as suggested by De Lyon et al. (2017), biennial certification updates for trainers could counter knowledge deficits seen in over 50% of physiotherapists misjudging stretching effects (Warneke et al., 2024), a parallel issue in RT. Digital platforms, per Bardus et al. (2020), provide a scalable solution, though Krishna & Thompson (2021)

warn of misinformation risks that require proactive management. These approaches build on existing frameworks but tailor them to RT's unique challenges, advancing beyond the general models of prior studies.

Future research should explore innovative avenues to enhance knowledge translation. Digital technologies like apps and wearables could personalize RT programs with real-time feedback, aligning practice with evidence (Brownson et al., 2018; Pyne & Périard, 2023). Investigating individual differences—e.g., sex-based muscular adaptations (Refalo et al., 2024) or age-related goal shifts (Larsen et al., 2021)—could refine training protocols further. Quantitative studies on misconception prevalence across demographics and cultures, alongside behavioral change interventions, would also strengthen targeted solutions. Meanwhile, countering social media misinformation remains critical, as Marocolo et al. (2021) highlight its growing impact on exercise perceptions.

Limitations of the study

Limitations of this study include its narrative review design, which lacks the replicability of systematic reviews, and the absence of primary data to quantify misconception prevalence firsthand. Nonetheless, by synthesizing existing evidence and offering actionable strategies, this work lays a foundation for aligning RT practice with its scientific potential, urging a collaborative effort among stakeholders to close the gap.

CONCLUSIONS

This study reveals a persistent disconnection between the robust scientific evidence supporting resistance training (RT) and its practical application among gym-goers and professionals. RT stands as a powerful tool for enhancing physical and mental health, yet its benefits are underutilized due to widespread misconceptions and inadequate knowledge translation. The analysis shows that myths, such as RT reducing flexibility or plant-based proteins being inferior for muscle growth, continue to shape behaviors despite clear evidence. This gap stems from limited scientific awareness among practitioners and end-users, highlighting a critical need for improved communication.

To bridge this divide, targeted strategies are essential. Enhancing the education of fitness professionals through regular training updates can ensure they convey accurate information. Leveraging digital platforms and accessible materials, like infographics and videos, can directly reach gym-goers with evidence-based insights. Collaboration between researchers and policymakers can further embed RT's benefits into public health initiatives. Collectively, these approaches promise to align practice with science, maximizing RT's potential to improve health outcomes across diverse populations.

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CONFLICT OF INTEREST

The author hereby declares that this research is free from conflicts of interest with any party.

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