



International Consensus on the Definition of Functional Training: Modified e-Delphi Method

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ABSTRACT

This paper aimed to develop the first consensual definition of functional training using an international e-Delphi method. From a panel of 31 experts initially selected, 13 participated in the consensus. The panel presented the following definition: *“Functional training is a physical interventional approach that contributes to the enhancement of human performance, according to individual goals, in sports, daily life, rehabilitation, or fitness, and takes into consideration the specificity of the task and the unique responsiveness of each individual.”*. Redundancy of the functional training definition emerged as a relevant consideration for this conceptual and methodological advancement, and a proposal to avoid the distinction between functional training and the general concept of training was presented (i.e., no real use of functional training as a concept). It was proposed that a training program or regimen could be analyzed based on a continuum of functionality, which could support further developments in this topic.

Keywords: movement; functionality; function; sport; exercise; conceptualization.

INTRODUCTION

The role of physical activity in the promotion of public health is unquestionable. Regardless of its manifestation (i.e., sport, exercise, recreation), millions of individuals experience some benefit from performing regular physical activity (14, 24, 38). Many approaches can be used for this purpose, which can be defined according to individual goals, contexts, and preferences. However, advancements in any field of knowledge usually bring along misconceptions, trends, methodological approaches, and terminological confusion, which may blur and hinder decades of practice and the evolution of the topic of interest (28). Accordingly, professionals, scholars, and researchers should act quickly and assertively to address such issues, helping to provide clarification that can redirect and guide the efforts of technical and scientific advancements (35).

One of the most quickly evolving concepts in physical activity-related fields and practices in the last two decades is functional training, as can be seen, for example, in the latest fitness worldwide trend analysis (15, 34). This approach to programming and/or training session design has permeated every domain of practice and extended to be not only a training approach/option but also related to specific exercises (e.g., bodyweight squat [versus leg press] (5)), places (e.g., functional training area in a health club), activities (e.g., High-Intensity Functional Training - HIFT (10)), and taxonomies (e.g., integrated; (22)). The diversity of interpretations of this concept suggests that every training approach could be functional, thus

rendering the term moot. The present paper seeks to clarify this conceptual Gordian knot and provide recommendations for the use of the term “functional training” in practice.

Functional training – A brief historical approach of the concept emergence

It is unclear when the term “functional training” was first used in sports and exercise. Historically, multiple influences seem to have existed from military practices and ancient medicine, where some exercises and training methods aimed to prepare the individual for some desired functions. Several examples existed in ancient Greece regarding this approach, where the first (registered) mention of a *medicine ball* appeared (3). In the late XVI century, Geronimo Mercuriali revitalized these ancient ideas through a book entitled *De Arte Gymnastica*, considered by most as the first sports medicine book, in which notions of prescribing exercises for functional purposes reappeared (3). This interconnection of exercise and medicine showed some first signs of independent exploration at the beginning of the XIX century, as seen, for example, in Donald Walker’s books, where he presents a set of exercises that would be “purposive” in the life of British men and women (36). In his books, exercises were recommended according to the activities that would better fit day-to-day movements, according to some general conceptions of gender roles and societal needs. Although far from the current (and multiple) existing definitions, the above examples shared the notion that some exercises could be helpful for specific activities and tasks requiring movement.

Other claims suggest that the general notion of functional training is derived from physical therapy. Given some reports throughout the XIX and XX centuries, therapists often used task-oriented training to retrain patients with movement disorders by selecting and incorporating in their interventions context-specific movements that would be meaningful to each specific task, activity, or context (1, 25).

However, in the late XX century, a boom in “functional” prescriptions emerged and these practices continue to expand up to the present day. Some examples that have permeated the current physical activity-related discourse can be seen in several commonly used expressions, like functional aerobic capacity (8), functional ability (41), and functional performance (27), as well as in other areas of study, like functional medicine (4), functional/task-oriented training (25) or functional nutrition/food (33, 42).

Physical training (as a general concept) was not an exception to this influence, in which the need to improve performance, reduce illness and injury, and improve health, has often been paired with other areas of knowledge and thus received a frequent conceptual contagion (26). Curiously, the coining of the functional training term in the late XX century seems to have gained momentum given the need to differentiate from other training approaches, like bodybuilding, which was very popular due to mainstream media and cultural influences. Some fitness professionals regarded bodybuilding as a very restrictive and specialized approach to training, which did not reflect the plethora of health and performance outcomes that could

emerge from other training (hence, the differentiation to functional training). Currently, functional training has gained relevance in a plethora of physical-activity-related contexts, described and recommended in several handbooks and manuals (e.g., ACSM's guidelines for exercise testing and prescription (18)), international entities (e.g., NASM, NSCA), focus of research (for a review, see (13)), and appearing in the top 10 fitness trends for several years around the globe (15, 34).

However, numerous definitions of functional training coexist (13; 31). While some consensual criteria within the last 20 years are partially accepted to define what constitutes functional training (e.g., designed to improve daily living; training movements; using multijointed and multiplanar exercises; challenging dynamic and static balance; coordination) (1; 5; 16), some terminological confusion, conceptual undefinition/overlap has exposed and troubled functional training definitions, purposes, and operationalization. Although some attempts to navigate this conceptual heterogeneity were previously made with relative little success, some authors have presented arguments against the need for this conceptualization and wanted clarifications on the topic (12), avoiding the proliferation of inaccurate or poorly defined concepts that can have societal relevance, and impact physical activity-related practices and health outcomes (12; 35).

Contemporary criticism of the functional training concept

According to the Oxford English Dictionary, the definition of function is *“an activity that is natural to or the purpose of a person or thing”* and functional is *“of or having a special activity, purpose, or task”; “designed to be practical and useful, rather than attractive.”* The same dictionary defines training as, *“The action of teaching a person or animal a particular skill or type of behavior”* (23). When trying to interpret and integrate the definitions, one must wonder how functional training, as a concept or domain of practice, differs substantially from the more general and broader idea of training.

Prior definitions have directly or indirectly resulted in some confusion when explaining the concept of functional training. For example, Boyle (5, 6) proposed that *“FT [functional training] is a purposeful system of programs and exercises to develop a higher level of athletic preparation”* and *“FT [functional training] can therefore be described as purposeful training,”* which, theoretically, lacks differentiation when contrasting to a ‘traditional’ view of what is training, or clarification of what would be, in opposition, a less purposeful training. Other authors have suggested that *“functional training focuses on the movement function of the human body”, “A spectrum of activities that condition the body consistent with its integrated movement”* (29), or that *“[functional training] places emphasis on movement patterns to let the body parts develop naturally”* (9), definitions that have helped to shape functional training practices into a selection of exercises that would address balance, coordination, weight-bearing multiplanar and multijoint exercises, but still present undefined or overlapping concepts (e.g., movement patterns; integrated movement) (1). Additionally, functional training has been suggested to

“mimic tasks or activities that occur in a person’s daily life to make training adaptations more transferable” (40), and that they should be *“(...) client, athlete, or patient-centered, and “[Functional training] designed to help people achieve their goals safely and efficiently”* (17). These conceptions expanded the functional training approach away from previous indications on athlete preparation, highlighting a transferable outcome for daily life activities. However, there is still some doubt on how it substantially differentiates from the broad concept of training.

This apparent absence of methodological and theoretical clarification and alignment led Stenger (31) to indicate that *“Functional training is a broad and confusing concept because of the multitude of definitions and applications”* (p. 35) and that *“Functional training is a mysterious philosophy of training because of its many definitions and inconsistent implementations”* (p. 41), suggesting that, although dependent on a subjective interpretation by the professional, some merit and usefulness was still present in a functional training based approach. To provide more precise and better-delimited concept for the advancement of physical activity and sport science, some criticism on the functional training concept and approach to training were presented. In a review by Ide and co-workers (12), and later in a commentary (13), authors concluded that *“there is no rationale in classifying exercise training programs as FT [functional training]. Insisting to use this term (...) is a classic case of needlessly reinventing the wheel”* (13), bringing forth new opposing views of some of the traditional classifications of what is functional training. All in all, apparent inconsistencies and strong criticism are present in the functional training approach, an issue sports sciences should not overlook.

Systematic Approach to the Problem

Albeit very popular and used in several contexts, functional training as a concept and methodology is prone to several interpretations, which considerably limits its understanding and application. Given that an analysis of the possible implications of functional training in sports and health outcomes depends on *what* functional training is, this paper aimed to develop the first consensual definition of functional training using an international e-Delphi method. Trainers and researchers in several sports and exercise fields participated in this process.

With this research effort, we hope to help clarify this practice and allow future development in the functional training method and approach, which can help better understand these programs' utility in several contexts and contribute to scientific clarification on the topic.

METHOD

Delphi is a scientific method to organize and structure expert discussion that generates insights on controversial topics with limited information (2). Consistent with the Delphi

methodology, four rounds of reviews were employed to develop a consensus definition of “functional training.”

Specialists were identified based on their expertise in the area of training or exercise and were invited to participate as part of an expert consortium. In the first round, those who agreed to participate provided their definition of functional training. Definitions were compiled in a word document, after which, the definitions were analyzed by inductive content analysis. Two researchers (HVP and DT) were responsible for the content analysis (2). Data analysis was comprised of six stages (7): (i) familiarizing with data, (ii) generating initial codes, (iii) searching for themes, (iv) reviewing themes, (v) defining and naming themes, and (vi) producing the report.

In the second round, a summary of concepts was presented to the panel of experts, who then provided feedback to hone a consensus. A Google questionnaire was sent to the specialists to check their level of agreement with identified themes. Results from the questionnaire were analyzed, and a first draft definition was proposed, including all the themes that had at least one expert approval.

In the third round, the specialists were solicited for any additional comments and/or revisions of the definition. All the comments and discussion points were considered to develop the definition.

In the fourth and last round of feedback from the expert panel, a draft manuscript and the final definition of functional training were presented to the panel for feedback. Once again, all feedback was integrated for authors until agreement was reached.

RESULTS

Participants

A panel of 31 experts (mean age 47) was initially selected from major publications in the area of interest (see Figure 1). These could be selected if they had published articles in the last five years exploring how to evaluate and/or prescribe exercise that encompassed several populations (e.g., athletes, sedentary individuals, and older persons) and contexts (e.g., sports modalities, health club, medical centers, and nursing homes). From those, 23 were randomly selected and contacted via email. Of those invited, seven never answered the first email and the three successive reminders, and four refused to participate. Among reasons to decline participation, specialists claimed not to agree with the need for the study ($n = 2$), with one specialist reporting that there was no need for any functional training definition. Other invited specialists did not disclose the reasons or stated they were no longer performing research in this area ($n = 2$). Twelve specialists (all males) participated in the first three rounds of the consensus. From the third to the fourth, one expert dropped out because he did not agree

with some of the claims made in the text, and another one because he felt he had not contributed enough to the final manuscript.

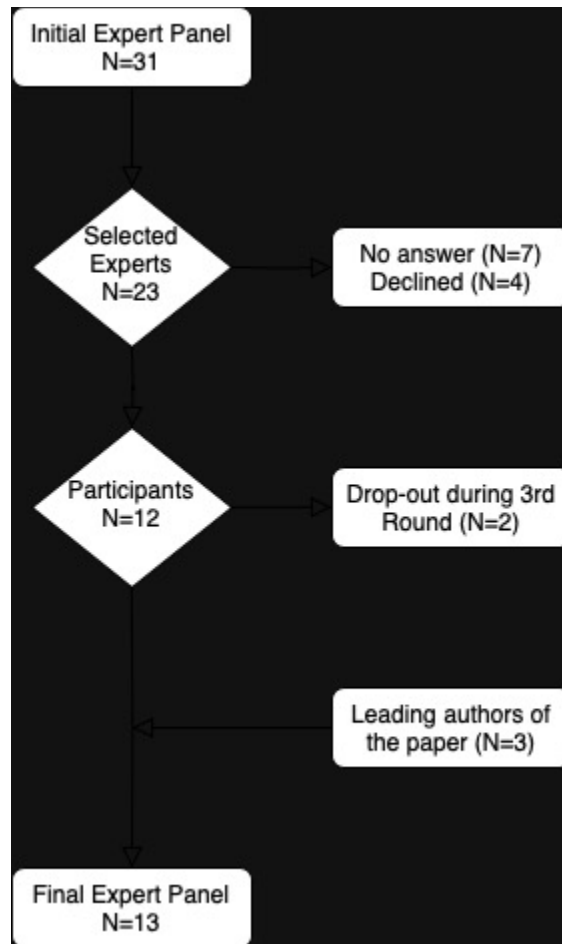


Figure 1

All but one of the co-authors (the expert panel plus the three leading authors) had a doctoral degree in exercise or sport-related fields. Three participants were from the United States of America, two from the United Kingdom, two from Brazil, two from Portugal, one from

Denmark, New Zealand, Canada and Spain. The main expertise areas were strength and conditioning (n = 6) and exercise physiology (n = 7).

Consensus process

After content analysis of the first round of definitions, eight themes were identified. Some participants highlighted redundancy, suggesting an overlap between the functional training definition and other forms or conceptions of physical exercise or the idleness of its use. The respondents also mentioned context specificity, individualization, human performance, and enhance performance in several contexts (daily, professional or sports). Other themes included daily life preparation, functional training to prepare the individual for daily physical demands, mimicry, references to functional training imitating real-world movements of daily life, physical fitness components, health and rehabilitation, and reference to functional training to recover or prevent illness or rehabilitate from injuries. Supplementary file one displays the themes identified through qualitative analysis and sent in the questionnaire for the second round.

The most prevalent theme developed is the functional training concept redundancy (92%). Specificity and individualization (both with 62%), and human performance and daily life preparation (54%), also garnered more than half of the participants' agreement. Figure 2 displays the percentage of participants' agreement with themes to include in a definition of functional training.

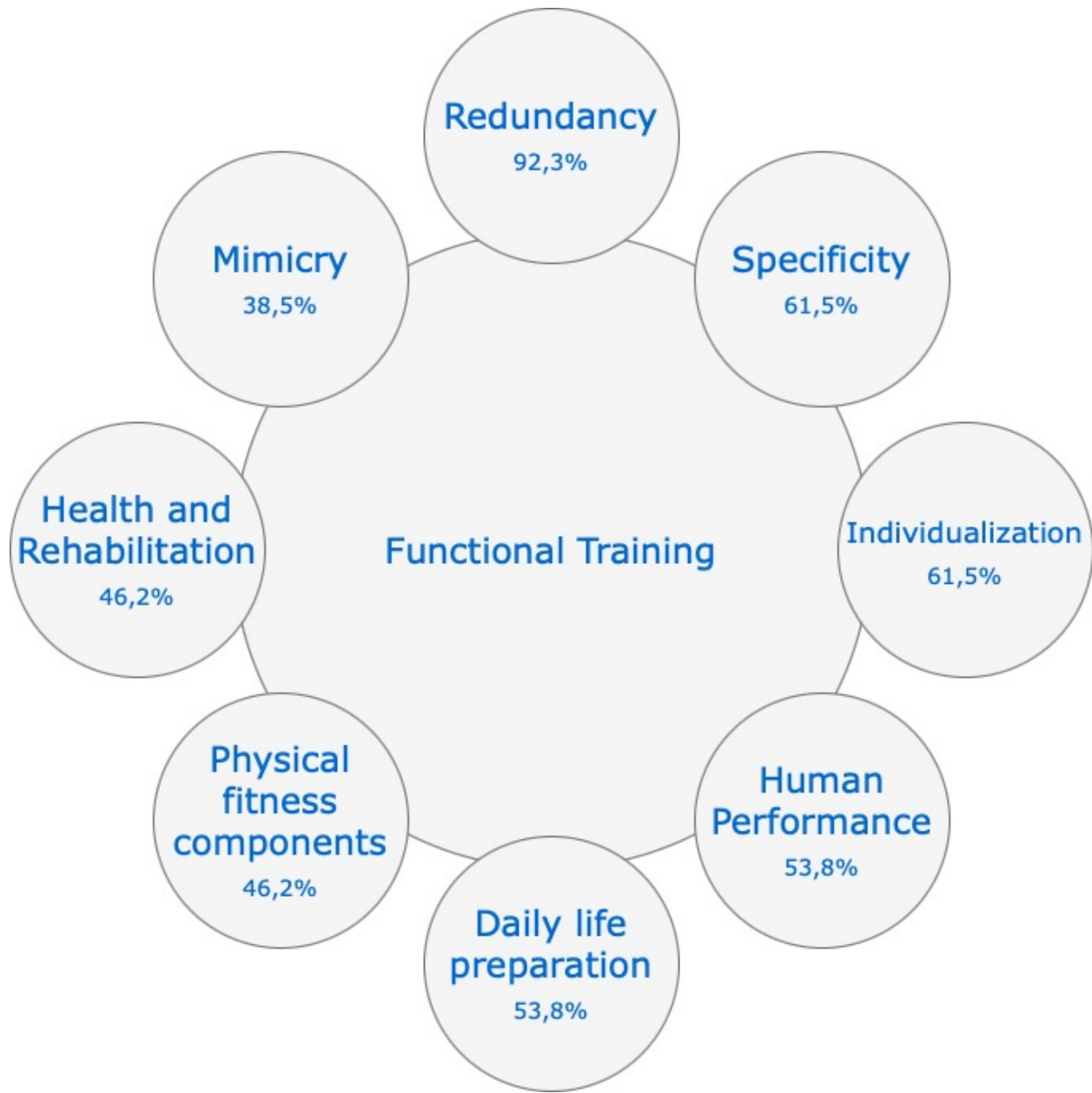


Figure 2

Based on the themes advanced, HVP, DT and BJS, suggested a functional training definition to the larger group of specialists for the third round of the study.

“Functional training is a process that contributes to the enhancement of human performance, according to individual goals, in sports, daily life, rehabilitation or fitness, and takes into consideration the specificity of the task and the uniqueness of each individual.”

After gathering feedback from all the experts through email discussion, a new version of the functional training definition was reached.

“Functional training is a physical interventional approach that contributes to the enhancement of human performance, according to individual goals, in sports, daily life, rehabilitation, or fitness, and takes into consideration the specificity of the task and the unique responsiveness of each individual.”

DISCUSSION

The purpose of this working group was to develop the first consensual definition of functional training using an international e-Delphi method among exercise and training specialists. Additionally, the implications of the proposed definition were explored. Specialists agreed on a definition of functional training but highlighted the possibility of conceptual redundancy. An exploration of the possible importance of considering functional training in a

continuum aligned with individual needs, characteristics, and goals is presented for discussion and methodological advancement.

The e-Delphi discussion and definition development stages

In the first stage of the e-Delphi content analysis, eight domains were identified. Five of them gathered more than 50% of the participants agreement, while three ranged between 35.5% and 46.2%. An exploration of how each domain was contemplated in the presented functional training definition will be presented for discussion.

The possible redundancy of the functional training concept and future definition was highlighted by most of the panel experts. In fact, when looking at contemporary definitions, it is possible to identify some conceptual issues and terminological confusion (12, 31), which anticipated that possibility. As can be seen, some commonly accepted components of a functional training program are also part of several other training approaches (13). These tend to reflect the general concept of what *training* is, thus reducing the need to further 'slice' the definition and create a term that is redundant with general training.

This notion of conceptual overlap and possible redundancy can be further detected when looking at other relevant domains. For example, specificity and individualization, which emerged from the content analysis in more than half of the panel participants' responses, are critical training principles long described in the literature (20, 30) and considered to be fundamental to the planning, prescription, and supervision of most training programs.

However, these training principles can be seen and implemented differently according to the activities and the exerciser/athlete training goals. For example, some programs seek to acquire broad benefits or adaptations, such as health or well-being, which may reduce the degree of specificity needed in the training process, and others may need to redirect all training characteristics and efforts to a very narrow and specific aim, such as speed development. The same can be discussed concerning the need for individualization, as some activities, like Zumba®, may be practiced in a group format for leisure or enjoyment purposes, thus having little individualization. In an additional example, a senior exercise program may reflect exercises or methods targeting individual needs, limitations, and broad adaptations, thus presenting what the exerciser can do within a larger and ideal toolbox of exercises and methods, being less specific but individualized. This range of possibilities reflects distinct approaches to the training process and organization, and they do not justify, by themselves, the need or existence of a functional training concept. However, given their representativity and possible articulation with other detected domains, they were considered relevant for the functional training definition exploration effort.

Two other domains detected in the content analysis and reported by more than half of the experts were human performance and daily life preparation. The concept of human performance tends to clarify that not only athletes can be the target of training procedures aimed at an improved function for a given task or context (32). This can be seen, for example, in the other equally proposed domain of daily life preparation, in which daily and routine

activities can be enhanced, performed with less stress, and with fewer injuries due to an adjusted training process (sometimes called transferable outcomes) (1, 19, 40). These two domains seem to reflect the need for functional training to differentiate from a more 'traditional' and sport-centered training concept. As noted previously, some lines of thought sustain that functional training should reflect transferable outcomes to the person's movement-based daily activities and be aligned with the client, athlete, or patient's needs (17, 40). This differentiation to populations or individuals other than athletes seems to redirect the evolution of the concept to encompass several other approaches to human performance and individual needs. Additionally, it must also be considered that applications of functional training can be found in several other contexts (e.g., health clubs), which tends to suggest that this approach to the training process (i.e., functional training), and therefore a possible definition, should be sufficiently wide to reflect them all.

Some of the less-mentioned domains included in the content analysis were physical fitness components, health and rehabilitation, and mimicry. The physical fitness components domain reflected a perspective where functional training should involve an eclectic approach, an aspect also considered in some past attempts to define functional training (e.g., Boyle (5,6); Heyward & Gibson, (11)). These definitions indicate that some movements have commonalities that are transferable, directly or indirectly, to a specific sport or task-related requirement. This argument seems to partially clash with the notion that functional training should be specific, but not with preparing the individual for common and uncommon/unpredictable daily task

challenges. Moreover, the health-related fitness components proposed by the ACSM (18) indicate that a multi-component training approach is relevant for individual health and well-being, something that can be achieved by some of the commonly used functional training approaches focused on developing physical fitness qualities. If individuality and specificity should guide the training process for improving human performance, it seems acceptable to consider that physical fitness components can be an attainable outcome of functional training.

Health and rehabilitation were also domains identified in the experts' initial definitions and may reflect the historical perspective of the concept of different but relatable areas of intervention (e.g., physiotherapy). It should be reasonable to assume that if this consensus panel involved fewer exercise/training specialists and more rehabilitation experts, the preponderance of this domain would be different. Notwithstanding, this domain seemed relevant for the definition exploration for different reasons. For instance, injury prevention and rehabilitation, which can be a concern in sport, exercise, or even daily life tasks (e.g., work-related injuries), reflects the historical intersections of medicine/rehabilitation/sport interventions in which movement-based supervised interventions were used for these purposes (25). Additionally, this domain is heavily dependent on specificity and individuality, and closely related to daily life preparation and human performance, further expressing an expansion to other non-sport-centered contexts and populations, something that common functional training definitions tend to reflect. Altogether, the expert panel considered that the

functional training approach could contemplate these needs and that the domain should be included in a proposed definition.

Finally, mimicry emerged as the least represented domain, meaning imitating a movement, task, or activity. The low representation may reflect that this domain is part, but not the whole of, the specificity domain, and that the latter best represents what functional training aims to differentiate. Additionally, previous definitions (e.g., (40)) of this concept have presented mimicry as an approximation to tasks or daily life activities, a conceptualization that was previously expressed in another domain. Generally, given that mimicry could be seen in several other domains' characteristics (but not necessarily independent of them), and presented the lower percental appearance in the panel discussion, it was concluded it did not need to be specifically addressed in the definition.

Given the domains identified and all the above considerations, the panel consensually proposed the following definition of functional training: *“Functional training is a physical interventional approach that contributes to the enhancement of human performance, according to individual goals, in sports, daily life, rehabilitation, or fitness, and takes into consideration the specificity of the task and the unique responsiveness of each individual.”*

Functional training continuum – A proposal for methodological advancement

There were concerns that the current definition would be redundant when contrasted with a general conception of training. There seems to be a significant overlap between these

two concepts, but not to the extent that it is instantly clear or unquestionable that they are the same. Conceptualizations in a dynamic field of practice like sport and physical activity are an evolving process, and even the most customary view of what training can be questioned and refined. Most training definitions found in the sports literature tend to include words and expressions such as “athlete”, “sport”, “athletic performance” and “level of competition”, which redirect the training process to a specific context and individuals, and often suggest that mental/psychological, nutritional, and tactical aspects should also be present (e.g., 21, 37, 39, 43). However, training, as a concept and process, is used in other several other contexts than physical training for sport fields and individuals, without the need for a differentiating term (e.g., training in a health club or training in a physical therapy clinic do not need a differentiating term). Transposing this line of thought for functional training, at this moment, and based on our current proposal of the functional training definition, the panel suggests that functional training is the result of the selection, articulation, and application of training methods to an individual, which reflect, as in many other situations, the general training concept (i.e., no real use of functional training as a concept).

Some considerations can be made where doubt exists and impedes a clear juxtaposition of concepts. For example, can a bodybuilder’s workout be considered functional? When looking at the current definition, the answer is potentially yes. It is a practice that could enhance performance (e.g., gains of muscle mass) in a sport/fitness activity, aligned with individual needs (e.g., responsiveness due to genetics, level of training), and goals (preparing

for a contest), in which the exercise regimen is created and adjusted based in the specificities of the modality. Applying this rationale to an older adult whose training goals are to promote an active lifestyle, reduce comorbidities, and maintain physical autonomy, we can consider a training regimen to be functional if it aims to improve their (human) performance, adjusted to current capacities and limitations (i.e., specificity), that targets common daily activities through a set of exercises addressing their individual needs and accounting for their characteristics (i.e., individuality). The same would be true for an athlete's training program in any sport modality, and virtually with any specific and individually guided training to improve human performance.

Additionally, and taking again the previously presented example of a bodybuilder's training program, it can be argued that two distinct workouts, designed by two separate trainers, given to the same individual with the same needs at a given time could be functionally different. This could be defined, specifically, by the proximity of the training to the individual needs, goals, and characteristics. In fact, one training approach would probably be better, although with differentiated degrees of efficacy, given that distinct strategies can be used to obtain similar outcomes (i.e., in some cases the two training approaches may not have relevant differences in the outcomes, in others that may not be the case). In other (more extreme) examples, a dance-based group class will necessarily have a lower functional transfer for a basketball player, although it may be beneficial for him for other leisure purposes. Alternatively, the same class for an individual aiming to be more physically active and improve general health, would present a higher functionality, especially if it aligns with individual characteristics

(e.g., preference and motivation for the activity; level of physical fitness; possible physical constraints). Moreover, this same individual could employ another activity or training method that confers an even higher degree of functionality (e.g., through an individualized approach in personal training). This can also be relevant to sports season stages and planning. Strength training in the pre-season of a long-jumper is usually a component of the training planning, but it is unadvisable immediately prior to a competition day. Thus, the same mode and expression of an exercise could contribute to a higher or lower degree of functionality given the season planning and athlete's preparation needs.

These arguments focus on the definition of functionality, i.e., "*of having a (...) purpose*" (23). At a given time point, a training method or mode of practice could have a purpose, some purpose, or no purpose at all, for the same individual. When looking at functional training from this standpoint, training can be analyzed in a *continuum of functionality*, where it is not the exercises, context, planes of movement, joints involved, and many other usually considered characteristics in training that would define it to be functional, but rather the degree of proximity to individual needs, characteristics, and goals, framed with high specificity in each practice context, aiming to improve performance. Thus, although all training approaches could be functional, it is the interpretation of, and adjustment to, the factors above that determines the extent to which this is true.

PRACTICAL APPLICATIONS

Taking into consideration the results from this paper, the specialist panel agreed on several recommendations for clarifying the concept of functional training and its practical application:

1. Instead of labeling an exercise routine or plan as functional or not, professionals should consider what degree of functionality is present in a specific training process; this degree of functionality should be viewed as the proximity of the training program to individual needs, characteristics, and goals while promoting training specificity and improved performance.
2. Instead of classifying if a specific training program or exercise is functional according to the material, context of practice, and number of joints/muscles/planes used, professionals should consider the association between the training specificity and the individual's goals and characteristics to assess a degree of functionality.
3. Instead of presenting functionality as an improvement to a more 'traditional' training mode, professionals should consider and present it as one of the main features of all prescribed exercises.

Limitations and future efforts

Although the current paper attempted to provide clarity as to the concept of functional training, some considerations should be made for adequate interpretation and future efforts

on the topic. First, the expert panel comprised exercise or sports professionals, trainers, and/or researchers. Given the historical evolution of functional training and the role of medical and rehabilitation professions in this process, a balance between experts in these professions would ensure a broader view of this theme. Second, the e-Delphi method and results could be further explored by presenting the definition and methodological considerations now accessible to an independent panel of experts and a sample of related professionals. This could be done, for example, using interviews, thus acquiring perspective on the findings, which could allow further reflections on the topic. Finally, a chronological and systematic follow-up of the suggestions mentioned earlier on the conceptual and methodological proposal could allow the interpretation of this work's impact. Given that misconceptions in the past have escalated into several manifestations prone to negatively influence practice and research alike, knowing and acting upon this currently proposed definition and operational recommendations would be relevant for the development of the field.

CONCLUSION

Fourteen members of the consensus panel of this study identified redundancy, specificity, individualization, human performance, daily life preparation, physical fitness components, and health and rehabilitation as domains to be explored in the definition of functional training. After meeting all stages of the e-Delphi method, the panel presented the

following definition of functional training: *“Functional training is a physical interventional approach that contributes to the enhancement of human performance, according to individual goals, in sports, daily life, rehabilitation, or fitness, and takes into consideration the specificity of the task and the unique responsiveness of each individual.”* Redundancy of the definition emerged as a relevant consideration for this conceptual and methodological advancement, and a *proposal to avoid* the distinction between functional training and the general concept of training was presented. However, it was proposed that a training program or regimen could be analyzed based on a continuum of functionality, an approach grounded on individual needs, characteristics, and goals, which could support further developments in this topic.

Competing Interests: BJS formerly served on the scientific advisory board for Tonal Corporation, a manufacturer of fitness equipment.

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