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RESEARCH ARTICLE

Speed Track Events: Development and Validity of Exercise Catalog

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Abstract:

Introduction:

Sports coaches are guided by empirical evidence at the moment of planning the training loads, and, many times, these loads are not recorded for posterior analysis. A validated scientific instrument could help coaches to plan, register, and analyse sports training load.

Aim:

The study aimed to develop and assess the content validity of a catalog of exercises for speed track events.

Methods:

Through interviews, a group of expert coaches elaborated a catalog of exercises. Two groups of raters evaluated the content validity of these exercises, producing a coefficient of content validity (CCV) for such validity indicators as clarity of language, practical pertinence and theoretical relevance. Additionally, raters assessed the specificity level of each exercise by deciding if the exercise was general, special or specific to speed track events.

Results:

These CCV results confirmed the content validity of a 75-exercise catalog with satisfactory validity indicators, meaning the exercises are understandable for athletic coaches ($CCV_{CL}=0,93$), pertinent for speed track training ($CCV_{PP}=0,84$) and relevant ($CCV_{RT}=0,83$).

Conclusion:

This catalog may help athletic coaches to plan, implement and analyze their players' sports training loads.

Keywords: Athlete, Exercise, Exercise performance, Track and field, Scientific instrument, CCV.

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1. INTRODUCTION

Track and field athletics are a collection of sports contests that basically involve contests of running, jumping and throwing, and it is one of the most popular and global sports domains worldwide [1]. Track events involve running in contests of different distances, with the fastest sprints. Sprints are also considered the most popular athletics events [2]. The speed track events in the Olympic program are currently the

100, 200 and 400-meter dash events. In these competitions, runners start in a staggered position from starting blocks and run in separate lanes for the entire course.

Training record has been considered a fundamental procedure as important as training planning [3]. Since the training load that was previously planned requires adjustment along with the session or even at the training session, the training record offers a strategy to analyze how the athlete performed [4, 5]. Applying the concepts of System General Theory proposed by Von Bertalanffy [6], some authors have developed models that treat sports training in a systemic view

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[7 - 9]. Following the systemic approach, a theoretical training system model named “Planning, Registration and Analysis of Sports Training Load” (PRACTE in Portuguese) was developed by Szmuchrowski & Couto [10] with the purpose of better planning, executing and controlling the variables that influence the training process.

The PRACTE model suggests a simplified process of planning, registration, and analysis of training load, and the development of catalogs of exercises for each individual and team sport. These catalogs are instruments that contain codified exercises organized and subdivided according to their specificity, as proposed by Pedrosa *et al.* [11] and Silva *et al.* [12] for judo and taekwondo, respectively. A catalog containing exercises in a codified way can be a quick solution to record the exercises performed in the training session if you have an organized training sheet, as the one designed by Kalina [13]. This registration allows a posterior analysis of training load parameters as magnitude, structure and dynamic as proposed by Szmuchrowski & Couto [10] and performed by Pedrosa *et al.* [14].

Development of an instrument as an exercise catalog that is able to improve the training planning, its execution and control is important for achieving better results in the sports, but it is important and necessary to assess the content of the instrument. There is no one validated exercise catalog for speed track events. Thus, this study aims to elaborate and assess the content validity of a catalog of exercises for speed track events.

2. METHODS

The methodological approach adopted for the elaboration and content validation process was guided by literature recommendations [15, 16] and this study was divided into two phases; the first phase for the development of items (catalog elaboration) and the second phase for evaluation of items (content validation); both are described below.

2.1. Catalog Elaboration

In order to achieve a high level of physical and technical performance in speed track events, the training planning might contain exercises that aim to improve some capacities as speed, strength, endurance, flexibility, motor coordination and specific technique [17 - 24]. These are important capacities for the speed track training adopted in this study.

In this phase, the sample was composed of ten experienced Brazilian speed track coaches (mean \pm SD: age $45 \pm 12,2$ years; time as coach $17,9 \pm 7,9$ years) (Table 1). As inclusion criteria, coaches must have been coaching for at least ten years continuously, must have done graduation in physical education, registered at Athletics Brazilian Confederation and have won relevant national or international tournaments. These coaches responded, through an individual semi-structured interview, what exercises are used during a training routine that aim at the development of the capacities previously cited (Appendices 1-5).

Table 1. Expert coaches' profile.

S.No.	Age (Years)	Time as Coach (Years)	Coaching for Category	Relevant Tournaments Won as Coach
1	66	35	Under-18 Under-16	Gymnasiade South American Championship U-20 Pan American U-20
2	32	10	Professional Under-20 Under -18	Gymnasiade Brazilian Championship U-20
3	38	13	Professional Under-20 Under -18	Gold Medal in PanAmerican Games Silver Medal in PanAmerican Games Brazil Trophy
4	33	15	Professional Under-20 Under -18 Under-16	Brazilian Championship U-20 South American Championship
5	58	11	Under-20 Under -18 Under-16	Brazilian Championship U-20 Brazilian Championship U-18
6	44	22	Professional Under-20 Under -18 Under-16	Íbero-American Champioship Military World Games Pan American U-20 Brazilian Championship U-20
7	46	24	Under -18 Under-16	Runner-Up World Champion U-18 Brazilian Championship U-18 Brazilian Championship U-16
8	46	18	Professional Under-20 Under -18 Under-16	South American Champioship Brazil Trophy Pan American U-20 Brazilian Championship U-20 Brazilian Championship U-18

(Table 1) contd.....

S.No.	Age (Years)	Time as Coach (Years)	Coaching for Category	Relevant Tournaments Won as Coach
9	30	10	Professional Under-20 Under -18	2x Silver Medal ParaSouth American Championship 3x Silver Medal in ParaPan American Games Silver Medal in Paralympic Games
10	57	21	Professional Under-20 Under -18 Under-16	South American Championship U-18 Brazilian Championship U-18 2x Gold Medal in ParaPan American Games Gold Medal in Paralympic Games 2x Silver Medal in Paralympic Games

After the interviews, the answers of all coaches were recorded in a file, and then similar exercises were grouped and repeated exercises were excluded. The items of this file were based on the exercises that were submitted for content validation.

2.2. Content Validation

To assess content validation, Pasquali [16] suggested inviting raters from the area of concern to evaluate each item by the analysis of three indicators and one dimension. The indicators were Clarity of Language (CL), Practical Pertinence (PP) and Theoretical Relevance (TR). According to Dunn *et al.* [15], the number of raters to assess content validity should be dictated by the availability of experts who are willing to participate in the evaluation process and who possess the knowledge and skills necessary to make valid judgments. However, the items need to be comprehensible to all members of the population to which the instrument is intended and thus, it must be checked by a group of raters with a low level of academic education [25].

Thus, the raters were composed of two groups. The first group, named Judges, was based on individuals with a high level of academic education, and they had, at least, a master's degree in sports science or related areas, besides a minimum of ten years of experience in athletics, whether as a coach, athlete or referee (mean \pm SD: age 40,6 \pm 7,9 years; time of expertise in athletics 18,6 \pm 7,5 years). The other group, named Instructors, was composed of individuals with a lower level of academic education, and they have been currently working as running coaches for at least the past two years and do not have reached the academic education level above than regular graduation (mean \pm SD: age 31,2 \pm 9,4 years; time as coach 5,2 \pm 2,7 years). Judges were composed of six raters and Instructors by five raters (Table 2).

All raters received the file of the exercises and an explanatory manual about how to evaluate the items. The raters were asked to read and rate each exercise using a five-point Likert scale, regarding the content validation indicators [12, 16, 26] known as CL, PP, and RT. Besides, they also rated the dimension of the items by using a four-point scale.

Table 2. Raters profile.

S.No.	Age (Years)	Expertise in Sports Science and Related Areas	Expertise in Athletics
Judges' Profile			
1	28	Bachelor in Physical Education MSc in Sport Science	Athlete during 5 years. Coach for 5 years. State Referee
2	42	Bachelor in Physical Education MSc in Sport Science 5 years as University Professor	Athlete during 15 years. Coach for 10 years. State Referee.
3	49	Bachelor in Physical Education MSc in Sport Science PhD in Health Science 17 years as University Professor	Coach for 25 years.
4	35	Bachelor in Physical Education MSc in Sport Science	Coach for 11 years.
5	42	Bachelor in Physical Education MSc in Sport Science	Athlete for 15 years.
6	48	Bachelor in Physical Education MSc in Motricity Science PhD in Physiology Science 14 years as University Professor	Athlete for 26 years.
Instructors' Profile			
1	24	Bachelor in Physical Education	Coach for 3 years
2	24	Bachelor in Physical Education	Coach for 4 years.
3	40	Bachelor in Physical Education	Coach for 10 years.
4	43	Bachelor in Physical Education	Coach for 5 years
5	25	Bachelor in Physical Education	Coach for 4 years

The CL checks if the language is written clearly and appropriately for the athletics coach. Thus, each rater responded to the following question: “At which level do you believe the description of this exercise is sufficiently clear, understandable and suitable for athletics coaches?” Ratings ranged from 1 (not very clear) to 5 (very much clear).

The PP considers if the item is indeed important for the speed track training. Thus, each rater responded to the following question: “At which level do you believe this exercise is important for speed track training?” Ratings ranged from 1 (not very important) to 5 (very much important).

The TR analyzes the relation of the exercise with the catalog and one of its dimensions. Thus, each rater responded to the following question: “At which level do you believe this exercise is representative of a catalog of exercises?” Ratings ranged from 1 (not very representative) to 5 (very much representative).

Dimension, in this study, is the classification of the exercises into groups, according to their specificity level related to modality, as suggested by Sozanski & Sledwieski [27] and Szmuchrowski & Couto [10]. These groups of exercises may be named as general, special and specific. According to these authors, general exercises are those that aim at the development of basic fitness, without requiring any specific motion from a determined modality, e.g. stretching exercises are considered general for judo training [26]. Special exercises are those that aim at the development of physical capacities such as strength or speed, using activities that have similar energetic demands, but not requiring reproduction of the technical motion from a determined modality, e.g., squats are considered special exercises for taekwondo training [12]. Specific exercises are those that aim at the development of technical motions required during the competition, as well as their energy demand, e.g., loaded jumps are considered specific exercises for improvement of the vertical jump [28]. Each rater responded to the following question: “At which level does this exercise can be considered specific for speed track training?” Ratings ranged from 1 (not specific) to 4 (very specific).

Considering the higher academic level and the high complexity of the task, only the judges evaluated the items on the three indicators and the dimensions [26, 29], while the instructors evaluated the items only by the CL [26].

2.3. Analysis

To verify statistically the ratings of CL, PP and RT, the Coefficient of Content Validity (CCV) was adopted as suggested by Hernandez-Nieto [30].

Initially, the CCV was calculated for each item separately for an indicator, with Eq. (1). Then, each item has a CCV for CL, for PP and for TR.

$$CCV_{item} = \frac{(\sum \text{obtained values in scale} / \text{Number of Judges})}{\text{Number of points in the scale}} \quad (1)$$

In sequence, the CCV was calculated for each indicator of the catalog and for the catalog as a whole, with Eqs. (2 and 3), respectively.

$$CCV_{indicator} = \frac{\sum CCV_{item}}{\text{Number of items}} \quad (2)$$

$$CCV_{catalog} = \frac{\sum CCV_{indicator}}{\text{Number of indicators}} \quad (3)$$

The catalog should present values above 0.8 for all indicators to have your content considered validated [16]. The items should present values above 0.8 for indicator CL and values above 0.6 for the indicators PP and TR [26]. Items with CCV_{CL} value below 0.8 were rewritten and reevaluated by the raters and if these items do not achieve the minimum rate of 0.8, they were excluded from the catalog [30].

To verify statistically the dimension of each item, based on the responses from the judges who used a four-point scale, the average value of each item was used, by calculating the sum of the scores divided by the corresponding number of judges. In this way, each item could have a minimum value of 1 and a maximum value of 4. For standardization, if the result of the average was less than two, this item was classified as general; if presented average between two and three, it was classified as special, and if it presented results higher than three, it was classified as specific.

3. RESULTS

From the interview process, 85 exercises were transcribed by expert trainers and they contemplated all the finalities proposed at the beginning of the study. No exercise presented CCV_{CL} below than 0.8 and thus, a second evaluation by the judges for this indicator was not necessary. However, ten exercises were not included in the final catalog because they presented CCV_{PP} or CCV_{TR} less than 0.6 (in Appendix).

Thus, from the 85 exercises initially developed, only 75 were included in the final catalog, with 16 general, 24 special and 35 specific exercises (Table 3). The catalog shows satisfactory CCV values for all indicators, meaning the exercises are understandable for athletic coaches ($CCV_{CL_j}=0,93$ and $CCV_{CL_i}=0,95$), pertinent for speed track training ($CCV_{PP}=0,84$) and relevant ($CCV_{RT}=0,83$) (Table 4).

Table 3. Exercise Catalog for Speed track Events.

S.No.	Exercise Description	Finality
Group of General Exercises		
1	Characteristic exercise from other modalities that aim to develop the muscle strength in many types of manifestation. <i>e.g.</i> Still Rings, climb on ropes or Olympic Weightlifting.	Maximum Strength; Explosive Strength;
2	Sequence of dynamic activities such as jumping jacks, rope jumping and others. <i>e.g.</i> 50 jumping jacks followed by 30s jumping rope.	Warm-up

(Table 3) contd.....

S.No.	Exercise Description	Finality
3	Competitive recreational activities. <i>e.g.</i> Captor flag and dodge ball	Warm-up
4	Exercising only with the body weight. <i>e.g.</i> Push-ups and pull-ups.	Explosive strength; Strength endurance
5	Low speed Running on different surfaces as warm-up before the main part of the training session. <i>e.g.</i> Running for 15 minutes.	Warm-up
6	Proprioception exercises. <i>e.g.</i> balance board.	Coordinating
7	Short run, with or without changing the direction and in various formats (front, back or side), varying or not the intensity. <i>e.g.</i> 25-metre submaximal side runs, alternating between right and left.	Warm-up
8	Resistance strength exercises using alternative sources. <i>e.g.</i> Rows with elastics, throwing medicine ball and dragging tires.	Strength endurance
9	Aquatic recovery activities. <i>e.g.</i> Pool or whirlpool.	Recovery
10	Activities that require low temperatures that aim to improve the recovery process. <i>e.g.</i> Cryotherapy.	Recovery
11	Dynamic or ballistic stretching that aim to increase the muscle temperature for the main part of the training session. <i>e.g.</i> 4 sets of 15 active-dynamic stretching movements for each chosen muscle group.	Warm-up; Flexibility
12	Activities for myofascial release and muscle relaxation, where equipment as balls, rollers or suction cups may be useful.	Recovery; Flexibility
13	Joint mobilization activities. <i>e.g.</i> Mobilization of the hip joint with the aim for increasing the range of motion.	Flexibility
14	Walking or jogging combined with dynamic or ballistic stretching. <i>e.g.</i> 10 repetitions of active-dynamic stretches for the calf muscle during an alternating walk with 10m jogging.	Warm-up
15	Stretching exercises to develop or maintain the flexibility.	Flexibility
16	Running at low speeds on different surfaces after the main part of the training session for colling down.	Recovery
Group of Special Exercises		
17	Running drills performed in a trampoline or similar surfaces. <i>e.g.</i> <i>Skipping</i> on a trampoline.	Racing technique; Coordinating
18	Running resisted by a partner. <i>e.g.</i> One athlete run pushing a partner that serves as resistance, making it difficult, but not insuperable.	Acceleration
19	Lateral displacements with or without trunk rotation movements. It can be linked to racing drills. <i>e.g.</i> 30m side run with trunk rotation and high knee lift.	Warm-up; Racing technique; Coordinating
20	Running pushing a large track and filed mattress positioned in front of the athlete. <i>e.g.</i> 20m race pushing a high and wide mattress.	Start-up Technique; Acceleration
21	Specific running drills for hurdle's training. <i>e.g.</i> Exercise of hurdles transposition.	Racing Technique
22	Technical exercises using weight to emphasize the posture. <i>e.g.</i> Knee lift holding a bar above head.	Racing Technique
23	Starting running from different initial positions (sitting, lying, or using the starting block) with no time pressure. <i>e.g.</i> 2 sets of running from the starting block.	Start-up Technique
24	Exercises using implements such as medicineballs, TRX, kettlebell or russian belt. <i>e.g.</i> Squatting with russian belt positioned below the knee or squatting holding a medicineball.	Maximum Strength; Explosive Strength; Strength Endurance
25	Exercise of articular mobility using hurdles. <i>e.g.</i> Transposition of hurdles emphasizing the movement of attack and rebound, seeking for greater range of motion.	Flexibility
26	Running for enhancing or maintaining the aerobic capacity. <i>e.g.</i> Running on street, treadmill or other places.	Aerobic Endurance
27	Knee elevation exercise with the body slightly leaning forward and hands resting on a wall (wall drills). <i>e.g.</i> Athlete positioned himself by leaning the arms on a wall and performing 30 seconds of knee raising as fast as possible.	Racing Technique
28	Combination of different exercises involving jumps. <i>e.g.</i> Drop Jump from a plinth followed by a sequence of rebound jumps passing through barriers.	Explosive Strength; Strength Endurance
29	Performing motor-learning exercises for running using of equipment that causes external overload (traction elastics, ankle weight, stride or bodytogs). <i>e.g.</i> Skipping with ankle weight.	Explosive Strength; Strength Endurance
30	Combination of Running Drills with uni or bilateral jumps. <i>e.g.</i> <i>Hop</i> combined with jumps.	Racing Technique
31	Sets of running between 400m and 1500m in intensity between 70% and 85% of Maximum Speed with incomplete rests for recovery. <i>e.g.</i> Five sets of 800-meter running at 80% of Maximum Speed with two-minute rest between sets.	Aerobic Power
32	Continuous running up to 5km with variation in intensity (fartlek). <i>e.g.</i> Running 4km alternating intensity every 400m, being 400m in high intensity and 400m in low intensity.	Aerobic Power
33	Running up the stairs. <i>e.g.</i> Run through 10 steps on a grandstand.	Acceleration
34	Running Drills using external load, as weight waistcoat or elastic. <i>e.g.</i> <i>To run wearing a waistcoat</i>	Racing Technique;
35	Exercises simulating the upper limbs motion during the race, wearing or not an extra weighth. <i>e.g.</i> Sets of upper limb moting holding a weighth.	Racing Technique
36	Running Drills passing by small hurdles or cones. <i>e.g.</i> Skipping over 20 cm hurdles.	Racing Technique; Coordinating
37	Drop Jumps with or without external weight loading, aiming to improve the stretch-shortening cycle action. <i>e.g.</i> Drop Jumps from a plinth with a weight waistcoat.	Explosive Strength

(Table 3) contd.....

S.No.	Exercise Description	Finality
38	Classic weight exercises. <i>e.g.</i> Bench press, leg press, rows and squats.	Maximum Strength; Explosive Strength; Strength Endurance
39	Multiple horizontal jumps, uni or bilateral carrying or not an external weight. <i>e.g.</i> Sequence of 10 meters horizontal jumps wearing a weight waistcoat.	Explosive Strength; Strength Endurance
40	Strength exercises for lower limbs using stairs or steps. <i>e.g.</i> Sequence of squat jumps going up the stairs	Explosive Strength; Strength Endurance
Group of Specific Exercises		
41	<i>Sprints up to 100 meters</i> after performing mechanical vibration in full-body or localized, associated or not with a strength exercise. <i>e.g.</i> print after performing full-body mechanical vibration on vibratory platform.	Acceleration; Maximum Speed; Speed Endurance
42	Run from the starting block using strategies to achieve greater movement of the lower limb responsible for the first contact with the ground. <i>e.g.</i> Place a 40 cm cone in front of the starting block and at the start signal, the athlete should raise the knee trying to overpass the cone and hit the ground in front of the cone.	Start-up Technique
43	Start running from different positions (sitting, lying) with time pressure after sound stimulus. <i>e.g.</i> Support the own weight with three body parts on the ground and starts running as fast as possible right after the whistle.	Start-up Technique; Reaction Time
44	Exercises that combine Coordinating actions with technical gestures of the race. <i>e.g.</i> Skips followed by short sprint motion.	Racing Technique; Coordinating
45	Start running from the block start and fall off on an athletic mat placed at the front.	Start-up Technique
46	Start running from the block start using strategies to keep the body inclined for a longer time. <i>e.g.</i> Pass under a rope positioned in front of the start at the desired height for athlete to keep the body tilted for a longer period.	Start-up Technique
47	<i>Sprints on high-speed treadmills.</i>	Maximum Speed; Speed Endurance
48	<i>Sprints up to 100 meters</i> after performing a set of strength exercise. <i>e.g.</i> <i>Sprint</i> after performing a set of 15 squats with submaximal load.	Acceleration; Maximum Speed; Speed Endurance
49	Set of sprints with increasing distances with incomplete rest. <i>e.g.</i> Sprints of 80m / 100m / 120m / 150m, with two minutes of recovery between each race.	Acceleration; Maximum Speed; Speed Endurance
50	Starting out of the block tractioned by an elastic for making the movement harder to perform.	Start-up Technique
51	Lean the body forward and run keeping it tilted for up to 25m. <i>e.g.</i> the athlete projects his body forward and when he feels unbalanced, he runs as fast as possible keeping the body leaned.	Acceleration
52	Races with an emphasis on stride length. <i>e.g.</i> Sprints up to 50 meters in a small barriers positioned on the track lane, showing the desired place to make contact with the ground, prioritizing the stride length.	Acceleration; Maximum Speed
53	Sprints using equipment's to provide external assistance. <i>e.g.</i> Sprints using towing elastics, pulleys or equipment that generate similar effects.	Maximum Speed
54	Short-term strength exercises at maximum intensity for potentiation and better performance in sprints. <i>e.g.</i> Squat with Maximal voluntary contraction followed by maximal 40-meters sprint.	Maximum Strength; Explosive Strength; Acceleration
55	<i>Sprints on uphill.</i> <i>e.g.</i> Sprints on uphill ramps or treadmills.	Acceleration
56	Sets of running up to 400m in intensity close to maximum with incomplete rests for recovery. <i>e.g.</i> Ten sets of 200-meters running in intensity close to the maximum with one minute walk	Aerobic Power
57	Running Drills followed by maximum sprints up to 25 meters. <i>e.g.</i> 10m anfersen followed by 10m skipping and 25m of maximum <i>sprint</i> .	Acceleration ; Racing Technique
58	Sprints combining uphill and downhill on ramps. <i>e.g.</i> Sprint in ramps, being 10m ascent followed by 10m descent with a one minute rest between each sprint.	Acceleration; Maximum Speed; Speed Endurance
59	Set of sprints with decreasing distances with incomplete rests. <i>e.g.</i> Sprints of 150m / 120m / 100m / 80m, with two minutes rest between each repetition.	Acceleration; Maximum Speed; Speed Endurance
60	Races emphasize on stride rate. <i>e.g.</i> Sprints up to 50 meters seeking to make as many steps.	Acceleration; Maximum Speed
61	Set of submaximal sprints at the distance where the athlete compete with incomplete rests for recovery. <i>e.g.</i> Five races of 200m in intensity close to 90% of the maximum with three min rest for a 200-meter dash athlete.	Speed Endurance
62	Simulation of competition. <i>e.g.</i> Speed races, starting out of the block after the official voice command and sign performed at maximum intensity.	Reaction Time; Acceleration; Maximum Speed; Speed Endurance
63	Set of sprints up to 30 meters with incomplete rest. <i>e.g.</i> Sets of six 20-meters sprints at Maximum Speed with two-minute rest.	Acceleration

(Table 3) contd.....

S.No.	Exercise Description	Finality
64	Set of 30 - 60 meters sprint with incomplete rest. <i>e.g.</i> Sets of six 60-meters sprints at maximum intensity for the occasion with two-minute rest.	Acceleration; Maximum Speed
65	Downhills sprints. <i>e.g.</i> Sprints on downhill ramps or treadmills.	Maximum Speed
66	Sprints using equipment to provide external resistance. <i>e.g.</i> Sprints using weight sled, parachute, weight waistcoat, traction belt or other equipment that generate similar effects.	Acceleration
67	Running Drills performed singly or in combination. <i>e.g.</i> <i>Skippings, anfersen, hop</i> and others.	Racing Technique
68	Running Drills performed in combination with running. <i>e.g.</i> 20m <i>skipping</i> followed by 20m running and more 20m <i>skipping</i> .	Racing Technique
69	Running up to 50 meters in low intensity emphasizing the technique or performing running drills. <i>e.g.</i> Submaximal running emphasizing knee lift	Racing Technique
70	Running up to 25 meters keeping the body leaned, starting at different positions. <i>e.g.</i> In three base position, the athlete starts and runs a determined distance keeping the body tilted	Acceleration
71	Set of 120 meters sprints approximately at maximum or near the maximum intensity with incomplete recovery rests. <i>e.g.</i> Sets of four 120-meter sprints at maximum intensity for the occasion with two-minute rest.	Acceleration; Maximum Speed; Speed Endurance
72	Set of 120 meters sprints approximately alternating the intensity in certain moments with incomplete rest. <i>e.g.</i> Sprints of 120m, alternating 20m at maximum intensity and 20m at submaximal intensity.	Acceleration; Maximum Speed; Speed Endurance
73	Starting out of the block commanded by an official voice. <i>e.g.</i> Series of starts simulating the official start of competitions.	Reaction Time
74	Running up to 25 meters starting out of by an official voice command.	Reaction Time; Acceleration
75	Set of submaximal sprints in greater distance than the distance that the athlete compete with incomplete rest. <i>e.g.</i> Five races of 500m in intensity close to 90% of the maximum with rest of three minutes for of recovery for a 400-meter dash athlete.	Speed Endurance

Table 4. CCV values for each exercise.

Code of Exercise	CCV _{CLj}	CCV _{CLi}	CCV _{PP}	CCV _{TR}
General Exercises				
1	0,80	0,96	0,60	0,60
2	0,97	0,96	0,60	0,60
3	0,97	0,96	0,60	0,63
4	0,80	0,92	0,63	0,70
5	0,97	0,96	0,67	0,63
6	0,83	0,96	0,67	0,70
7	0,90	0,96	0,67	0,70
8	0,83	0,92	0,70	0,63
9	0,97	1,00	0,70	0,70
10	0,90	0,96	0,73	0,63
11	0,93	0,92	0,73	0,73
12	0,90	0,96	0,80	0,70
13	0,93	0,92	0,83	0,70
14	0,93	0,84	0,87	0,83
15	0,93	0,96	0,90	0,77
16	0,97	1,00	0,97	0,93
Mean General	0,91	0,95	0,73	0,70
Special Exercises				
17	0,93	0,96	0,63	0,63
18	0,87	0,92	0,67	0,57
19	0,80	0,76	0,67	0,67
20	0,80	0,92	0,67	0,77
21	0,83	0,92	0,70	0,67
22	0,90	0,92	0,70	0,73
23	0,93	0,96	0,70	0,73
24	0,83	0,96	0,70	0,80

(Table 4) contd.....

Code of Exercise	CCV _{CLj}	CCV _{CLi}	CCV _{PP}	CCV _{TR}
25	0,97	0,96	0,80	0,63
26	0,83	1,00	0,80	0,77
27	0,80	0,84	0,80	0,80
28	0,97	1,00	0,80	0,87
29	0,83	0,96	0,83	0,80
30	0,97	0,84	0,83	0,83
31	0,90	0,96	0,83	0,83
32	0,97	0,96	0,83	0,90
33	0,93	1,00	0,87	0,87
34	0,97	1,00	0,87	0,87
35	0,93	0,96	0,90	0,80
36	0,97	0,92	0,90	0,90
37	0,97	1,00	0,90	0,93
38	0,97	1,00	0,93	0,87
39	0,97	1,00	0,93	0,93
40	0,97	1,00	0,93	0,93
Mean Special	0,91	0,9	0,80	0,80
Specific Exercises				
41	0,80	0,96	0,70	0,67
42	0,87	0,84	0,77	0,83
43	0,93	0,96	0,83	0,83
44	0,90	0,80	0,83	0,90
45	0,93	0,88	0,87	0,87
46	0,97	0,96	0,87	0,93
47	0,93	0,92	0,90	0,83
48	0,97	0,96	0,90	0,90
49	0,93	0,96	0,90	0,90
50	0,97	0,92	0,90	0,90
51	0,97	1,00	0,90	0,90
52	0,90	0,96	0,90	0,93
53	0,97	1,00	0,93	0,83
54	0,90	0,88	0,93	0,90
55	0,97	0,96	0,93	0,93
56	0,97	0,96	0,93	0,93
57	0,97	0,96	0,93	0,93
58	0,93	0,96	0,93	0,93
59	0,97	0,96	0,93	0,93
60	0,97	0,96	0,93	0,93
61	0,97	0,96	0,93	0,93
62	0,93	1,00	0,93	0,93
63	0,97	0,96	0,93	0,97
64	0,97	1,00	0,93	0,97
65	0,97	1,00	0,97	0,83
66	0,97	1,00	0,97	0,97
67	0,97	0,96	0,97	0,97
68	0,97	0,88	0,97	0,97
69	0,97	0,96	0,97	0,97
70	0,97	1,00	0,97	0,97
71	0,97	1,00	0,97	0,97
72	0,97	0,92	0,97	0,97
73	0,97	1,00	0,97	0,97
74	0,97	1,00	0,97	0,97
75	0,97	0,92	0,97	0,97
Mean Specific	0,95	0,95	0,92	0,92

(Table 4) contd.....

Code of Exercise	CCV _{CLj}	CCV _{CLi}	CCV _{PP}	CCV _{TR}
Mean of Catalog CatalogCCV=0,87	0,93	0,95	0,84	0,83

4. DISCUSSION

Studies that used CCV as a statistical tool to assess content validation of different instruments, including catalogs, have shown satisfactory results for the instrument, with CCV above 0.8 for them [12, 26].

The results of CCV_{CL} showed that the exercises described in the catalog are sufficiently clear and adequate for the target population. As the catalog is intended for athletics coaches, it is recommended that this population evaluates the language of the instrument and not just people with a higher degree of ability to perform this task [29]. Judges besides possessing expertise in the modality, have a high level of academic training in the sports field and this may influence their understanding of the description of the exercises [31]. For general and special exercises, a discrepancy was observed concerning the mean CCV_{CL} values between the group of judges and the group of instructors; however, regarding the group of specific exercises, this value was similar, corroborating with the one proposed by Pedrosa *et al.* [26]. In another similar study, Silva *et al.* [12] did not perform the CL evaluation with a population with a lower degree of ability. The degree of the academic rigor of the judges can influence this kind of analysis since a panel of experts with a higher level of academic experience tends to require greater details in the description of the items when compared to the group of instructors who have a lower academic degree. However, in both cases, the values obtained in this analysis were higher than those established at least in the literature [30], indicating that the items in the catalog are clear and understandable for the population of athletic trainers.

The results of CCV_{PP} indicate that judges considered that the exercises evaluated are relevant and important for the training of speed track events. Exercises 1-3 and 65-75 were considered the least and most important exercises in the catalog, respectively. A possible explanation for these findings is associated with the principle of specificity, which shows that the adaptations resulting from the training are specific to the applied stimuli [32]. Confirming this, CCV_{PP} value for the specific exercises was higher than the value for the special exercises, which was higher than the value for the general exercises, corroborating with the findings of Pedrosa *et al.* [11]. As described in the catalog, exercises 1-3 are focused on strength training through exercises with movements characteristic of other modalities or are preparatory activities used as a warm-up for the main part of the training session and are not used in specific situations during competitions. Other exercises with a similar purpose obtained higher scores for PP (for *e.g.*, 34 for strength training and 19 for warm-up) because they are more similar to the demand for speed track events. Strength training and activities of warm-up are important for the training of speed track events; however, how these exercises are executed in a session can increase or decrease the perception of their importance by an evaluating judge. Wilson *et al.* [33] analysed the effects of various types of strength exercises on the performance of dynamic activities and showed

that training with exercises considered specific resulted in a greater improvement in performance compared to training with other types of exercises, suggesting that specific exercises are more efficient and pertinent to achieve better performance.

The values of CCV_{RT} showed that exercises have a relation with the instrument and its dimensions, being classified in general, special or specific, and thus, confirming its relevance to the catalog. CCV_{RT} values, as well as CCV_{PP}, were higher for the exercises classified as specific. As for the PP indicator, the specificity principle may be associated with the RT indicator, since specific exercises can be interpreted as more relevant for the training, as in the study of Franchini & Takito [34], where athletes answered a questionnaire and the results pointed out that the exercises considered specific were classified as more relevant than the non-specific exercises. Understanding exercise as a component of the training load, exercises could be divided into different dimensions that tend to help coaches in the planning of these loads [10, 35]. Baker [28] presents a training progression to vertical jump through groups of general, special and specific exercises and directs that, for the beginning of the physical preparation, more general exercises than specific ones are used. Nuñez *et al.* [36], investigating soccer, also used exercises divided into three dimensions for the planning of strength and endurance training for 48 weeks that were divided into four macrocycles. It was observed that all four macrocycles of the cited study had predominantly classified exercises as general in their first-week and in their last week exercises were classified as specific.

The division into dimensions also allows a facility for recording and analysing the loads performed during training. Tota *et al.* [37], in mixed martial arts, recorded 11 training micro cycles where the exercises used were previously divided into three dimensions by the coaches. Thus, after the registration, it was possible to verify the total and relative time of exercises of each dimension executed in each micro cycle and to analyse if the training was following the one initially planned by the trainers. In judo training, Pedrosa *et al.* [14] recorded, using video analysis, 14 training sessions and investigated how long general, special and specific exercises were performed throughout these sessions. Thus, it would be possible to identify the need to increase or decrease a type of stimulus during training.

Although the specific means of training are the ones that most resemble the demands of competition and that can generate a transference that may result in better performance, the excessive use of this type of stimulus can generate negative results like overtraining, muscular imbalance, increased risk of injury and monotony [32]. Thus, exercises considered general are important throughout the training process.

How the dimension of the items was analysed in this study has not been discussed in the literature. Catalogs elaboration studies adopted the majority choice of raters to determine the exercise dimension classification and measured Cohen Kappa Coefficient to show an agreement among the evaluators [11,

12]. In these studies, the concordance values presented were 0.533 [11] and 0.441 [12], values that represent a moderate agreement. However, both studies mentioned above show that this is not the best way to determine the dimension of an item, because according to these authors, the means of training should be placed on a continuum, where at one end they would be classified as extremely general or nothing specific and at the other end as completely specific. Finally, they suggest that more research needs to be done to verify this possibility of classification [11, 12].

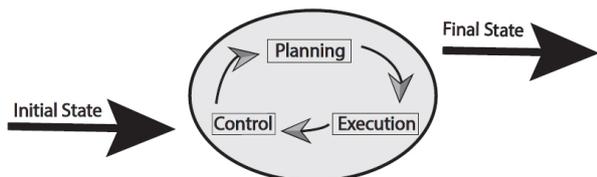


Fig. (1). Basic subsystems of the sports training process.

The present study adopted the option to classify the dimension of the items based on a continuum. Thus, most of the judges' choices were not taken into account, but rather the average score based on scores on a four-point scale. This form has limitation because if a judge disagrees with others who agree with each other, it may suggest that the mean score of an item represents a dimension that may not be the most appropriate for it. More studies using this format to choose the dimension of an item are necessary to confirm its suitability and to determine what would be an ideal or suitable number of points on a scale.

A few number of studies related to content validation in instruments, such as an exercise catalog, make it difficult to compare and discuss some data. Furthermore, if this study had been realized in another country, the results of content validation could be different due to the influence of sports culture. Different exercises could be reported by the coaches in the interview, and local language maybe influence the form that the exercises were described in the catalog. Additionally, some adjustments may be made in the catalog based on an ecological validation assessment. However, the content of the present instrument has validity, and it may contribute to speed track exercise selection and registration.

CONCLUSION

The content validation assessment performed in this study by two groups of raters confirmed that the catalog of speed track exercises was pertinent, representative of training and had suitable language for athletics coaches. According to the

Appendix 1. Coaches profile.

S.No.	Age (Years)	Time as Coach (Years)	Coaching for Category	Relevant Tournaments Won as Coach
1	66	35	Under-18 Under-16	Gymnasiade South American Championship U-20 Pan American U-20
2	32	10	Professional Under-20 Under -18	Gymnasiade Brazilian Championship U-20

presented results, athletics coaches can use this instrument to guide them in the moment of the selection, recording and control of the training (Fig. 1).

LIST OF ABBREVIATIONS

- PRACTE** = Planning, Registration and Analysis of Sports Training Load.
- CCV** = Coefficient of Content Validity
- CL** = Clarity of Language
- PP** = Practical Pertinence
- TR** = Theoretical Relevance

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the Ethics Committee of Federal University of Minas Gerais, Brazil (CAAE - 26729814.7.0000.5149).

HUMAN AND ANIMAL RIGHTS

No animals were used in this research. All human research procedures were followed in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

All participants signed informed consent prior to participating in the study.

AVAILABILITY OF DATA AND MATERIALS

The data supporting the findings of the article is available in the Figshare at: <https://figshare.com/s/4508034a92ed596ae515> Reference number: 10.6084/m9.figshare.16799452.

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None.

CONFLICT OF INTEREST

The authors declare no conflicts of interest, financial or otherwise.

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Declared none.

APPENDICES

(Table Appendix 1) contd....

3	38	13	Professional Under-20 Under -18	Gold Medal in PanAmerican Games Silver Medal in PanAmerican Games Brazil Trophy
4	33	15	Professional Under-20 Under -18 Under-16	Brazilian Championship U-20 South American Championship
5	58	11	Under-20 Under -18 Under-16	Brazilian Championship U-20 Brazilian Championship U-18
6	44	22	Professional Under-20 Under -18 Under-16	Íbero-American Champioship Military World Games Pan American U-20 Brazilian Championship U-20
7	46	24	Under -18 Under-16	Runner-Up World Champion U-18 Brazilian Championship U-18 Brazilian Championship U-16
8	46	18	Professional Under-20 Under -18 Under-16	South American Champioship Brazil Trophy Pan American U-20 Brazilian Championship U-20 Brazilian Championship U-18
9	30	10	Professional Under-20 Under -18	2x Silver Medal ParaSouth American Champioship 3x Silver Medal in ParaPan American Games Silver Medal in Paralympic Games
10	57	21	Professional Under-20 Under -18 Under-16	South American Championship U-18 Brazilian Championship U-18 2x Gold Medal in ParaPan American Games Gold Medal in Paralympic Games 2x Silver Medal in Paralympic Games

Appendix 2. Questions responded by the coaches.

S.No.	Questions
1	What exercises or activities do you plan to use in the beginning of training session as warm-up?
2	What exercises do you plan to improve reaction?
3	What exercises do you plan to improve acceleration capacity?
4	What exercises do you plan to improve maximum speed?
5	What exercises do you plan to improve speed endurance?
6	What exercises do you plan to improve flexibility?
7	What exercises do you plan to improve maximum and explosive strength aiming hypertrophy, develop muscle power or improve stretching-shortening cycle?
8	What exercises do you plan to improve endurance strength?
9	What exercises do you plan for training the aerobic power and the aerobic endurance capacities?
10	What exercises do you plan to improve start and racing techniques?
11	What exercises do you plan to develop coordinative capacities and motor skills?
12	What exercises or activities do you plan for recovery training?

Appendix 3. Judges profile.

S.No.	Age (Years)	Expertise in Sports Science and Related Areas	Expertise in Athletics
1	28	Bachelor in Physical Education MSc in Sport Science	Athlete during 5 years. Coach for 5 years. State Referee
2	42	Bachelor in Physical Education MSc in Sport Science 5 years as University Professor	Athlete during 15 years. Coach for 10 years. State Referee.
3	49	Bachelor in Physical Education MSc in Sport Science PhD in Health Science 17 years as University Professor	Coach for 25 years.

(Table Appendix 3) contd.....

4	35	Bachelor in Physical Education MSc in Sport Science	Coach for 11 years.
5	42	Bachelor in Physical Education MSc in Sport Science	Athlete for 15 years.
6	48	Bachelor in Physical Education MSc in Motricity Science PhD in Physiology Science 14 years as University Professor	Athlete for 26 years.

Appendix 4. Instructors profile.

S.No.	Age (Years)	Expertise in Sports Science and Related Areas	Expertise in Athletics
1	24	Bachelor in Physical Education	Coach for 3 years
2	24	Bachelor in Physical Education	Coach for 4 years.
3	40	Bachelor in Physical Education	Coach for 10 years.
4	43	Bachelor in Physical Education	Coach for 5 years
5	25	Bachelor in Physical Education	Coach for 4 years

Appendix 5. Exercises disposable of catalog.

Finality	Exercise Description	CCV _{PP}	CCV _{RT}
1	Cycling at low speeds as a form of warm-up before the main part of the training session. <i>e.g.</i> Cycling for 15 minutes.	0.27	0.43
1	Sports games with adapted rules. <i>e.g.</i> Basketball, handball.	0.33	0.43
4	Exercises that stimulate the development of basic coordinative capacities. <i>e.g.</i> slackline, trampoline.	0.47	0.53
4	Exercises that stimulate the development of basic coordinative capacities using objects such as balls, arches, ropes and stairs. <i>e.g.</i> Running bouncing a ball followed by jumps on steps.	0.50	0.57
2 / 4	Running Drills in sand or similar surfaces. <i>e.g.</i> <i>Anfersen</i> performed in sand	0.47	0.43
4	Coordinating exercises without visual perception. <i>e.g.</i> Walk on a rope on the ground blindfolded.	0.33	0.37
5.1	Reaction speed recreational games involving auditory, visual, or tactile stimuli.	0.47	0.60
5.1	Recreational activities with time pressure element. <i>e.g.</i> Throw a ball up, and go back for a 5-foot course and catch the ball before it falls on the ground.	0.53	0.53
8.2 / 8.3	Combination of exercises involving jumping and other strength exercises. <i>e.g.</i> Jump from a platform and then do push ups and sit ups.	0.47	0.40
7.2	Cycling to enhance or maintain aerobic capacity. <i>e.g.</i> Pedaling on cycloergometer, street, tracks, mountain or other places.	0.60	0.57

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