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Strategies used in the Olympic weightlifting and psychological aspects: factors that contemplate sports performance

Estratégias utilizadas no levantamento de peso olímpico e os aspectos psicológicos: fatores que contemplam o desempenho esportivo

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To identify the strategies used in Olympic weightlifting and the psychological aspects that include mindfulness and focus on the present moment of sports performance. The search occurred in January and February of 2021, PubMed, Web of Science, Scopus, and LILACS databases were used. The PRISMA checklist was used, and the risk analysis of bias was adapted from the Cochrane Manual for Clinical Trials and, for other studies, the Downs and Black scale. Nineteen studies were included for qualitative analysis. On squat strategies to facilitate performance during Olympic weightlifting, both low and high barbell squats are compatible methods for increasing strength in the lower body, core, and muscles back. Athlete's everyday practice using mindfulness shows a strong impact on attention self-regulation development at the present moment and a precursor in self-confidence acquisition. Through this study, implementation of mindfulness is recommended to increase sportive performance, once acceptance of being totally present creates a favorable conception to the athlete. The technique shows itself as promising to prevent injuries, increasing of performance and control of the emotions; however, in a period of not less than eight weeks, along with biomechanics factors specific analysis. Mental preparation using mindfulness to acquire self-confidence, the composition of the method to be developed, time of adaptation and betterment are steps that should be pre-set in aware practice aiming the development of contemporary strategies in different sports, mainly in olympic weightlifting.
Keywords: mindfulness, performance improvement, sport psychology.

Identificar as estratégias utilizadas no levantamento de peso olímpico e aspectos psicológicos que contemplam a atenção plena e concentrada no momento presente do desempenho esportivo. A busca ocorreu em janeiro e fevereiro de 2021, nas bases de dados *PubMed*, *Web of Science*, *Scopus* e *LILACS*. Utilizou-se o *checklist* PRISMA e, para análise de risco de viés, utilizou-se duas escalas adaptadas: Cochrane Manual para Ensaios Clínicos e *Downs and Black*. Incluíram-se Dezenove estudos para análise qualitativa. Sobre as estratégias de agachamentos para facilitar o rendimento durante o levantamento de peso olímpico, o agachamento de barra baixa e alta são métodos que aumentam a força na parte inferior do corpo, no núcleo e nas costas. A prática cotidiana dos atletas com o uso do mindfulness apresenta um forte impacto no desenvolvimento da autorregulação da atenção ao momento presente e um precursor na aquisição da autoconfiança. Por meio deste estudo, recomenda-se a implantação do mindfulness para construir melhorias no rendimento esportivo, uma vez que a aceitação de estar presente é favorável ao atleta. A técnica mostrou-se promissora para prevenção de lesões, desempenho e controle das emoções, mas num período não menos de oito semanas, junto aos fatores biomecânicos. O preparo mental com a utilização do mindfulness para aquisição de autoconfiança, a composição do método a ser desenvolvido, o tempo de adaptação e o aperfeiçoamento são etapas que devem ser pré-estabelecidas na prática de cônscio que visa o desenvolvimento de estratégias contemporâneas em diferentes esportes, em especial no levantamento de peso olímpico.
Palavras-chave: atenção plena, melhoria do desempenho, psicologia do esporte.

1. INTRODUCTION

Given the progress of sports science, psychology involves issues integrated into sports activity and assistance to its practitioners [1]. Athlete emotional behavior seems to show a strong impact on their competitive practice due to professionals' personalities [2]. High-performance athletes go through constant emotional and physical distress situations. Therefore, understanding their emotions and controlling their mood is fundamental, a behavior factor relevant to sportive performance [3, 4].

Guidelines related to good mental preparation, such as self-confidence, attention, positive visualization, and concentration, all positively corroborates that athletes have kept their mood and emotional state adequate to training and during competition [3]. Scholars report the importance of professional follow-up in situations where there is the need for planning programs that consider the principle of individuality in training planning [3, 5]. Thus, it seems indispensable an orientation to athletes' clinical treatment which emotional conditions need specialized follow-up; moreover, establishing cognitive techniques to develop attention and focus on something involves not only set a task to ground a stimulus but a specific strategy as a feed-back instrument [5, 6].

Power output to execute a movement in different sport modalities is a typical and traditional variable in training scenarios to characterize the individual performance [7]. However, recent studies have pointing strategies with positive results to weightlift olympics athletes (WLO) [8, 9]. Among others, different techniques comprehend athlete positioning, bar position, and even a number of pre-set maximal repetitions (MR) [8, 10]. Therefore, this dynamic related to load and number of MR comes to awaken an innovative training to any resistance preparatory program. Furthermore, it shows a complete and effective training stimulus to lower appendicular muscles in several categories involving biomechanics action [10].

Training programs grounded in interdisciplinarity between psychology applied to sport and biomechanics factors focusing on speed and strength acquisition suggest promising management for several sports modalities. A consistent statement, since the lower control of anxiety, competitive stress, attention, and concentration of the competitor harmed different athletes in their autonomic balance, breathing, and performance [11-13].

The inter-relation between psychological athlete status and specific strategies concerning olympic weightlift suggests an investigation that favors contemporary studies and establishes better guidelines to more efficiency of the athletes. Therefore, this study aims to identify strategies used in WLO and psychological aspects that contemplate full attention and focused on the present moment of the sportive performance.

2. MATERIALS AND METHODS

There was developed a systematic literature review. This research used guidelines according to a list of verification: the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA - 2020) [14]. This systematic review was registered in the CRD (Center for Reviews and Dissemination) under the number CRD42021276916.

2.1 Eligibility criteria

According to a pre-set protocol, studies' methodological characteristics were collected through this criterion: a Search was conducted by data from primary or secondary sources kept in clinical trials, cohort studies, control cases, or transversal studies.

This survey used data from instrument validation studies, review studies, and studies from Search strategies in the literature to develop systematic reviews. However, it is worth highlighting that this study's analysis was used to improve the current research, but the conclusion and data from it were not computed in the quantitative analysis of the present study.

There were not considered personal articles, editorials, letters, reviews, comments, and abstracts of congresses.

Inclusion criteria: the searches could only be executed in studies with strategies to weightlifting athletes, that is, researches that approached techniques and strategies to those professionals.

Exclusion criteria: non-relevant scientific articles that approached other conditions or that would not focus on factors that could impact outcomes or strategies for better sportive performance.

2.2 Information sources

The search was conducted in databases Web of Science, Scopus, PubMed/MEDLINE, and Health Information from Latin America and The Caribbean Countries (LILACS). After obtaining the studies included, there was developed a manual review to supply a more accurate evaluation. Health Sciences Descriptors (DeCS) from LILACS, a virtual health library, were verified to obtain the keywords. The search occurred in January and February of 2021.

2.3 Search strategy

The descriptors "weightlifting", "mindfulness", "performance enhancement", "sport psychology" and "biomechanics", were associated with Boolean operators "AND" and "OR". Search for keywords: “weightlifting” OR “mindfulness” OR “performance enhancement” OR “sport psychology” OR “biomechanics”; “weightlifting” AND “mindfulness” AND “performance enhancement” AND “sport psychology” AND “biomechanics”

In literary research, there was applied the PICO strategy [15]. Which "P" refers to the population of interest (evaluated participants of the studies); "I" represents interventions evaluated from the studies that comprehend the observations of interest; "C" meaning comparations or interventions of interest; and "O" represents the outcomes intended to measure or reach.

The population of interest included athletes who perform weightlifting exercises. In interventions, there were observed prognoses of relations between athletes who underwent monitorization and behaviors during training. comparison does not apply, this is not a comparative study. However, it will be observed the comparisons in different studies. The outcomes correspond to strategies that favor weightlift training and how they might be meaningful for other sports modalities.

2.4 Selection process

Article screening followed two selection steps. In the first stage, article selection was carried out individually by three researchers (K.R.P., F.M.M.B.G., R.F.) following the inclusion criteria and according to titles and abstracts of all references. Concomitantly, two reviewers (H.R., I.B.N.) analyzed and checked the criteria needed to select the studies. In the second stage, the same authors read the full text articles and excluded those that did not meet the inclusion. the analysis was independently developed, and whether there was disagreement, two other authors would give their seem always following the priority as established in the initial protocol, prioritizing the more recent year, methodology with a broader scope, and the strength of the scientific evidence.

2.5 Data collection process

Afterward, a referential selection was applied to systematic reviews, following these steps: identification through sites of search mentioned above; title and abstract screening; population eligibility; methods and project relevance; association data between psychological factors and

strategies used to a better sportive performance; studies that identified comparative values of cinematic and kinetic variables; and outcomes related to the validity of the applied strategy.

If some information was not clear because of data missing or any other reason, the articles' authors were contacted for clarification. Data extraction: the authors aimed to collect and organize data and, in a descriptive way in the text, identify the countries where the qualitative studies were conducted.

Another proposal to facilitate readers' interpretation was developing a table concerning studies' methodological characteristics, with statistical analysis, equipment related, and with the use of different clinical trials and observational studies. Subsequently, there was decided to develop a chart with all studies included in the quantitative analysis that should include author name, year of publishment, the country where the study was conducted, and strategies used in each research. Again, the goal was to facilitate or elucidate the reader with the text.

Topics evaluated

- Strategies used in Olympic weightlifting and their relation to sportive performance;
- Strategic aspects used in psychological behavior and factor that interfere in the sporty practice.

2.6 Evaluation of the risk of bias in selected studies

The clinical trials studies followed the guidelines Cochrane Handbook for Systematic Reviews of Interventions (Version 5.1.0) [16]. In addition, an adaptation of the tools was developed to verify bias in table 8.5.d (Cochrane handbook for systematic reviews of interventions, version 5.1.0, guidelines). The researchers evaluated and considered the results as follows: there were regarded as satisfactory and of possible allocation; when determined study reached "≥4" domains from the table with low risk of bias. To a study be selected, it should show a low risk of bias, preferentially in domains six and seven, that is, superiority in the low level of bias in four domains or more, since it included the sixth and seventh domains. On the other hand, there was considered unsatisfactory for this study when a study reached "low risk of bias" in only one, two, or three domains "≤3".

To the observational cross-sectional, case-control, and cohort studies, the level of bias was verified through an adaptation of the Downs and Black's scale [17]. This scale has priority in analyzing bias in observational studies. The score was stipulated as follows: to select the research, it should reach 13 points, at least, independently of the study type. However, the maximal score of case-control studies was set at 28 points according to the scale criteria and a maximum of 22 points for transversal and cohort studies.

3. RESULTS

From the databases selected for the search for articles, 3,128 articles related to the topic of interest were identified. After removing 365 duplicate articles, 2,503 articles were obtained for analysis in Portuguese, English and Spanish. A comprehensive title and abstract analysis eliminated 1,469 articles, resulting in 1,034 articles. Subsequently articles excluded based on the PICO question (n = 988).

In the second stage, all 46 articles were read in full and 27 were excluded from the analysis; five due to lack of data to identify the strategies used in Olympic weight lifting, thirteen evaluated other results, nine presented insufficient association data to assess the relation-ship between emotional control and the respective sport modality. The flowchart showing the identification, inclusion and exclusion process is better detailed in Figure 1.

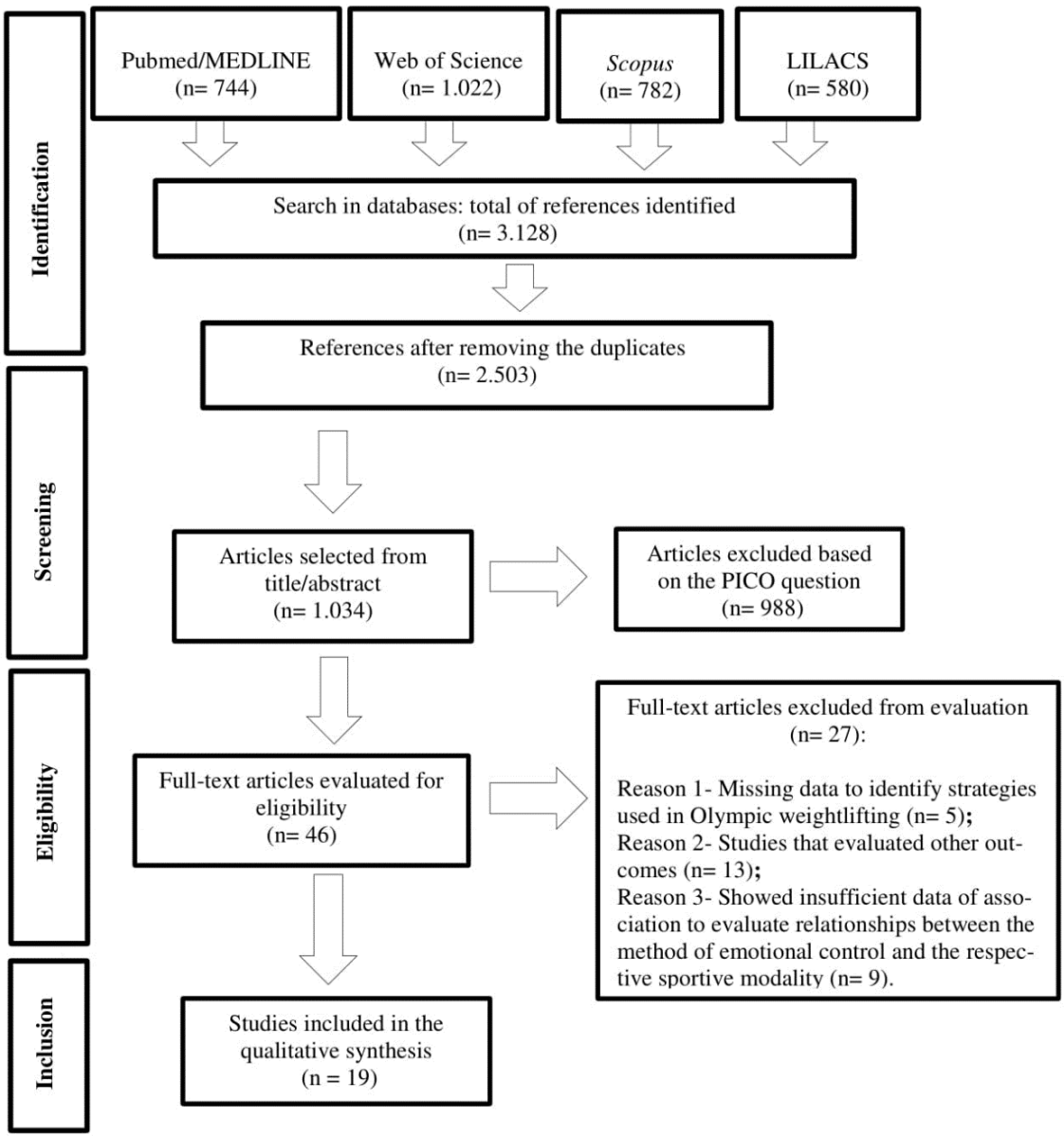

Figure 1: Flowchart of the selection process for the bibliographic search; the diagram checklist (PRISMA 2020). Fonte: PRISMA (2020)

General characteristics of the research related to the type of study and country where it was developed.

The current systematic review, obtained, in inclusion 19 scientific studies for the qualitative analysis after applying the selection befitting the criteria mentioned above, which fourteen (73,7%) were clinical trials, three (15,7%) were cohort, one (5,3%) Cross – sectional and Cohort study and one (5,3%) was cross-sectional studies. Concerning the country where the studies were developed: one (5,3%) was developed in Sweden, three (15,8%) in Brazil, two (10,52%) in the United Kingdom, two (5,26%) in Iran, one (5,26%) in Tunisia, one (5,26%) in Spain, two (10,52%) in the United States, one (5,26) in Canada, one (5,26) in Egypt, one (5,6%) in China, one (5,6%) in Germany, two (10,52%) in Austria, and one (5,26%) in New Zealand (Table 1).

Table 1: Characteristics of studies selected for qualitative analysis.

Author/year of publishment/Country	Sample	Strategies used
Josefsson et al. [2] 2017 (Sweden)	n= 242 elite competition athletes	n= 242 elite competition athletes There were applied 4 questionnaires: FFMQ, DERS, RRQ and ACS.
Bevilacqua et al. [4] 2019 (Brazil)	n=15 futsal athletes	There were applied the Characterization Questionnaire and Brunel Mood Scale – BRUMS. The BRUMS scale was applied at the day before the game (last training day), 1 hour before the game and 1 hour after the game.
Stefanello [6] 2007 (Brazil)	n=2 men (the champion Olympic pair in beach volleyball).	Data collection occurred from May to August (a period corresponding to one of the phases of the psychological skills training program). Instrument: "feedback" in a total of 26 games.
Kelly et al. [7] 2014 (UK)	n=12 men, diverse sports	That performed a variation of PC for at least 12 months. 1-MR assessments were performed within an interval of at least 48 hours. For each PC variation (from the ground, knee, or waist), 6 tries were made with a progressive increase in the bar load. The increase was gradual with 2 to 5 kg, and each exercise was performed from a stationary position.
Hermassi et al. [8] 2019 (Turkey)	n= 20 men	Allocated randomly between experimental groups (6 sessions of 90 minutes per week). During 8 weeks, twice a week. The training of technical-tactical skills was replaced by a dynamic WL program to maximize the strength gain. Training was focused on upper limbs through exercises like: BP, HS, Snatch and CJ (60%-80% of 1RM, 3-8 repetitions e 3-6 sets).
Hermassi et al. [9] 2019 (Spain)	n= 30 men Elite handball players.	All participants trained for at least 8 years. There were performed 4 tests: handball throw test (using a digital camera), a part was a jump with throwing and another part with only throwing (both of them at 9 meters from the goal, and with 3 preparatory steps); force-speed test (using a Monark Cycle ergometer), the lower limb muscles were assessed through instant speed in 7s of maximum pedaling. To the muscles of the upper limbs there was used an ergometer (the braking force started at 1.5% of the participant's mass and was gradually increased); 1-MR of CJ, 1-MR of Snatch (2 at 70%, 2 at 80%, 1 at 90%, 1 at 95%, 2 at 3 a 100% of 1-MR) with anthropometric evaluation.
Lucero et al. [10] 2019 (USA)	n= 72 men Olympic weightlifters.	The study collected data from participants of a variety of clubs and training techniques through phone contact, e-mails and interviews. Data were: 1 MR Snatch, 1 MR CJ, 1 MR Total, 1 MR FS e 1MR BS.
Chan et al. [11] 2019 (Canada)	n= 15 men	All with at least 2 years of experience in conventional DL being able of performing a DL at 1-MR of twice their own body-weight. Image acquisition system Vicon, and force plataforms of 1000Hz acquisition rate. Were made 3 visits to the laboratory. On the first, it was Applied a questionnaire and a test of 5RM at 87% of 1RM, it was increased the load by 5% until an unsuccessful attempt. On the second and third visits, the participants were instructed to do a DL, 20 X 1 reps at 87% of 1RM, associated to a determined experimental condition.

Abbreviations: ACSI – Athletic Coping Skills Inventory; BP – Bench-Press; BRUMS - Brunel Mood Scale; BS – Back Squat; CJ – Clean and Jerk; DERS - Difficulties in Emotion Regulation Scale; DL – Deadlift; FFMQ - The Five-Facet Mindfulness Questionnaire; FS – Front Squat; HS – Half-Squat; PC- Power Clean; RRQ - Rumination Reflection Questionnaire; RM – Repetition Maximum; WL – Weightlifting.

Table 1: continuation.

Author/year of publishment/Country	Sample	Strategies used
Zadeh et al. [12] 2019 (Iran)	n= 26 male elite	There was a comparison between the pre and post-training measures of the athletes. The DS training program was applied in 12 weeks, which consisted of 5 training units per week (90 minutes per unit). Athletes performed Snatch, CJ. In the last unit, each lift was repeated twice, then the lift was repeated 4 times with 15% less weight, then the weight was again reduced by 10%, and the exercise was repeated 6 more times.
Mehrsafar et al. [13] 2019 (Iran)	n= 26 male elite	Wushu athletes were randomly assigned to MBI (n=13) or control (n=13) groups. None of the participants had previous experience with meditation. The intervention of the MBI group with 8 weeks of mindfulness (Workshop of 1h30 minutes of practice at home with the use of CDs and associated Wushu sessions in weekly groups. Psychometric assessments using CSAI-2R and MAAS questionnaires. Physiological assessment: levels salivary samples of sCort and sAA Saliva collections in the BASELINE (competition without intervention), POST (competition after 8 weeks), and FOLLOW-UP (competition after additional 8 weeks) periods.
Muhammad [23] 2019 (Egypt)	n=7 men, weightlifters	There was a comparison between the pre and post-training measures of the athletes. The DS training program was applied in 12 weeks, which consisted of 5 training units per week (90 minutes per unit). Athletes performed Snatch, CJ. In the last unit, each lift was repeated twice, then the lift was repeated 4 times with 15% less weight, then the weight was again reduced by 10%, and the exercise was repeated 6 more times.
James et al. [24] 2018 (Australia)	two groups of distinctly different lower body strength levels	(1RM relative squat) performed the same 10-week integrated ballistic training plan for the lower body. Two 5-week training blocks with load conditions and exercise selection were divided. Test of Single-day on three different occasions during the study (baseline, mid, and post), three 1-hour sessions before baseline testing. Measures derived from the squat with incremental load jump, in addition to the level of strength and muscle activation, were obtained.
Tricoli et al. [29] 2005 (Brazil)	n= 22 men.	Group 1 (LP, n=7): training 3 times a week (8 weeks) with HP (3 X 6RM, progression 4 X 6RM), PC (4 X 4RM, progression to 6 X 4RM), CJ (4 X 4RM , progression to 6 X 4RM). Group 2 (SV, n=8): training 3 times a week (8 weeks) with DHH (6 X 4, progressed to 10 X 4), ASHH (4 X 4, progressed to 4 X 6), SHH (4 X 4, progressed to 4 X 6) DJ (40cm, 4 X 4, progressed to 4 X 6). Both groups 1 and 2 were supplemented with HS exercises (4 X 6RM). The control group (n=7) only tested in the pre-test and post-test—a contact platform for calculating flight time in VJ tests (SJ and CMJ).
Teo et al. [30] 2016 (Australia)	n= 26 men	Force platform, sampling rate at 50Hz, two pre-intervention sessions, data collection within a 48h interval not exceeding 7 days. Random selection of groups: LP (n=13) and SV (n=13), 18 training sessions (6 weeks, 45 min) complemented with HS (4 X 6RM). The LP group used training derived from LP: HPC and PS at 70% of 1-RM (4 X 4 reps) in the first 3 weeks and 6 X 4 reps in the last 3). The SV group trained using the SV variant exercises: WDLJ using a hydraulic system (4 X 4 reps 30% 1RM, progressing in the last 3 weeks to 6 X 4 reps 30% 1RM) and 40cm DPJ (8 X 10 reps, progressing in the last 3 weeks to 8 X 12 reps). The tests during the pre-and post-intervention sessions were: CMJ, SJ, 45cm DPJ, 20m drag test, and the 5-0-5 COD test.

Abbreviations: ASHH - alternated single-leg hurdle hops; CDs – Compact Discs; CG – Control Group; CJ – Clean and Jerk; CMJ – Countermovement Jump; COD – Change of Direction; CSAI-2R - Competitive State Anxiety Inventory-2 Revised; DHH - double-leg hurdle hops; DJ – Drop Jump; DPJ – Depth Jump; HBBS – High-Bar Back-Squat; HP – High Pull; HPC - Hang Power Clean; HS – Half Squat; LBBS – Low-Bar Back-Squat; MAAS - Mindfulness Attention Awareness Scale; MAC – mindfulness, acceptance and commitment; MBI - Mindfulness Based Intervention; MSPQ - Mindful Sport Performance Questionnaire; PC – Power Clean; PS - Power Snatch; RM – Repetition Maximum; RPE - rating of perceived exertion; sAA – Salivary alpha-amylase enzyme; sCort - Salivary Cortisol; SHH - Single-leg hurdle dops; SJ – Squat Jump; VJ – Vertical Jump; WDLJ - Weighted Double Leg Jump; WL – Weightlifting.

Table 1: continuation.

Author/year of publishment/Country	Sample	Strategies used
Glassbrook et al. [31] 2019 (New Zealand)	n=18 world-class male powerlifters (group 1, LBBS) and Olympic weightlifters (group 2, HBBS).	1000Hz sampling force platform. The CG 6 trained recreational athletes (they performed both HBBS and LBBS in random order). Groups 1 and 2 only participated in a 3h session, in which there was a "level 2" anthropometric assessment and a 1 RM test of LBBS for group 1 and HBBS for group 2. The comparison group participated in 4 sessions (3 of familiarization and 1 of 3h of tests). Two days, familiarization exercises were performed based on a predicted or self-reported RM (up to 60% RM in the first and up to 80% RM in the second). The RPE scale was used in the first two sessions to estimate the MR better. The third day was a more targeted familiarization for each athlete with the opportunity to perform the movements (up to 3 repetitions). Anthropometric assessment only took place on the last day for this group, and the order of exercises in the 1RM test was random (half started with HBBS).
Suchomel and Sole [32] 2017 (USA)	n=13 resistance-trained men with at least 2 years of training history in weight lifting techniques.	4 testing sessions were performed. The first had the objective of determining the 1 RM of the HPC of each participant and familiarizing them with the movements of the JS and the HHP. The RM recorded was the one with the heaviest load successfully performing the move. The exercises performed on the other test days were: HPC, JS, and HHP (performed on a sampling force platform at 500Hz, 1 type of exercise each day, 2 repetitions at 30, 45, 65, and 80% of 1RM). The order of loads was random in the first session for each participant and was kept in the order established in the first session and the other subsequent sessions.
Frenkel et al. [33] 2019 (Germany)	n=88 men. Two groups of ego depletion (group 1) and control (group 2).	Group 1 went through ego depletion by copying a text about the history of the German city of Mannheim while omitting the letters "e" and "n". In the waiting room, participants answered the WAI-S and WAI-T questionnaires and gave the first saliva samples. In the sports room, the HRSST protocol was used (with a jump backward, attached to the rope, and a landing on the wall, instead of jumping on the rope), individuals reported the state of stress at the top of the climbing wall. In the third room, saliva samples were collected once more, and participants answered other questionnaires (WAI-S, SSV, KIMS-D short).
Brotherton et al. [34] (2019) (UK)	n= 15 men.	In this study, skin and rectal thermometers (probe) were used, in addition to the POMS, TA, and SSS questionnaires. Participants took the 1RM test in the BP and LPR and then went to the laboratory for 4 sessions (intervals of at least 2 days) in order to become familiarized with the protocol (grip strength on the dominant side, in addition to BP and LPR with loads at 40%, 60% and 80% of 1RM). Three groups were formed that completed the following experimental conditions: N (normal, night's sleep from 11:00 pm to 6:30 am), SD (Partial sleep deprivation, sleep from 3:30 am to 6:30 am), and SDN (Same as SD group, but with a nap from 1:00 to 13:00). Group 1 (Order: N, SD, and SDN), group 2 (Order: SD, SDN, and N), and group 3 (Order: SDN, N, and SD). The interval between each condition was at least 1 week. After that, familiarization tests were performed (grip strength on the dominant side and BP and LPR with loads at 40%, 60%, and 80% of 1RM).
Guo et al. [38] 2019 (China)	n=49 men, Chinese military recruits.	Who scored at least 4 points in GHQ-12. The MBSR group (n=30) underwent a mindfulness-based intervention for 8 weeks, with daily practice, 2-hour group sessions, and exercises at home (formal as body scan, yoga, and meditation or informal during house cleaning and food). The data collected were: participant information (demographic data); 3 questionnaires (GHQ-12, PSS-10, and FFMQ), collected from BASELINE, 5, 8, and 12 weeks after engaging in the intervention.

Abbreviations: BP – Bench Press; CJ – Clean and Jerk; DS – Drop Set; FFMQ – The Five-Facet Mindfulness Questionnaire; GHQ-12 – General Health Questionnaire-12; HHP – Hang High Pull; HPC – Hang Power Clean; HRSST – Heidelberg Risk Sport-Specific Stress Test; JS – Jump Shrug; KIMS-D short – Kentucky Inventory for Mindfulness Skills Short; LPR – Leg press; MBSR - mindfulness-based stress reduction; N – Normal; POMS – Profile of Mood States; PSS-10 – Perceived Stress Scale 10; RM – Repetition Maximum; SD – Partial Sleep Deprivation; SDN – Partial Sleep Deprivations with a Nap; SSS – Sleep and sleepiness scales; SSS-V – Sensation Seeking Scale V; TA – tiredness and alertness; WAI-S – Wettkampf-Angst-Inventar-State; WAI-T – Wettkampf-Angst-Inventar-Trait.

Absolute sum of data in relation to the number of researches and scores achieved Concerning the Downs and Black adapted scale scores, two studies reached sixteen points, one study reached fourteen points and two reached thirteen (Table 2).

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Table 2: Observational studies included in the qualitative synthesis and scores for the adapted Downs and Black scale.

Authors	Type of study	Downs and Black SO/MS	Relative frequency (%)
Josefsson et al. [2]	Cross – sectional and Cohort study	13/22	59.1
Bevilacqua et al. [4]	Cohort study	16/22	72.7
Stefanello [6]	Cohort study	16/22	72.7
Lucero et al. [10]	Cohort study	13/22	59.1
Chan et al. [11]	Cross-sectional prevalence study	14/22	63.6

SO: score obtained; MS – maximal score.

Using an adaptation of the bias verification tool from the Cochrane Handbook, three clinical trials had low risk of bias in five (5) domains, which was the most significant proportion of the low risk of bias, and eleven scientific research reached low risk of bias in four (4) domains (Table 3).

Table 3: Experimental studies and the number of domains found from the adaptation of the Cochrane Manual's Bias Check Tool.

Authors	Type of study	Cochrane Handbook SO/MS	Relative frequency (%)
Kelly et al. [7]	Study experimental	4/7	57.1
Hermassi et al. [8]	Study experimental	4/7	57.1
Hermassi et al. [9]	Study experimental	4/7	57.1
Zadeh et al. [12]	Study experimental	5/7	71.4
Mehrsafar et al. [13]	Study experimental	5/7	71.4
Muhammad [23]	Study experimental	4/7	57.1
James et al. [24]	Study experimental	4/7	57.1
Tricoli et al. [29]	Study experimental	4/7	57.1
Teo et al. [30]	Study experimental	4/7	57.1
Glassbrook et al. [31]	Study experimental	4/7	57.1
Suchomel and Sole [32]	Study experimental	4/7	57.1
Frankel et al. [33]	Study experimental	4/7	57.1
Brotherton et al. [34]	Study experimental	5/7	71.4
Guo et al. [38]	Study experimental	4/7	57.1

SO: score obtained; MS – maximal score

The OWL strategies have not shown relative or absolute values of more significance concerning sportive performance compared to vertical jumps (VJ) training. However, in analyzing the use of innovative strategies, issues related to developing better physical abilities and/or force development rate (FDR) must be considered. Moreover, the effects of training with VJ seem to be more relevant and of specific particularities than other training exercises.

Squats strategies to facilitate performance during weightlifting, just as low-bar back-squat and high-bar back-squat, are methods compatible to upgrade strength in the lower body, core, and back. However, adaptations and time of improvement must be considered, just as the choice of the method for the respective muscle groups aiming for its strength development. The state generated by the perception of stimuli in sports disputes can cause emotional changes and disturbances in homeostasis. Such impairment has a strong association impact with sleep disorders and the development of stress.

Mindfulness training showed itself as promising in preventing injuries and upgrading performance and emotional control. The intervention may be applied along with the OWL model training to sportive performance and promote psychological well-being.

4. DISCUSSION

Strategies used in olympic weightlifting and their relationship with sportive performance in different modalities.

The techniques used in Olympic weightlifting are being applied to other sportive modalities [8, 9]. OWL seems to be an alternative strategy to increase sportive performance. A consistent statement, once scientific findings point to a considerable improvement of the inferior limbs muscle thickness, strength and power in response to the OWL exercise in the sportive season; increasing thickness of the vastus lateralis and rectus femoris, even when athletes show physical wear [18]. Relations between OWL and countermovement jump are similar, whereas OWL is na alternative for several sports to obtain strength and power [19].

OWL performance and success are dependent to the weight the individual can lift under task constraints, obeying specific rules of the classic movements, which are characterized by snatch and clean and jerk [20]. The multiarticular movement requires triple extension of knee, hips and ankle also is part of performing OWL exercises, needing to develop motor skills to adequate performance [21]. Though, the main objective of OWL exercises is increasing inferior limbs power, there were advocate many additional benefits as balance, coordination, flexibility and central stability, what also may improve performance, and consequently, assure performing OWL movement in its totality [22].

Variable such as velocity, strength and power are usually the most important mechanical functions in planning the direction related to sport performance in OWL, just as in other sport modalities. There is observed that muscle strength shows a positive correlation with support strength; by that, it is one of the most important characteristics in OWL athletes [23]. On that note, due to the complexities concerning OWL techniques, the need of mental preparation is noticed, and to optimize sportive performance, the athlete must increase strength, just as velocity and power, the strength can be developed in joint of inferior and superior limbs.

OWL movements have been shown to provide a higher training stimulus of inferior extremities compared to other kinds of training, including jumping, powerlifting and kettlebell exercise [24, 25]. In OWL, the classic movements of snatch and clean and jerk may be modified, removing the lifting off the ground phase, focus only in the pull action. Of these, *hang snatch and hang clean* are variables conducted in training as a possibility of getting close to traditional *snatch, and clean and jerk*. The absence of lifting off ground and shoulder activation makes the movement easier to learn compared to traditional movements of weightlifting [26].

Therefore, it is noticed that sport performance during OWL movements have shown direct relation with sprint, jumping and change of direction performance [25]. On that count, weightlifting movements and its derivatives are frequently implemented due to its similarities with specific movements of the sport, since they allow expression of moderate to high loads, with minimal deceleration, whether there was, during concentric/propulsion phase [24].

It is important to grasp that, in order to obtain results in training and show an effective result in OWL sportive performance, a series of exercises of load must be prescript in a sequential and periodized form, through the main OWL exercises (snatch, and clean and jerk), because there was noticed that movement matched with specific load maximizes the exercise results and they might vary according to the form of output to execution [27].

The way these movements are performed (that is, from a static position [ground] and other started in a countermovement [hang]) may allow athletes to develop higher concentric characteristics of strength-time (strength, impulse, power) when started in a countermovement. A recent study showed that initiate a derived traction with an anterior countermovement resulted in higher kinetic values (strength, impulse and power) when compared to a static beginning, although not from ground, during propulsive phase [27].

In a few words, shortening and stretching cycle shows itself as muscle function of natural occurrence in which the muscle is immediately stretched before shortened. This produces more potent muscle action than the one that would result in isolated concentric action, via storage and elastic energy release, and neurologic potentiation via muscle spindle [28]. In this regard there was noticed that OWL movements and its derivatives are broadly used also to improve power and sport performance in other modalities. Training comprehends exercises of ballistic resistance which often produce lower increases in maximal strength than heavy resistance training programs; however, at the same time they develop higher increases in power movements [29]. Effective transference of training from movements derivatives of OWL are consequence of its capacity of having triple extension of hips, knee and ankle and it not Only depends of intermuscular coordination and motor ability, but of adequate psychological preparation to stablish better performance

Performance during Olympic weightlifting has been showing correlation with sprint, jump, and direction change performance [20, 24]. Olympic weightlifting exercises and their derivatives are often implemented due to their similarities with specific movements of the respective sport in analysis. They allow the expression of moderate to high loads, with minimum slowdown, whether there is, during the concentric/propulsion phase, and magnitude of velocity peak improve was influenced by the pre-existent strength level in the initial stages of training [24].

A survey compared three groups in pre and post-test conditions to verify the short-term effects of heavy resistance to the training using OWL versus (vs) VJ programs. All three groups were compared through squat-jump (SJ) maneuver and countermovement jump (CMJ). The Control group has not shown any upgrade in the physical aspects, although, in OWL and VJ, in pre, SJ showed a mean of 38.9 vs. 36.5, and, post-test, 42,6 vs. 37.5, respectively. As for CMJ, 42.2 vs 40.2, and in post-test, 45.0 vs 42.5. The group that used the VJ program in-creased their 1-MR half-squat strength more than the OWL group, 47.8% vs. 43.7%, and in VJ, the OWL group showed 9.5% vs. 3.66% of the VJ group [29].

Other scholars identified significant outcomes in sportive performance with a six-week of OWL and VJ [23]. It is worthy of highlighting that the strategy was associated with collective sports tasks and not with individual training programs, once this last one has not shown significant values [30]. Olympic weightlifting aiming to increase athletes' power show betterment in performance of task associated with sports of team (WL group: increase of 10%, d = 0,701) [29].

Vertical jumps and squats are between the most commons conditioning and strength exercises, mainly in practitioners and athletes of Olympic weightlifting [31]. Some study of impact suggested that the low-bar back-squat (LBBS) technique is a more efficient mode of squat with high loads, as shown by kinetic outcomes comparable to high-bar back-squat (HBBS); although absolute higher loads are lifted with the adaptation during training [31]. The practitioners that look for emphasizing the strongest hip muscle must consider LBBS, once its most considerable inclination toward during the movement action ensures that the hip muscles are more engaged in the HBBS maneuvers [31].

Innovative studies are needed once authors identified the need for new methods to acquire strength and performance. Research data showed the importance of increasing the sportive performance level through "drop set" training. The muscle is taken until its limit with a set of repetitions, without rest, although decreasing the load [23]. Other scholars stressed the relevance of identifying particularities in the muscle activity between LBBS and HBBS, pro-posing to include 100% of 1-MR [31]. Therefore, situations that demand a replica of movements with more straight trunk position, as snatch and clean, the HBBS maneuver tend to be more adequate.

Researchers even reported essential points about the relation between barbell-squat and OWL performance [10]. Among others, the absolute strength capacity of primary muscles used in OWL is highly related to the quantity of load raised in the star and throw. Other aspects of being established are the factors concerning efficiency with which sportspeople demonstrate their back squat strength from the start and throw. Those movements might be considered a reflexive action of competitive level athletes, just as the efficiency level demonstrates different values between a higher-level athlete and from a smaller category [10].

Related to strategy reliability to rise and/or perform the movement from the ground, matching two movements are needed, also known as clean and jerk (CJ); the technique showed reliability in the scientific findings [7]. With this method is possible to predict 1MR performance in the execution of clean (first part) of the knee or medium thigh, and consecutively, the professionals may save the time of strength and conditioning, giving them an estimative more precisely of 1-MR achievement performance to other variation during the stages of OWL. Aiming changes in performance for each OWL variation, researchers suggest changes to all clean and jerk variations, from the knee and integrity of medium thigh strength, respectively; therefore, these changes to be investigated in innovative studies [7].

Still concerning movement variation in OWL, the findings show that the JS (jump shrug) and HHP (hang high pull) present unique characteristics in power-times curve (p-t) compared to the HPC (hang power clean). Specifically, the JS and HHP may produce more relative peak power (RelPP) and work (RelW), as well as the notable differences between p-t during the second traction movement [31]. The biggest differences in each variable were showed in loads lighter than 30 and 45% 1-MR of HPC, suggesting that lighter load might provide more global training stimuli When implemented HHP and JS exercises. On the other hand, the sportperson must prescribe moderate to high loads (65-85% of 1-MR) to maximize the energy output during HPC [32].

Strategic aspects in the psychological behavior and factors that interfere in the sporty practice

Elite athletes tend to have a technique to increase focus during sports practice and competition. Thereby, sleep quality seems to have a strong impact on this concentration process. Thus, impaired sleep quality promotes scientific outcomes related to the physiological and psychological state of human beings [33]. Time of sleep-related aspects influence sportive performance, for example, high-performance sports in which there is a prevalence of a expectative of part of the athletes might trigger off sleeping disorders in sportspeople [34].

Collaborators reported the possibility of deleterious effects of total sleep deprivation in sports, causing a loss of performance that defocuses the individual in their training activity [34, 35]. However, when the purpose of a study was to examine the effects of an athlete's internal and external focus of attention during a barbell sports activity, Chan et al. [11] found no important differences in bar speed or movement duration when the focus of attention is present. However, there is an effect observed in external focus (EF) on postural stability, since when the athlete had focused the barbell movement in a straight and vertical trajectory, it led to greater postural stability when performing heavily loaded barbell movements. Thus, the adoption of an EF has as prognosis a greater production of strength through a variety of mechanisms not yet fully elucidated in the scientific [11, 35]. Therefore, the perspective of a strategy to the athletes that stablish itself as na instrument to a higher acquisition of attention and focus at the present moment and reduce thoughts about past mistakes or expectations of the future prevail.

Sleep loss and poor focus on exercise had a strong impact on literary findings [13, 33]. The losses caused by the lack of sleep and the body's reactions to incomplete nights of sleep accumulated over weeks can also lead to physiological disorders, which culminate in chronic diseases such as depression, diabetes, and obesity [33]. Changes in the sleep period are associated with stressful situations or situations that generate anxiety [13, 33, 36, 37].

The mindfulness technique was relevant in the lives of professionals in sports and in reducing stress and anxiety. The use of mindfulness over eight weeks had positive effects on anxiety in Wushu athletes in periods of competition [13]. A similar period of mindfulness

intervention was used in the Guo et al. (2019) [38] study to ease the change in the military's lifestyle, demonstrating an improvement in stress after gaining the full attention of the recruits.

In another study, the authors used stress-linked salivary cortisol levels (sAA, Alpha-Amylase) to obtain a parameter for stress and the cortisol levels of each individual added to data collected from a questionnaire; to measure the athletes' state of mindfulness and anxiety during competition. The mindfulness intervention group had greater self-confidence, better anxiety management, and lower daily salivary cortisol levels on the competition day. Likewise, it was the ability to better reduce stress after competition compared to the control group [32].

An important aspect was the analysis made by researchers regarding the risk of injuries in soccer athletes. The use of mindfulness has led to a decrease in this risk due to the improvement in athletes' attention and decision-making capacity. The research results were concerned with the outcomes of other scientific works, pointing to a reduction in risks due to improved attention and better decision-making skills during sport. However, significant improvements in athletes, in general, were not found [12].

In view of the stress provoked to the athletes during and after competitions, mindfulness strategies may be the key point to achieve success and reduce complications produce by physical discomfort, affliction and anguish of the competitors. Different scholars assessed the apparition and predictors of sportive self-confidence. Among others, mental preparation has been present along with precursor aspects that focus in social issues, trainer leadership, vicarious experiences, environmental comfort, confidence at the team and ability demonstration [39, 40]. Nevertheless, mental preparation and the impact of improving the attention self-regulation capacity, in the here and now, to conquer self-confidence; it still is an overcome to be accomplished at the sport scenario.

Attendance strategies comprehending different psychologies and intervention programs may be the form to create more favorable conditions to the athlete be less reactive to what happens at the present moment. Recognizing intern and extern experiences while they occur, e not acting automatically to them, it is the definition of being in the here and now [41]. Mindfulness practice helps contemplating your thoughts, sensations and emotions, and promotes acceptation of these experiences, since the practice of mindfulness is an awareness that manifests itself centering in the present moment, away from judgment [41].

In counter position, one research investigated if cognitive rumination and emotional regulation deficit intermediate the relation between attitudes of mindfulness and sportive coping. The attitude of mindfulness had a negative effect as in rumination as in emotional regulation deficit; yet it had a positive effect in sportive coping [42]. Therefore, everyday practice of mindfulness becomes of total important in controlling emotions in the perspective of a sportsman support himself less in cognitive rumination and improving his capacity of sportive coping.

Concerning sport performance, it is notory that psychological variables are present during competitions, and concurrently, the need of intervention programs, posting that anxiety at the moment of the competition tend to affect athletes' performance. The impact over emotions control have shown itself as significant as flexibility, competition resistance and strength [23, 41, 42]. However, associations between sportive performance variables yet are not totally enlighten in scientific literature, as the difficulties in finding more precise definitions in sporty requirement and aspects more essential related to athlete's individual demands.

Sportsman high-performance implies in consider higher and more stable values of self-confidence. It is worthy highlighting the complexity of achieving self-confidence, which seems to be related with a structural composition of values acquired by the athlete. Such determination institute itself through personal history of accomplishments and learning lived, as from success as failures, vicarious experiences and levels of emotional activation [41]. Mindfulness persevering practice can be a resource considerable important to achieve high-performance in sport, once sportive performance does not only consist of decision making and movement elaboration, but in process of autonomic regulations, emphasis in physical training and stability of emotional control [43, 44].

There are other ways of mental training involving behavioral cognitive techniques, e.g., psychological skills training (PST), excitement control, self-control and pre-competition

routines [44]. Nevertheless, mindfulness allows a more specific strategy, with implication in athletic performance that is organized through attention self-regulating exercises. The athletes benefit themselves of an automatized system allowing to direct their focus to a determined goal [12, 23, 41]. Thus, the sportsman has the possibility of establish himself integrally at that moment, free of judgments, with acceptation and non-avoidance [2, 42]. Such situation institutes a challenge to the athlete, since himself face challenging situation that propitiates a series of physiological, behavioral, motivational and emotional complications. Authors report that mindfulness attitudes may favor diminishment of intensity and duration of psychomotor arousal, and of intense emotions [41, 42, 45]. On that note, based on literature, mindfulness can contribute persuasively to elevate sportive performance by the ability of controlling or dislocate definitively attention from intern experiences during more meaningful moments.

This study presents some limitations, as the scarce number of researches about the impact of strategies used in Olympic weightlifting with psychological complications; likewise, studies dedicate to explore self-confidence in sport. Requirement to sample acquisition, ill-defined methods, masking, and pairing and restriction of age, gender and level of physical activity increased bias during qualitative synthesis. The strong suit was detailing of the strategies used in the selected studies, making easy and enlightening the process of intervention. The development of contemporary studies with results more specifics are important, what means a lower overrating of p-values and higher detention and analysis of results along with confidence intervals. This way, a more precise investigation about benefits and/or effect size level over different techniques and outcomes would be possible. In special, the need of enlargement of research with a higher impact about the relation between mindfulness, high-performance sportsmen, and definitely investigation of self-confidence, not only aiming to improve sportive performance but also reducing emotional suffering of these athletes.

5. CONCLUSION

Mindfulness everyday practice of athletes shows a strong impact in developing attention self-regulation in the present moment and a precursor to acquire self-confidence. Through this study, it is recommended implementation of mindfulness to improve sportive performance, since the acceptation of experimenting the present, in the here and now during that instant and attention focus in that activity in that moment creates a favorable conception to a sportive high-performance.

The interface between sport science and psychology is relevant, especially for the strategies used in Olympic weight lifting, as they are compatible with different sports. The use of mindfulness was shown to be favorable in not less than eight weeks, together with the specific analysis of biomechanical factors. The technique proposes an increase in self-confidence and better management of emotions. However, the participation of a specialized professional with the team is suggested, since identifying, in an individualized way, which are the situations that demarcate cognitive and physiological disorders in a sportsperson, involves cognitive techniques of a self-informed nature, imagination and focus of attention, whose loss of thought processes and the restricted concentration on a stimulus presented itself as disturbing factors in sports performance.

Just as low-bat back-squat (LBBS) as high-bar back-squat (HBBS) are strategies compatible to increase strength in lower limbs, core and back. Mental preparation using mindfulness to acquire self-confidence; composition of the method to be developed, adaptation time and betterment are steps that must be pre-set in practice of awareness aiming the development of contemporary strategies in different sports, mainly in the OWL.

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