 doi:10.20944/preprints202208.0100.v1

Article

Burnout and Mental Interventions among Youth Athletes: A Meta-Analysis of the Studies

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Abstract: (1) Background: The subject of athlete burnout is often discussed among sports psychologists. Interventions to reduce this phenomenon are still under investigation with follow-up. Thus, the purpose of the current meta-analysis was to examine psychological interventions that have already been carried out to decrease or eliminate burnout syndrome in young athletes. (2) Methods: Scientific electronic databases were searched and five published studies published between January 2002 and June 2022, which met the criteria, were selected. This systematic review and meta-analyses followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Cochrane Collaboration's tool for assessing the risk of bias was used to assess the studies' quality. The metafor a package of the R statistical program was used to perform the analysis. (3) Results: Cognitive-behavioral therapy as well as mindfulness-based interventions effectively reduced most dimensions of burnout. Moreover, online interventions were significantly more beneficial in this reduction (4) Conclusions: There should be more high-quality studies on the effectiveness of psychological interventions in reducing burnout. Mainly because it leads to tremendous physical and psychological problems for athletes and their coaches and therefore requires particular interventions and prevention strategies.

Keywords: burnout phenomenon; child and adolescent athletes; psychological intervention; online intervention

1. Introduction

Sport activity has the potential to facilitate positive youth development and increase well-being through strengthening peer and social relationships, engagement, positive emotions and sport accomplishments [1,2]. However, sport does not always positively affect children and adolescents. Especially the world's tendency for early specialization leads to dangerous consequences when immature children participate in intensive all-year-round training and competition in a single sport. The lack of diversification and exposure to different sports activities during the developmental periods may underlie the enhanced risk of injuries, stopping motor skill development, psychosocial problems, overtraining syndrome, and a high possibility of burnout and potential dropout from sport. Moreover, children who are early specialized in one selected sports discipline are deprived of the opportunity to increase their self-esteem by naturally trying different activities and hobbies [3,4].

The topic of athlete burnout is a frequent element of discussion among sports psychologists and researchers all over the world. The first reports on athlete burnout syndrome were published in the early 1980s, and since then, the issue of athlete burnout has received increasing attention [5]. The first study of burnout in sports was conducted by Caccese and Mayerberg (1984) on college female and male athletic coaches [6]. In the

 doi:10.20944/preprints202208.0100.v1

sports science literature, athlete burnout has been defined in various ways. For example, Smiths (1984), in his Cognitive-Affective model, described athletic burnout as emotional, psychological, and physical exhaustion that causes withdrawal from the activity which was once enjoyable and became an unpleasant source of stress. The author emphasized that burnout appears when stress-related costs surpass the benefits of sports engagement [7]. On the others hand, Schmidt and Stein (1991) in their Sport Commitment model, viewed burnout as a reaction to chronic stress, when rewards are decreasing while costs and investments are increasing with low satisfaction and resources as well as availability of better alternatives rather than sport [8]. However, one of the theories which have led to a certain consensus among researchers is the concept of athlete burnout as a multidimensional syndrome by Raedeke (1997). It refers to Maslach's and Jackson's (1981) definition of occupational burnout. Through a study conducted on 236 female and male 13–18 age-group swimmers, Raedeke defined burnout through three core dimensions: emotional and physical exhaustion, reduced level of accomplishments, and sport devaluation. Emotional and physical exhaustion is associated with intense training and competition and, therefore, the feeling of fatigue. A reduced sense of accomplishment is related to the feeling of inefficacy while athletes cannot achieve personal goals or perform below expectations. Sport devaluation refers to losing interest, a "do not care" attitude, or resentment toward performance and one's sport. Athletes can hold different levels of these dimensions with raised perceptions on all three determining the burnout syndrome [2,5,9,10]. Athlete burnout can lead to a variety of adverse outcomes. Firstly, affective problems such as low mood and hostility toward the training environment. Secondly, cognitive issues such as distracted focus, memory, and helplessness. Thirdly, physical aspects, such as fatigue, increased probability of injury, even using doping. And finally, behavioral issues such as absenteeism and poor sports performance. And all these aspects can lead to a final dropout [11]. Consequently, athlete burnout can also lower academic outcomes and performance leading to disharmonious parent-child and peer relationships [12]. Reducing burnout among young athletes could play an essential role in the general development of young people in society. Feigley (1984) believed that the loss of young elite athletes who retire early, consumed by psychological problems before their peak performance and top form, means the failure to fulfill human potential and the decline in the quality of national and world sport [13].

Psychological interventions implemented to cure burnout are the techniques of mental training generally used to improve the functioning of athletes depending on age and sports level. Mental training is a set of exercises that, through systematic repetition, lead to the formation and consolidation of the player's mental qualities and skills, such as concentration of attention, self-control of the level of arousal and emotions, mental resistance in the face of stress [14]. The basic techniques of mental training that control motivational and emotional-cognitive processes include visualization, relaxation, goal setting, and internal dialogue. Those techniques are mainly rooted in cognitive-behavioral therapy (CBT), the most commonly used in a sports setting [15].

Athlete burnout, especially among young sports participants, is a severe problem for athletes themselves and their coaches, therefore requires particular interventions, prevention strategies, and discussion because of the serious consequences it leads to [16]. Thus, the purpose of the current meta-analysis was to examine the phenomenon of sports burnout and the offline and online psychological interventions that have already been carried out to decrease or eliminate the burnout syndrome among child and adolescent athletes practicing various sports disciplines.

2. Materials and Methods

2.1. Eligibility criteria

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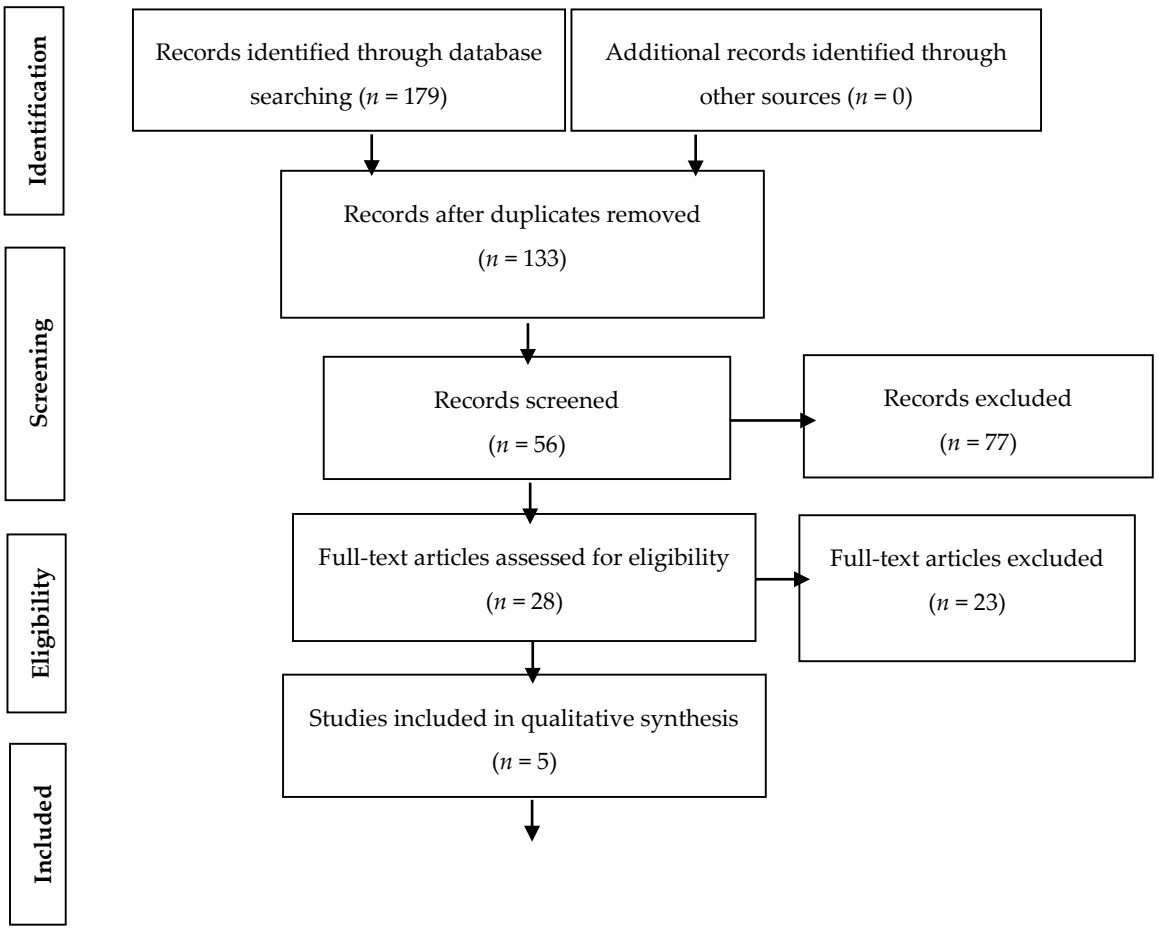
This systematic review and meta-analyses followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Published studies were retained for extensive examination if they met the following inclusion criteria: (a) at least one treated and one control group with pre- and posttest measures, RCTs; (b) published prior to June 10, 2022; (c) the participants were young athletes; (d) meta-analyzed data concerned with burnout and mental intervention; and (e) included meta-analytic data to calculate the effect size. There was no language of publication restriction. Across multiple checks, all authors confirmed study eligibility. Three authors completed the final inclusion assessments.

2.2. Information sources

Between March 2022 and June 2022, authors searched electronic databases, personal meta-analysis history, and checked with personal research contacts. Electronic database searches occurred in EBSCOhost with the following individual databases selected: All. Also searched Web of Science, Pubmed and Google Scholar.

2.3. Search protocol

The following specific search of the EBSCOhost with all databases. Also searched Web of Science, Pubmed and Google Scholar returned 179 results from 2002–2022. One hundred and thirty-three records were deleted because of duplicates or irrelevant. Next, 28 full-text articles were evaluated for eligibility, and 23 of them were excluded. The reasons included the following: nonmatching participant age (n = 18). Finally, five were included. The study selection flowchart is shown in Fig. 1.



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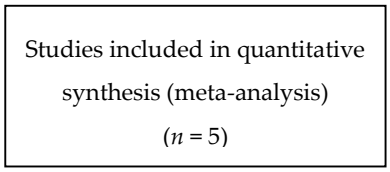

Figure 1. PRISMA flow chart for the identification of the included studies

2.4. Study selection

The studies found in the searches were stored, and duplicates were removed. The abstract of each article was then reviewed, and if appropriate for inclusion in the meta-analysis, the full article was evaluated. Two reviewers independently selected the five included studies (see Table 1). The degree of agreement calculated using Cohen's kappa coefficient was κ =.96; disagreements were resolved by a third reviewer.

2.5. Data extraction process

A data extraction protocol was developed and applied in a systematic and standardized way to each of the studies included in the meta-analysis. Checks occurred during the extraction process for potential discrepancies. Only, it was necessary to contact one study authors for missing information about percentage of female during the data extraction process. Across the search for studies, all identified studies were reported in English. Thus, no translation software or searching out a native speaker occurred. This process was carried out independently by two reviewers. Cohen's kappa coefficient was κ =.98 for the categorical variables, and the intraclass correlation (ICC) index for the quantitative variables grouped by domains was above .97 in all domains. All data extraction forms are available from the first author.

2.6. Data items

To help address our main aim, the data recorded are as follows: (a) study identification (authors, year of publication, country, and journal name); (b) study design (numbers of participants in the intervention and control groups, type of intervention, type of control group, implementation modality, number of measures, and follow-up time frame); (c) participants (age, percentage of female); (d) intervention characteristics (duration in minutes of each session, duration in weeks of the intervention, number of sessions per week and total number of sessions of the intervention); and (e) results (mean scores, standard deviations, and sample sizes). For all information sought, we coded missing information as not reported.

2.7. Risk of bias

Cochrane Collaboration's tool for assessing the risk of bias [17] was used to assess the quality of the studies included in the meta-analysis. It was used with the five RCT studies to determine whether any biases influenced the true effect of the intervention. Two investigators assessed the risk of bias with the following categories: random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective reporting, and other sources of bias. They were assessed with four classifications: "low risk", "high risk", "unclear risk" and "n/a". Cohen's Kappa coefficient resulted in κ =.94.

Table 1. Empirical studies of burnout.

Title	Database	Author	Year	Journal	Aim	Participants	Methods	Instrument	Result

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Testing the Effects of a Self-Determination Theory-Based Intervention with Youth Gaelic Football Coaches on Athlete Motivation and Burnout.	Web of Science	Langan et al. [18]	2015	The Sport Psychologist	To test the effects of a self-determination theory-based intervention on athlete motivation and burnout. To examine the feasibility and acceptability of the intervention.	The sample (n = 87) included players between 11 and 17 years of age (experimental: M = 15.02, SD = 1.62; control: M = 15.34, SD = 0.96).	This study is a cluster randomized controlled trial (RCT) analyzing change in player motivation and burnout as a result of their coach participating in a 12-week SDT-based intervention. We randomly assigned coaches (n = 6) and their teams to an experimental or a control group (i.e., usual practice) (n = 3 each group)	Behavioral Regulation in Sport Questionnaire (BRSQ; Lonsdale et al., 2008). **Athlete Burnout Questionnaire (ABQ; Raedeke & Smith, 2001).** Perceived Environmental Supportive Questionnaire (PESQ; Tobin, 2003). Controlling Coach Behavior Scale (CCBS; Bartholo-mew et al., 2010).	The findings demonstrated the feasibility and acceptability of implementing a self-determination theory-based intervention in the coaching domain. In addition, this study demonstrated favorable trends in the quality of player motivation and burnout symptoms as a result of an SDT-based intervention.
The effects of a meaning-oriented onlinw writing intervention on commitment, stress, and burnout in collegiate athletes.	ProQuest	Luzzeri et al. [19]	2020	Dissertation	To evaluate the efficacy of an online writing intervention in treating burnout in collegiate athletes. Specifically, it was hypothesized that increases in presence of meaning in sport through writing would lead to decreases in burnout symptoms.	The sample consisted of 65 student-athletes from various NCAA programs across the United States. The final sample included male (n = 12) and female (n = 53) athletes, ranging from 18 to 23 years of age (M = 20.09, SD = 1.25).	Screening involved 425 NCAA collegiate athletes from a variety of sports, with 157 qualified participants, 86 agreeing to participate, for a total of 65 participants completing the intervention. The online intervention included six sessions to be completed over the course of two weeks (i.e., three sessions each week). The study was composed of four distinct phases, namely screening, group assignment, intervention or control, and follow up.	Meaning in Sport Questionnaire (MSQ; Luzzeri & Chow, under review). Sport Commitment Questionnaire-2 (SCQ-2; Scanlan et al., 2016). Satisfaction With Sport Scale (SWSS; Gabana et al., 2017). A modified version the Perceived Stress Scale (PSS; Cohen et al., 1983). **Athlete Burnout Questionnaire (ABQ; Raedeke & Smith, 2001, 2009).**	Results from a series of repeated-measure ANCOVAs showed marginal improvements in constrained commitment and presence of meaning in sport for the intervention group, with no other changes in burnout or related constructs. Manipulation check results using the LIWC software suggest the writing intervention elicited the content they were designed for. Findings are discussed in light of new research on meaning in sport, theoretical approaches of athlete burnout, and future research directions in both domains.
Can the Attention Training Technique Reduce Burnout in Junior Elite Athletes?	Semantic Scholar	Moen & Wells [20]	2016	International Journal of Coaching Science	To investigate the effects of the attention training technique on junior elite athletes' level of burnout. To examine an ancillary question of whether the technique impact on mindfulness.	This study comprised of 78 Norwegian junior elite athletes. The ATT condition consisted of 27 athletes, whilst the control condition consisted of 51. A gender breakdown of the participants showed that 67 % of the entire sample was male and 33% were female. Their average age was 18.5 years. Out of the 78 elite athletes who participated in the project at the pre-test, 57 athletes participated at the post-test after 12-weeks (25 in the experiment group and 32 in the control group). This gave a response rate of 73%.	After assignment to group a pre-test was administrated through an online questionnaire that measured the psychological variables in this study. Then an ATT program was administrated for a period of 12-weeks. Athletes participated at the post-test after 12-weeks. The ATT used in this study is the audio training technique developed by Wells (1990), which has the goal to enhance mental control and flexibility (Fisher & Wells, 2009; Wells, 2000).	**Athlete Burnout Questionnaire (ABQ; Raedeke & Smith, 2009).** Mindful Awareness Attention Scale (MAAS; Brown & Ryan, 2003).	The results showed that there was a significant decrease in in burnout amongst the ATT group but not the control group. In the ATT group, but not the control, mindfulness increased.

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The Effects from Mindfulness Training on Norwegian Junior elite Athletes in Sport.	Web of Science	Moen et al. [21]	2015	International Journal of Applied Sports Sciences	To investigate the effects from a mindfulness intervention on perceived stress, perceived performance in school and sports, and athlete burnout among junior elite athletes in sports.	This study comprised of 77 Norwegian junior athletes in sports. A gender breakdown of the subjects included 49% men and 51% women. Their average age was 18 ½ years old (ranging from 16 to 20). Out of the 77 athletes who participated in the project at the pre-test, 50 athletes participated after 12-weeks, which give a response rate of 65% (23 in the experiment group and 27 in the control group).	Experimental design of this study was a pre-test post-test control group design. After the junior elite athletes were randomly assigned into either the experimental or control groups, a pre-test was administrated. The junior athletes then participated in an online questionnaire, which measured the psychological variables in this study. Then a mindfulness program was administrated for a period of 12-weeks.	Mindful Awareness Attention Scale (MAAS; Brown & Ryan, 2003). Perceived Stress Scale (PSS; Cohen et al., 1983). Athlete Satisfaction Questionnaire (ASQ; Riemer & Toon, 2001). **Athlete Burnout Questionnaire (ABQ; Raedeke & Smith, 2009).**	As hypothesized, it was found significant effects from the mindfulness intervention on athlete burnout. There were no significant effects found on perceived stress, perceived performance in school and sports.
Effect of digital storytelling intervention on burnout thoughts of adolescent.	Web of Science	Ofoegbu et al. [22]	2020	Medicine	To ascertain the effect of digital storytelling intervention on burnout thoughts of adolescent athletes with disabilities.	This study involved 171 adolescent para-athletes involved in the preparation for various local and international competitions in Southeastern Nigeria. Intervention group (n = 85; M age = 20.18, SD age = 3.15) and waitlisted control group (n = 86; M age = 20.57, SD age = 3.07)	This study is a randomized controlled trial involving a total of 171 adolescent-athletes with disabilities who showed a high degree of burnout symptoms. These adolescent-athletes were randomly assigned to either an intervention group or a waitlisted control group. The treatment intervention for the adolescent-athletes was digital stories which were created based on the framework of rational emotive behaviour therapy (REBT). The questionnaire was used for gathering of data at three different times (baseline, post-test and follow up). Data were analyzed using repeated measure analysis of variance at a significant level of .05.	**Athlete Burnout Questionnaire (ABQ; Raedeke & Smith, 2001).**	Results showed that the digital storytelling intervention based on REBT significantly reduced burnout thoughts among disabled adolescent-athletes in the intervention group compared to athletes in the waitlisted control group as measured by the Athlete Burnout Questionnaire. Additionally, at follow-up evaluation, it was observed that the decrease in burnout scores was maintained by those athletes in the digital storytelling intervention.

2.8. Effect size indices and data analysis

The meta for package of the R statistical program [23], together with the R Studio program, was used to perform the analysis.

Cohen's d was calculated as measure of effect size for all included studies [24] and the standard error of the effect calculated. A random-effects model was used to pool the effect sizes and examine the efficacy of the interventions for each of the dimensions of burnout (*reduced sense of accomplishment*, *emotional and physical exhaustion* and *devaluation of sports*).

Heterogeneity, the diversity in the characteristics of the outcome measures, was quantified using Cochran's Q statistic and the I^2 index. For I^2 estimates, a value of 0%

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equates to no heterogeneity, 25% to low heterogeneity, 50% to moderate heterogeneity, and 75% to high heterogeneity [17].

Individual random effects meta-regressions evaluated the impact of nine moderating variables that were included in the research: three categorical moderating variables (type of intervention, type of control group, implementation modality) and six continuous moderating variables (age, percentage of female, duration in minutes of each session, duration in weeks of the intervention, number of sessions per week and total number of sessions of the intervention).

Publication bias was assessed for each dimension through the visual inspection of funnel plots [25] and Egger's regression tests [26], which is based on a simple linear regression model; if $Z \geq 1.96$ or ≤ -1.96, the effect is significant.

3. Results

3.1. Descriptive characteristics of the studies

The studies included in the meta-analysis were published between 2015 and 2020 (see Table 2). The total sample consisted of 430 participants, with a mean percentage of 46.12% female (33.00%–81.54%). The age range was from 11 to 23 years, with a mean age of 18.82 (2.25).

The control group types were control group without intervention (41.33%) and waiting list with intervention after study completion (58.67%).

The following techniques were used in the interventions: CBT (76.59%) and MBI (23.41%). Of the total number of participants, 43.41% participated in offline implementation modality and 56.59% were it in online implementation modality.

In all five studies, pretest and posttest measures were taken, while in one of them data was collected in the middle of the intervention (mid-test) and in two data were collected several months after of the intervention (follow-up).

Table 2. Details of the studies included in the systematic review.

Authors	% Female	Age	Internet	Group experimental	Group control	Duration	Measures	Instrument	Risk of bias
Langan et al. (2015) [18]		15.18 (1.29) R= 11-17	Offline	CBT *n*= 41	Waiting list *n*= 46	Weeks= 12 Session (min)= 70	2	ABQ	- + - + - ? +
Luzzeri (2020) [19]	81.54	20.09 (1.25) R= 18-23	Online	CBT *n*= 31	Control *n*= 34	Weeks= 2 Session (min)= 20	4	ABQ	- ? ? ? + ? +
Moen & Wells (2016) [20]	33	18.5	Offline	MBI *n*= 25	Control *n*= 32	Weeks= 12 Session (min)= 12	2	ABQ	+ + ? ? + ? +
Moen et al. (2015) [21]	51	18.5 R= 16-20	Offline	MBI *n*= 23	Control *n*= 27	Weeks= 12 Session (min)= 20	2	ABQ	+ + ? ? + ? +
Ofoegbu et al. (2020) [22]	35.09	20.38 (3.11) R= 11-21	Online	CBT *n*= 85	Waiting list *n*= 86	Weeks= 12 Session (min)= 90	3	ABQ	- - - - - ? ?

Notes. For risk of bias, - = low risk of bias, + = high risk of bias, ? = unclear risk of bias on the following indices: random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective reporting and other sources of bias. ABQ = Athlete Burnout Questionnaire [27,28]. CBT = Cognitive Behavioral Therapy. MBI = Mindfulness-Based Intervention.

3.2. Bias risk assessment

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The risk of bias is low in 71% of studies for random sequence generation; 12% for allocation concealment; 33% for blinding of participants and personnel, 12% for blinding of outcome assessment; 33% for incomplete outcome data; and 0% for selective reporting and other sources of bias. The risk of bias is high in 29% of studies for random sequence generation; 50% for allocation concealment; 21% for blinding of outcome assessment; 67% for incomplete outcome data; 0% for blinding of participants and personnel and selective reporting; and 88% for other sources of bias. In the other cases, the risk of bias was unclear (see Figure 2). See Table 2 for the individual studies.

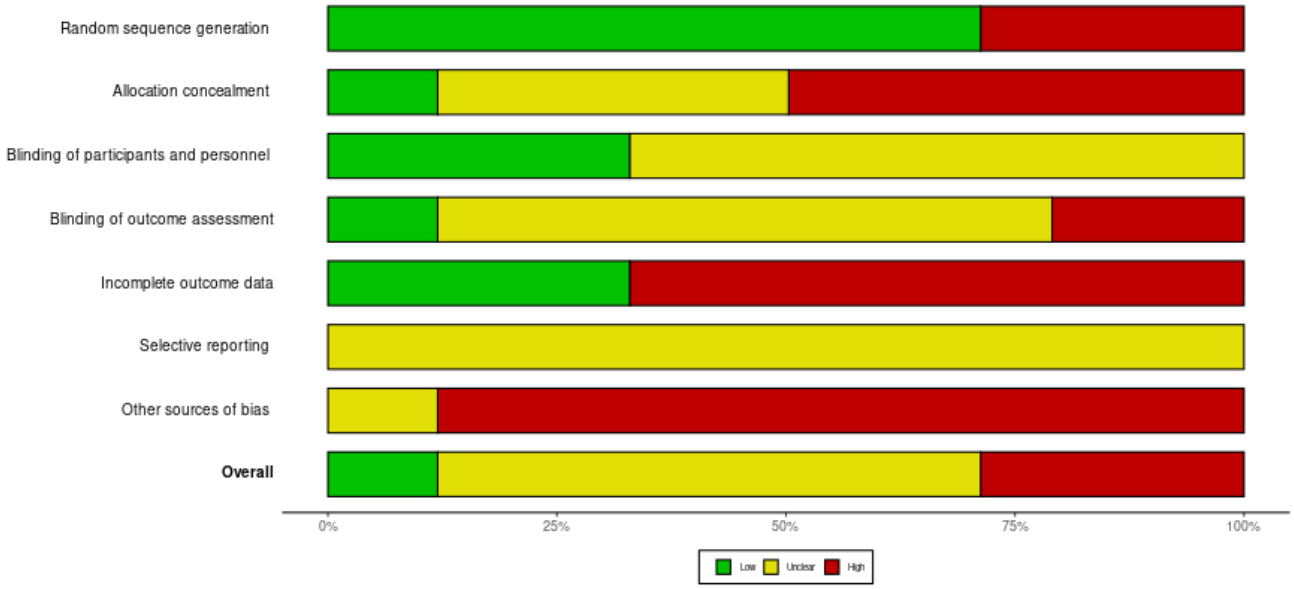

Figure 2. Risk of bias in the studies included in the meta-analysis.

3.3. Effectiveness of interventions

The five RCT studies, with two types of intervention, two types of control group and two implementation modalities, 15 measures and 3 dimensions of burnout were analyzed. Significant effect sizes were obtained for all dimensions. Figures 3, 4 and 5 shows the forest plot for each dimension, that explains a diagrammatic synthesis of studies effects, confidence interval and summary RE (Random Effect) for the metanalytical random-effects model.

Thus, we obtained a moderate significant effect sizes in *reduced sense of accomplishment* (d = -0.74, SE = 0.31, p <.05). *Reduced sense of accomplishment* was significantly decreased by the intervention's programs (95%CI: - 1.34, - 0.14). The Q-statistic and the I^2 index showed that heterogeneity was moderate for *reduced sense of accomplishment* (Q (df = 4) = 8.84, p = .07; I^2 = 54.73%).

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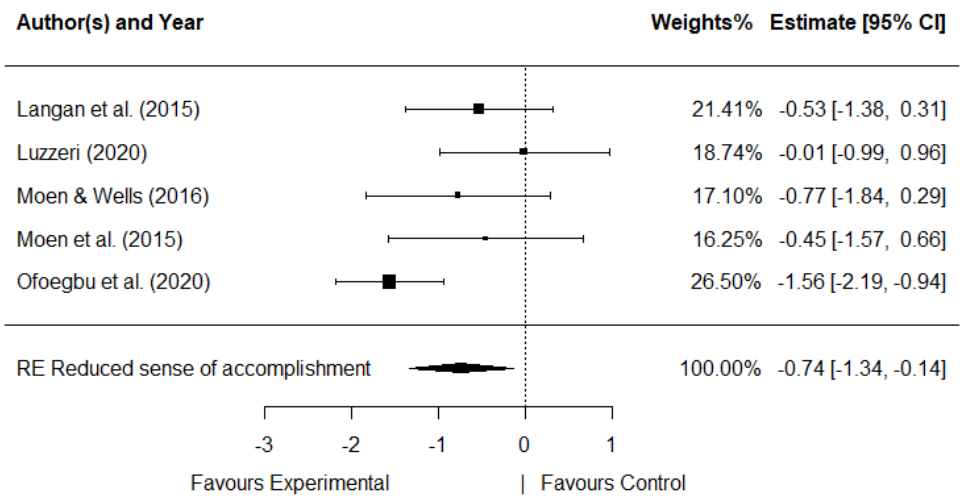

Figure 3. Forest plot for reduced sense of accomplishment.

A large effect was observed for *emotional and physical exhaustion* (d = -0.87, SE = 0.20, p <.001). *Emotional and physical exhaustion* was significantly reduced by the intervention programs (95%CI: - 1.25, - 0.48). The Q-statistic and the I^2 index showed that heterogeneity was absent for *emotional and physical exhaustion* (Q (df = 4) = 3.25, p = .52; I^2 = 0.00%).

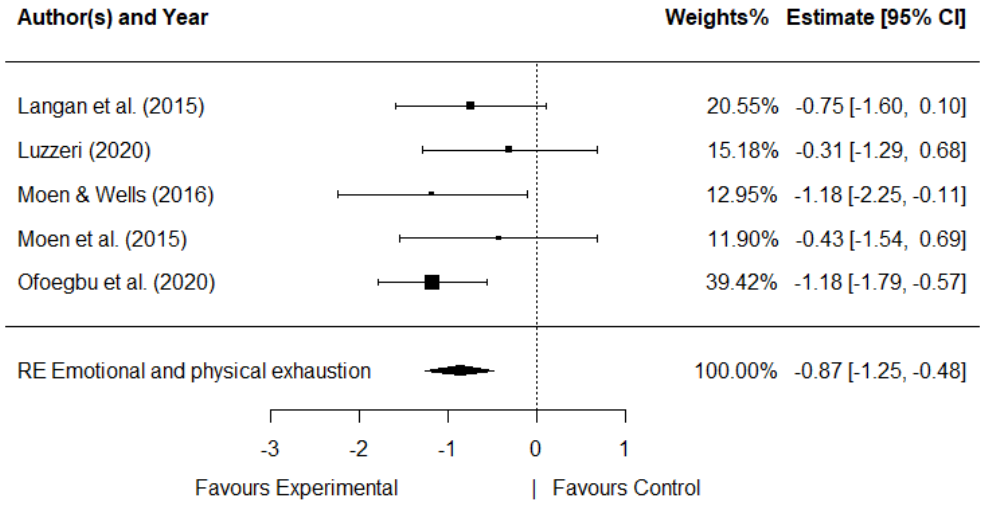

Figure 4. Forest plot for emotional and physical exhaustion.

A moderate effect was observed for *devaluation of sports* (d = -0.77, SE = 0.33, p <.05). *Devaluation of sports* was significantly decreased by the intervention's programs (95%CI: - 1.43, - 0.11). The Q-statistic and the I^2 index showed that heterogeneity was significant for *devaluation of sports* (Q (df = 4) = 10.56, p < .05; I^2 = 62.11%).

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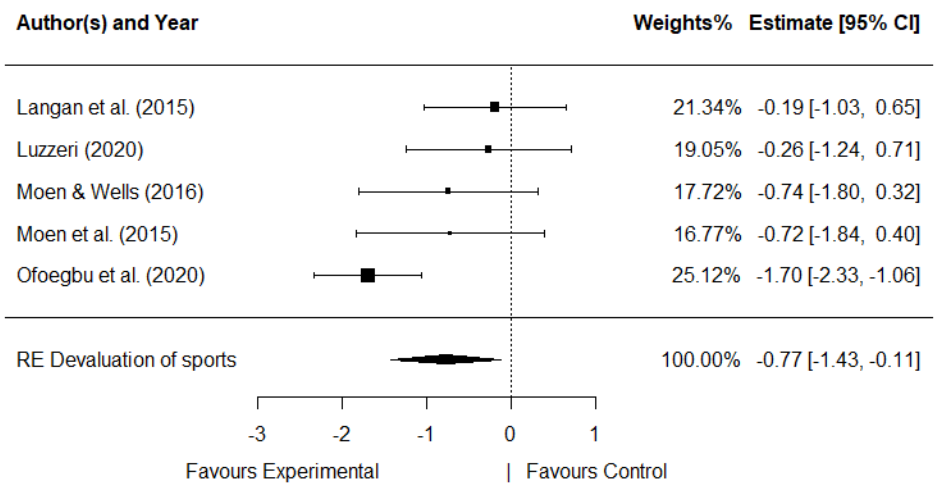

Figure 5. Forest plot for *devaluation of sports.*

Publication bias was calculated using Egger's regression test: *reduced sense of accomplishment* ($Z = 2.45$, $p < .05$); *emotional and physical exhaustion* ($Z = 1.18$, $p = .24$); *devaluation of sports* ($Z = 1.39$, $p = .16$). Figures 6, 7 and 8 indicates funnel plots for each dimension.

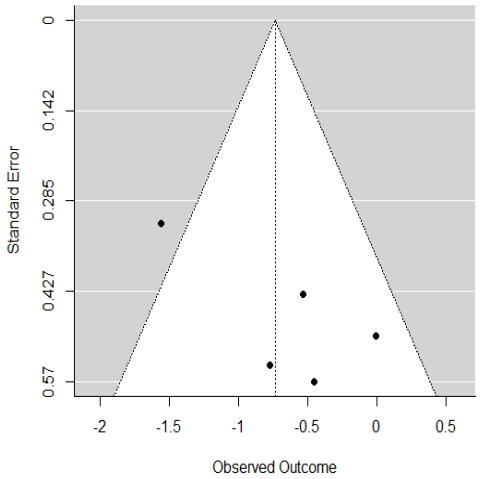

Figure 6. Funnel plot for reduced sense of accomplishment.

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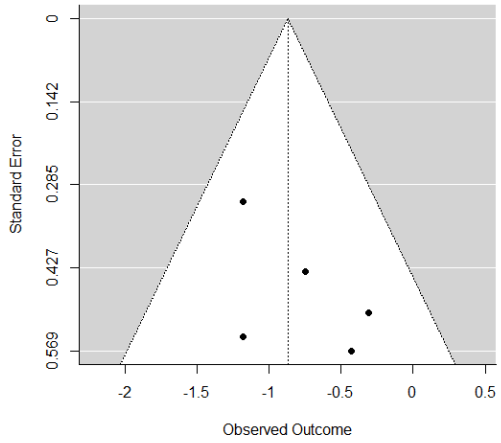

Figure 7. Funnel plot for emotional and physical exhaustion.

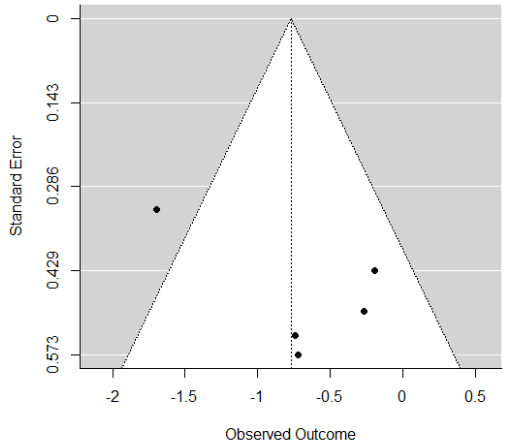

Figure 8. Funnel plot for *devaluation of sports.*

3.4. Influence of the moderating variables on the efficacy

Table 3 shows the moderating variables that predict variation in aggregate effect sizes for the *reduced sense of accomplishment* dimension. No significant differences were found between the different types of intervention or according to the form of implementation. However, significant differences were found between the control group types, finding more effect when the control group was waiting list instead of control. No significant differences were found according to age, duration of the interventions in weeks, number of sessions per week or total number of sessions. Though, significant differences were found according to percentage of female and according to the duration of the sessions in minutes.

Table 3. Moderating variables for the efficacy of interventions on *reduced sense of accomplishment*.

Moderating variables	*k*	*d*	95% CI	*Qm*	*Qe*	*p*
Intervention type [a]	5			4.60	8.31*	
CBT		-0.78	[-1.60, 0.04]			.06
MBI		-0.62	[-1.74, 0.51]			.28
Control type [a]	5			10.77**	4.75	

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Control		-0.39	[-1.12, 0.33]			.29
Waiting list		-1.13	[-1.84, -0.42]			<.01
Internet [a]	5			5.31	7.05	
Offline		-0.58	[-1.44, 0.27]			.18
Online		-0.91	[-1.85, 0.04]			.06
Age [b]	5	-0.09	[-0.42, 0.25]	0.26	7.11	.61
Female percentage [b]	4	0.03	[0.00, 0.05]	4.63*	2.31	<.05
Duration in minutes [b]	5	-0.01	[-0.03, -0.00]	4.29*	3.42	<.05
Duration in weeks [b]	5	-0.09	[-0.23, 0.05]	1.68	5.35	.20
Sessions per week [b]	5	0.11	[-0.21, 0.44]	0.47	7.00	.49
Total sessions [b]	5	0.00	[-0.03, 0.28]	0.01	8.68*	.94

Notes. k = number of studies; d = mean effect size; CI = confidence interval; Qm = Test of Moderators; Qe = Test for Residual Heterogeneity. * $p < .05$; ** $p < .01$; *** $p < .001$. [a] Categorical moderating variables. [b] Continuous moderating variables.

See Table 4 for moderating variables that predict variation in aggregate effect sizes for the *emotional and physical exhaustion* dimension. Significant differences were found between the different types of intervention, proved to be a more effective type of CBT intervention than MBI. Significant differences between the control group types were found, finding more effect when the control group was waiting list instead of control. Also, significant differences were found according to the form of implementation; online interventions were found to be more effective than offline interventions. No significant differences were found according to age, percentage of female participants, the duration of the sessions in minutes, duration of the interventions in weeks, number of sessions per week or total number of sessions.

Table 4. Moderating variables for the efficacy of interventions on *emotional and physical exhaustion*.

Moderating variables	*k*	*d*	95% CI	*Qm*	*Qe*	*p*
Intervention type [a]	5			17.38***	3.23	
CBT		-0.87	[-1.34, 0.40]			<.001
MBI		-0.82	[-1.61, 0.03]			<.05
Control type [a]	5			20.59***	2.23	
Control		-0.62	[-1.23, -0.02]			<.05
Waiting list		-1.03	[-1.53, -0.53]			<.001
Internet [a]	5			18.44***	3.11	
Offline		-0.79	[-1.37, -0.21]			<.01
Online		-0.93	[-1.47, -0.39]			<.001
Age [b]	5	-0.04	[-0.24, 0.15]	0.20	3.05	.66
Female percentage [b]	4	0.02	[-0.00, 0.04]	2.63	0.52	.10
Duration in minutes [b]	5	-0.01	[-0.02, 0.01]	1.16	2.09	.28
Duration in weeks [b]	5	-0.07	[-0.17, 0.04]	1.47	1.78	.22
Sessions per week [b]	5	0.06	[-0.15, 0.28]	0.35	2.91	.56
Total sessions [b]	5	-0.00	[-0.02, 0.02]	0.00	3.25	.97

Notes. k = number of studies; d = mean effect size; CI = confidence interval; Qm = Test of Moderators; Qe = Test for Residual Heterogeneity. * $p < .05$; ** $p < .01$; *** $p < .001$. [a] Categorical moderating variables. [b] Continuous moderating variables.

Table 5 explains the moderating variables that predict variation in aggregate effect sizes for the *devaluation of sports* dimension. No significant differences were found between the different types of intervention or types of control group. Significant differences

 doi:10.20944/preprints202208.0100.v1

were found depending on the form of implementation; online interventions were found to be more effective than offline interventions. No significant differences were found according to age, percentage of female participants, the duration of the sessions in minutes, duration of the interventions in weeks, number of sessions per week or total number of sessions.

Table 5. Moderating variables for the efficacy of interventions on *devaluation of sports*.

Moderating variables	*k*	*d*	95% CI	*Qm*	*Qe*	*p*
Intervention type [a]	5			4.05	10.31*	
CBT		-0.77	[-1.69, 0.15]			.10
MBI		-0.73	[-1.97, 0.51]			.25
Control type [a]	5			5.19	8.37*	
Control		-0.57	[-1.50, 0.36]			.23
Waiting list		-1.00	[-2.01, 0.01]			.05
Internet [a]	5			6.94*	6.67	
Offline		-0.52	[-1.35, 0.31]			.22
Online		-1.09	[-2.01, -0.17]			<.05
Age [b]	5	-0.20	[-0.48, 0.09]	1.81	5.42	.18
Female percentage [b]	4	0.02	[-0.01, 0.05]	2.54	2.80	.11
Duration in minutes [b]	5	-0.01	[-0.03, 0.01]	1.08	6.44	.30
Duration in weeks [b]	5	-0.06	[-0.23, 0.11]	0.50	8.61*	.48
Sessions per week [b]	5	0.05	[-0.34, 0.43]	0.06	9.86*	.81
Total sessions [b]	5	-0.00	[-0.03, 0.03]	0.01	10.54*	.93

Notes. *k* = number of studies; *d* = mean effect size; CI = confidence interval; *Qm* = Test of Moderators; *Qe* = Test for Residual Heterogeneity. * $p < .05$; ** $p < .01$; *** $p < .001$. [a] Categorical moderating variables. [b] Continuous moderating variables.

4. Discussion

The current meta-analysis focused on studies (RCT) on psychological interventions that aimed to reduce young athletes' burnout, published between January 2002 and June 10, 2022. We considered both online and traditional (offline) methods of psychological interventions, as well as inclusion and exclusion criteria. Finally, five RCT studies, with two types of intervention, two types of the control group and two implementation modalities, 15 measures, and three dimensions of burnout were selected for description. The meta-analysis compared the effectiveness of CBT (cognitive-behavioral therapy) and MBI (mindfulness-based intervention) interventions in decreasing burnout, such as reduced sense of accomplishment, devaluation of sport, and emotional and physical exhaustion. While considering the effectiveness of psychological intervention in general, we obtained a moderately significant effect size in a reduced sense of accomplishment and devaluation of sports. The intervention's programs significantly decreased both parameters of burnout. However, the CBT interventions were more effective in reducing emotional and physical exhaustion than MBI. As previously mentioned, CBT techniques are most commonly used in sports; however, mindfulness techniques that focus on the presence may be beneficial [15,29]. The systematic review on depressive symptoms and burnout in football players emphasizes the positive effects of both CBT ad MBI in preventing and curing the mental problems [30]. Breslin et al. (2022) underline, in the systematic review of the interventions to increase awareness of mental health and well-being in athletes and coaches, that there is a considerable need for longitudinal studies with larger samples of males and females and validated measurement tools [31]. Observations show that in some cases, athletes are even more prone to mental disorders when going through different adversities such as burnout, injury, and long competition periods when being away from friends and

 doi:10.20944/preprints202208.0100.v1

family. Furthermore, sports coaches, who are expected to play the role of gatekeepers of athlete mental health, suffer similar mental disorders as athletes [32].

While searching for the predictors of the changes in 3 analyzed burnout dimensions, the reduced sense of accomplishment was positively changed while the control group character was waiting list instead of just control, as well as the percentage of females among respondents and duration of sessions in minutes. If the respondents were females, the positive effects of the intervention were significantly higher, which is in relation to other studies proving that female athletes are significantly more open to mental consultation and less stigmatizing the psychological help itself. Moreover, females are more involved in mental training and convinced of its usefulness than male athletes [33,34]. Similarly, the emotional and physical exhaustion dimension was more significantly reduced in the waiting list control group. What is interesting is that online interventions were more effective in reducing the emotional and physical exhaustion dimension as well as the devaluation of the sports dimension compared to offline, traditional face-to-face interventions. Openness to online help has been seen in sports settings since the lockdown caused by the Covid-19 pandemic. Nowadays, the use of interventions based on modern technologies seems to be more and more effective. For example, many sports associations have introduced specially prepared online mental interventions for athletes during confinement. Furthermore, studies revealed that athletes who received such professional psychological help coped better with psychological stressors, showing improved well-being than those who did not participate in such training. Online interventions give new opportunities and allow to help athletes wherever they are [35].

The present study has a major strength that all the studies reviewed used the same measure of burnout, so that the effect of the interventions on each of the subdimensions of the questionnaire was analyzed. However, this meta-analysis has a few limitations due to the small number of studies that met the inclusion criteria. The total participant size among all the studies reviewed is low and caution is needed with the results obtained. In addition, the combination of moderating variables is not always complete, for instance, the reviewed studies that were provided in online format performed a CBT intervention, thus the effect of the MBI intervention delivered online has not been analyzed. Another limitation is that the effects of the intervention have been analyzed only among young athletic participants. Future research could expand the number of studies analyzed by comparing the effect of the intervention in young and adult athletes

5. Conclusions

The five studies were selected for the analysis. The meta-analysis revealed that both CBT and MBI interventions were effective forms of reducing most burnout dimensions. Moreover, online interventions seemed to be more beneficial for young athletes' burnout healing, showing that new forms of therapy could be more beneficial nowadays. The current meta-analysis and previous systematic reviews have emphasized a strong need for more research on psychological interventions' effectiveness in reducing burnout among young athletes, mainly because the phenomenon of athlete burnout still requires more observations and measurements.

Author Contributions: For research articles with several authors, a short paragraph specifying their individual contributions must be provided. The following statements should be used "Conceptualization, D.W..; methodology, D.A., M.J.A. and Q.W..; formal analysis, D.A. and M.J.A; resources, D.W., Q.W., J.C.J, D.A and, M.J.A; writing—original draft preparation, D.W., Q.W., J.C.J, D.A, M.J.A. and M.L.; writing—review and editing, D.W., D.A., M.J.A. and J.C.J. All authors have read and agreed to the published version of the manuscript."

Funding: Please add: "This research received no external funding"

Institutional Review Board Statement: not relevant

Conflicts of Interest: "The authors declare no conflict of interest."

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