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Review Paper

Impact of Stress Inoculation Training on Psychological Variables in Sports: A Narrative Review

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ABSTRACT

The aim of the study was to identify, examine, and understand the consensus in the existing literature on the Effects of stress inoculation training on psychological variables in sports utilizing a narrative review-based research design. The methodology included finding published English language articles through electronic academic databases following the PRISMA flow guidelines rendering 8 research articles for review as they fulfilled the inclusion criteria. There was some degree of consistency between the studies with regard to the methodology employed however while all the findings of the studies did not report significant differences, there was an established uniformity in the assertion that stress inoculation training had no negative implications as an intervention for managing psychological parameters in sports.

Keywords: *Stress Inoculation training, psychological variables, physiological variables, sports*

Psychological stress is an inherent aspect of sports. Henceforth, Athletes must prepare for the psychological strain and stress related to competitive sports in the same manner that they undertake the physical and technical requirements for elite performance (Fletcher & Arnold, 2021).

Stress encompasses a multifaceted psychobiological process comprising three key components: stressors, assessments of threats, and emotional responses. Stress is typically triggered by situations or circumstances perceived as threatening, potentially detrimental, or aggravating. The term stressor implies circumstances or situations that encompass a specific level of objective physical or psychological risk (Spielberg, 1990).

The notion of stress pertains to an individual's evaluation of a scenario as potentially distressing or perilous. Anxiety states are emotional responses characterized by a distinctive blend of: feelings of nervousness, tension, and apprehension; distressing thoughts (worries); and physiological changes. Trait-state anxiety theoretical formulations offer a comprehensive constitution for analysing key parameters in stress and anxiety research, proposing potential relationships among these variables. (Spielberg, 1990)

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With regard to physiological arousal, it is widely recognized that the presence of a perceived or real stressor enhances the nervous system's activity of the flight-or-fight part, whereas the parasympathetic or rest-or-digest activation of the nervous system exhibits decreased arousal (Berntson & Cacioppo, 2004). The polarity in this process underlies numerous psychiatric and medical afflictions (Berntson & Cacioppo, 2004). Consequently, implementing relaxation techniques will enhance the activity of the parasympathetic nervous system, & various investigations demonstrate that such techniques are efficient tactics for alleviating the stress response (Davis, Eshelman, & McKay, 2008).

Commonly utilized relaxation modalities include progressive muscle relaxation and breathwork practice (Bernstein, Carlson, & Schmit, 2007). These practices are believed to address 2 separate facets of emotional regulation & arousal. Muscle relaxation decreases arousal via muscle-to-mind relaxation techniques. Abdominal breathing enhances variability of heart rate (Moss, 2017), while reduced heart rate variability has been structurally associated with various medical ailments in which stress is a contributing factor (Berntson & Cacioppo, 2004).

Amid the most commonly utilized stress inoculation training, & stress regulation training protocols (Meichenbaum & Deffenbacher; Meichenbaum, 2008) have demonstrated effective results within the realm of sports (Long, 1984; Whitmarsh & Alderman, 1993; Holm et al., 1996). The process includes 3 stages: skill acquisition, conceptualization, & application. The skill acquirement stage, a key component of the program, involves training cognitive strategies and employs methods including trained breathing, relaxation, attention diversion, imagery, along positive intrapersonal communication (Kerr & Leith, 1993). The implementation of SIT has demonstrated efficacy in reducing anxiety levels enhancing academic orientation (Holm et al., 1996), and enhancing positive self-statements (Long, 1984).

METHODOLOGY

The objective of the current study was to thoroughly evaluate the literature regarding the effects of SIT (stress inoculation training) on various psychological variables in sports, following the framework established by Arksey & O'Malley (2005), which encompasses guidelines for determining the research questions, identifying pertinent studies, selecting studies, summarizing, collating, charting data, and report findings. The goal of the study was to amalgamate accessible scientific literature affiliated with the effect of SIT on various psychological & physiological variables in sports.

Search Strategy

A systematic search was conducted using Google Scholar to retrieve articles that comprised the terms "stress inoculation training in sports," "stress inoculation intervention in sports," along with the words "psychological, "and "sports" was done in order to identify credible, pertinent studies that should be included. Furthermore, the "citations of pertinent articles for additional references that were omitted in the preliminary pursuit were also assessed.

Inclusion and Exclusion Criteria

The review encompassed all the papers that answered the" research question along with literature that was available in the English language, original empirical studies, specific interventions & sports population. Nevertheless, the review did not include duplicate, irrelevant, abstract-only papers, studies with unavailable full texts, "reports that were not

published in the scientific peer-reviewed journals, studies, or reviews" wherein the sample target was not "met.

Article Selection and Data Extraction

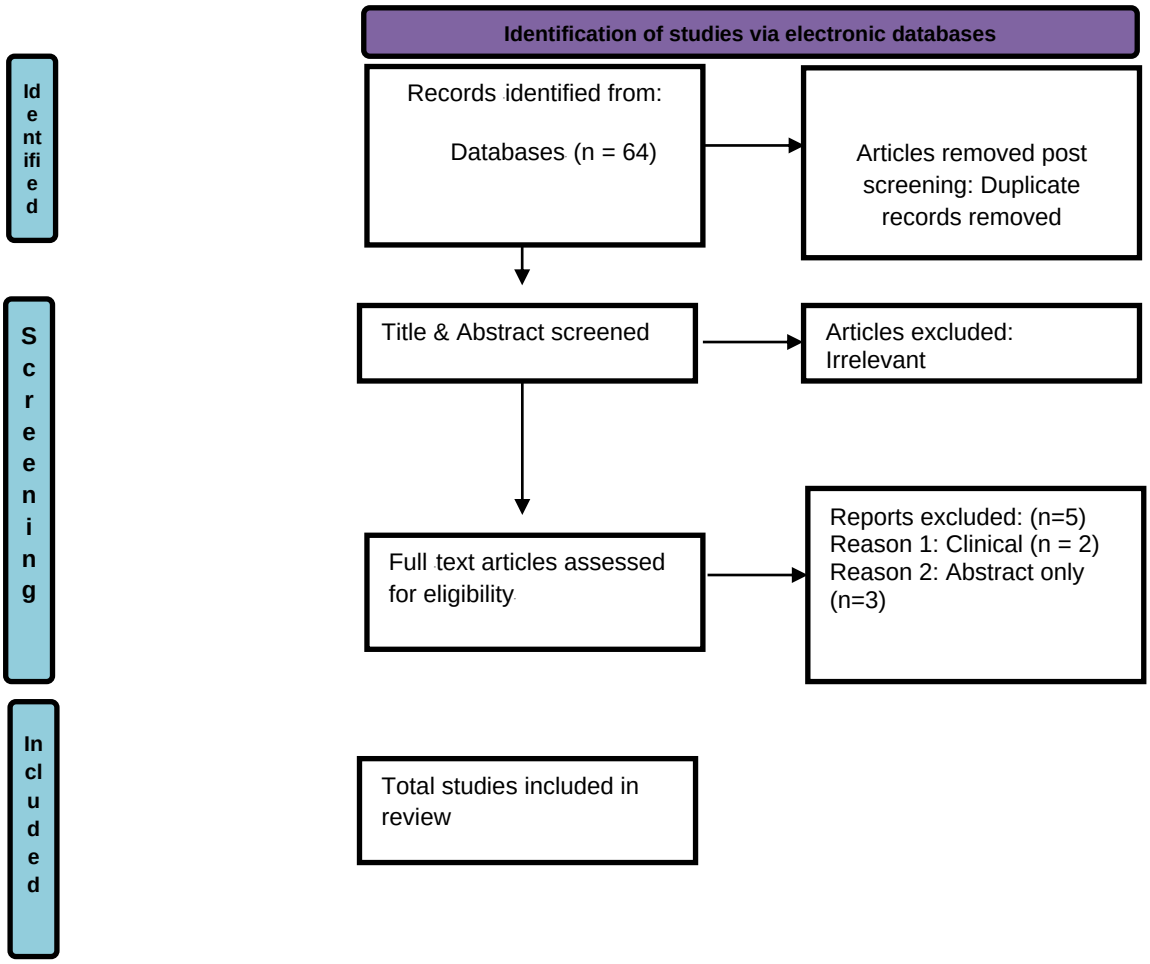
The reliability of this review was ensured by employing 2 reviewers to autonomously screen for inclusion of the publication title & abstract. The data haul out from each paper is as follows: (a) authors, (b) title, (c) publication year, (d) sample size, (e) research" design (f) methodology (h) "results.

Statistical Analysis

A descriptive analysis of the included literature's characteristics to investigate the" effect of stress inoculation training on various psychological & physiological variables in sports was performed. This narrative review was conducted in accordance with the PRISMA Flow Diagram.

RESULTS & DISCUSSION

The PRISMA Flow protocol was used for the identification of studies. The database searches utilized academic search engine platforms such as Google Scholar, Semantic Scholar, BASE, and Science.gov resulting in a total of 42 papers wherein ineligible and duplicate document types were not included. After screening the titles and abstract, 29 papers were eliminated. Subsequently, full-text papers were cast after screening full texts, out of the remaining 13 papers, five were factored out, resulting in eight papers for incorporation. The PRISMA Flow provides a summary of the search results and screening criteria.



Characteristics of Articles:

This review revealed considerable variability in research objectives, methodologies, sample sizes, and outcome measures. Table I illustrates a summary of the data heterogeneity utilizing the variables: Title/; author/year/; Sample; Variables/IV/DV; research design and method; Results. A summary of the characteristics of the article is given below:

Table 1 Summary of the characteristics of the articles reviewed

Title	Author (Year)	Sample	IV	DV	Research design	Data Collection & Statistics	Findings
Effects of stress inoculation training on self-report, behavioural and psychophysiological reactions to abseiling	Mace et al. (1986)	n =20; Abseiling athletes	SIT	Perceived stress, state anxiety, Heart Rate	Experimental Pre-post design with control group	Quantitative data collection-self report, telemetry Parametric statistical tools	Significant differences were found in the stress inoculation group in self-reported anxiety & stress in regard to control group, however no significant differences were reported between the heart rate goups.
Stress inoculation training: a case study in gymnastics	Mace et al. (1986)	n = 1; Female Gymnast	SIT	Self-image, performance metrics	Descriptive Case study	Qualitative data analysis & description: interview , rating and performance metric analysis	Qualitative analysis of interviews & disparity of comments put forward by the athlete prior to & after the intervention, stipulated that the training had been effective in improving the athlete's attitude & rate of skill acquisition.
Stress inoculation training to control anxiety in sport: two case studies in squash	Carroll et al. (1986)	n = 2; Squash	SIT	State anxiety	Single subject case study design	Quantitative & qualitative data collection & analysis	Both the squash players showed considerable decrease in experience of self-reported state anxiety post intervention.
The effects of stress inoculation training on gymnastics performance on the pommelled horse	Eastman et al. (1987)	n = 1; Gymnast	SIT	Anxiety, confidence & performance	Descriptive Case study	Qualitative data collection, analysis & description: interview , rating and performance metric	The outcomes of the study indicated improvement in confidence and performance of the athlete along with reduction in symptoms of anxiety & stress.
Effect of Eight Sessions of Stress Inoculation Training on Reducing Anxiety before the Competition	Abdi & Zandi (2019)	n = 30; Adolescent school boys	SIT	Anxiety	Semi experimental with pretest-post-test design with experimental and control groups	Quantitative data collection; Independent & dependent t-test	The study reported that stress inoculation training contributed to management of physiological arousal prior to competition
Stress Inoculation Training and Mental Fatigue	Gallagher et al. (2020)	n = 9; Moderately trained runners	SIT	Mental fatigue (self-rated emotional response, suppressed emotions), Physical Performance (H.R, Lactate, effort, pain, average time)	Pretest-post-test design with experimental and control groups	Quantitative data collection; Mixed ANOVA	Data analysis of the study revealed that while there were no negative impacts of the intervention at the same time it did not show any significant differences in the variables under study.
The effect of stress inoculation training on self-reported stress, observer's rating of stress, heart rate and gymnastics performance	Mace & Carroll (1989)	n = 18; Female Gymnast	SIT	Psychological distress, H.R, Performance	Pretest-post-test design with experimental and control groups	Quantitative data collection; t-test	Subjects in the stress inoculation group exhibited markedly lower stress compared to the control group. However, no changes were observed between the groups in regard to heart rate.
The effect of stress inoculation training on athletes' anxiety, pain and return to functioning during rehabilitation from orthopaedic injury	Berger, R. S. (1990).	n = 60; Athletes	SIT	Anxiety, Pain & Recovery time	Pretest-post-test design with experimental and control groups	Quantitative data collection	Participants in the treatment group demonstrated significantly less postsurgical pain and anxiety during the rehabilitation process, compared with controls

Note. SIT = Stress Inoculation Training; IV = Independent Variables; DV = Dependent Variables

The results were collated and summarized on the basis of existing literature on the principles of good practice in narrative reviews. Based on the evaluation of the characteristics of the articles that were included in the review on the basis of the inclusion criterion it was found that there were result-based inconsistencies across the eight studies, however in terms of a methodical approach to the research, there was consistency except one study that operated with a qualitative research approach.

Mace et al (1986) were the pioneer who systematically introduced stress inoculation training from a clinical backdrop into the field of sports and performance optimization by utilizing its psychological skill training protocol to assist athletes in mitigating the symptoms of pre-competition anxiety, performance-related distress, and understand the implications of this intervention towards performance enhancement. In his study he utilized an experimental design with a control group to evaluate the impact of SIT on self-report, psychophysiological as well as behavioural responses to rappelling in which significant differences were found in the stress inoculation group in self-reported anxiety & stress in regard to the control group, however, no substantial discrepancies were reported between the groups with regard to heart rate measures.

Mace et al. (1986) performed a case study on the impact of Stress Inoculation Training in gymnastics to assess its impact on the self-image and performance metrics of a gymnast experiencing difficulties in performance enhancement following an injury. The data was collected from the athlete through interviews which were compared prior to and post-intervention indicating an improvement in her self-image and performance which was also corroborated by the coach.

Carroll et al. (1986) investigated the implications of SIT on anxiety management in sports through two case studies in squash. The baseline measure of anxiety was taken through state anxiety questionnaire prior to five important league matches, followed by eight training sessions of SIT. Post-training, the measures of anxiety were taken again using state anxiety questionnaire prior to homologous matches. The analysis of data revealed sizeable differences in anxiety along with self-reported improvement in performance.

Eastman et al. (1987) evaluated the influence of SIT on gymnastics performance, self-confidence, & anxiety in relation to the pommelled horse. A descriptive case study design was utilized to collect data and describe the effects of the intervention based on interviews with the gymnast which revealed that the gymnast showed improvement in his self-confidence, levels of anxiety, and performance after participating in the sessions.

Abdi and Zandi (2019) evaluated a study to inspect the implications of eight sessions of SIT on alleviating anxiety before the competition. A semi-experimental study design with pretest-post-test experimental and control group has been employed with a sample size of n = 30 adolescent school boys who actively participated in sports. After the eight sessions were concluded, the competitive state anxiety inventory responses were compared pre and post-intervention showcasing that the intervention was successful in managing the experience of anxiety in the experimental group.

Gallagher et al. (2020) studied stress inoculation training and mental fatigue in which mental fatigue was measured through parameters of self-rated emotional response, and suppressed emotions while physical performance was evaluated on the basis of Heart rate, lactate, effort, pain, & average time. A pretest-post-test design with control as well as experimental

group approach was employed, & the findings from the undertaken research suggested that while there were no negative impacts of the intervention at the same time it did not show any significant differences in the variables under study in terms of physical performance, however within mental fatigue the parameter of emotional suppression, self-rated disgust and difficulty in its suppression was observed in the experimental group.

Mace & Carroll (1989) conducted research to understand the influence of stress inoculation training on gymnastics performance, heart rate, observer's rating of stress as well as self-reported stress. A pretest-post-test design with a control as well as experimental group approach was employed, & the findings from the data analysis concluded that self-reported stress, and observers' rating of the performance on the beam showed improvement however no differences were found with regard to heart rate.

Berger, R. S. (1990) investigated the impact of SIT on athletes' pain, and anxiety, along with rehabilitation outcomes following orthopaedic injuries. Subjects in the intervention group demonstrated considerably less postsurgical pain and anxiety during their treatment phase, in contention with the control group.

Effect of stress inoculation training on psychological variables:

Studies by Mace et al (1986,1987,1989) showed corroborative evidence of stress inoculation training as an effective means of improving anxiety in sportspersons over a span of multiple studies, across different sports in a timeline spanning four years. It also revealed that in addition to the management of anxiety, it was also successful in improving the athlete's attitude, rate of skill acquisition & performance. Further two studies (Berger, R. S. 1990), (Abdi & Zandi, 2019) examined the implications of stress inoculation training on various psychological parameters & found that the intervention was effective in positively impacting the psychological factors under study.

CONCLUSION & RECOMMENDATIONS

Summing up the review, it can be ascertained that stress inoculation training generally improved psychological factors under study and also did not indicate any negative impacts on psychological, physiological, or performance-related factors. In few studies, along with improvement in psychological factors, it was also seen that the intervention also positively influenced the performance metrics of the respective sports under study.

While the current study utilized a narrative review study design to understand the implications of the intervention on psychological variables in sports, a further step towards a more comprehensive study design using systematic review, meta-analysis, and triangulation-based studies can offer a more in-depth understanding of the intervention and its impact. It is also further recommended that there is a lacuna of studies within the domain of the Indian sports ecosystem on this intervention and its various implications, thus it is encouraged that more data-driven, empirical-based research in this domain can enhance our understanding of stress inoculation training as a performance enhancement tool.

REFERENCES

Abdi, H., & Gharayagh Zandi, H. (2019). Effect of Eight Sessions Stress Inoculation Training on Reducing Anxiety before the Competition. Strategic Studies on Youth and Sports, 18(45), 315-326.

Berger, R. S. (1990). The effect of stress inoculation training on athletes' anxiety, pain and return to functioning during rehabilitation from orthopaedic injury. Saint Louis University.

Bernstein, D. A., Carlson, C. R., & Schmidt, J. E. (2007). Progressive relaxation. Stress Management, 88.

Berntson, G. G., & Cacioppo, J. T. (2004). Heart rate variability: Stress and psychiatric conditions. Dynamic electrocardiography, 57-64.

Davis, M., Eshelman, E. R., & McKay, M. (2008). The relaxation and stress reduction workbook. New Harbinger Publications.

Gallagher, J., Svir, M., Albers, J., & Frost, J. (2020). Stress Inoculation Training and Mental Fatigue. International Journal of Research in Exercise Physiology, 16(1), 1.

Holm, J. E., Beckwith, B. E., Ehde, D. M., and Tinius, T. P. (1996). Cognitive-behavioral interventions for improving performance in competitive athletes: a controlled treatment outcome study. Int. J. Sport Psychol. 27, 463–475.

Kerr, G., and Leith, L. (1993). Stress management and athletic performance. Sport Psychol 7, 221–231. doi: 10.1123/tsp.7.3.221

Long, B. C. (1984). Aerobic conditioning and stress inoculation: a comparison of stress management interventions. Cogn. Ther. Res. 8, 517–541. doi: 10.1007/BF01173289

Mace, R. D., & Carroll, D. (1989). The effect of stress inoculation training on self-reported stress, observer's rating of stress, heart rate and gymnastics performance. Journal of Sports Sciences, 7(3), 257-266.

Mace, R. D., Carroll, D., & Eastman, C. (1986). Effects of stress inoculation training on self-report, behavioural and psychophysiological reactions to abseiling. Journal of Sports Sciences, 4(3), 229-236.

Mace, R., & Carroll, D. (1986). Stress inoculation training to control anxiety in sport: two case studies in squash. British Journal of Sports Medicine, 20(3), 115-117.

Mace, R., Eastman, C., & Carroll, D. (1986). Stress inoculation training: a case study in gymnastics. British Journal of Sports Medicine, 20(3), 139-141.

Mace, R., Eastman, C., & Carroll, D. (1987). The effects of stress inoculation training on gymnastics performance on the pommelled horse. A case study. Behavioural and Cognitive Psychotherapy, 15(3), 272-279.

Meichenbaum, D. H., & Deffenbacher, J. L. (1988). Stress inoculation training. The counselling psychologist, 16(1), 69-90.

Moss, D., & Shaffer, F. (2017). The application of heart rate variability biofeedback to medical and mental health disorders. Biofeedback, 45(1), 2-8.

Whitmarsh, B. G., and Alderman, R. B. (1993). Role of psychological skills training in increasing athletic pain tolerance. Sport Psychol. 7, 388–399. doi: 10.1123/tsp.7.4.388 [Original source: https://studycrumb.com/alphabetizer]

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Conflict of Interest

The author(s) declared no conflict of interest.

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