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EFFECT OF A 24-WEEK YOGA INTERVENTION ON PERCEIVED STRESS AMONG COMPETITIVE SPRINTERS, MIDDLE-DISTANCE RUNNERS, AND JUMPERS

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Abstract:
Yoga is a traditional mind–body practice that integrates physical postures, controlled breathing, and meditative techniques to enhance both physiological and psychological functioning. Athletes are frequently exposed to psychological stress due to intensive training demands, competitive pressure, and performance expectations, which may negatively influence performance outcomes. The present study examined the effect of a

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24-week yoga intervention on perceived stress among sprinters, middle-distance runners, and jumpers aged 18–25 years. A total of 120 healthy participants were selected and equally assigned to experimental and control groups, with each category comprising male and female athletes. The experimental group participated in a structured yoga program for one hour per day, five days per week, for 24 weeks, whereas the control group continued their regular training routines without yoga. Perceived stress was assessed using the Perceived Stress Scale (PSS). Statistical analyses included paired samples t-tests, independent samples t-tests, and repeated measures ANOVA. The findings revealed significant reductions in perceived stress among participants in the experimental group across athletic categories, while no meaningful changes were observed in the control group. These results indicate that yoga may serve as an effective intervention for reducing perceived stress and supporting psychological well-being among athletes.

Keywords: yoga, perceived stress scale, athletes, sports psychology, mental health

1. Introduction

Yoga is a traditional Indian system of practice and involves the practice of coordinated use of bodily postures (asanas), regulated breathing (pranayama), and meditative techniques (dhyana) with a view of promoting integration of physical and mental functions (Iyengar, 2015; Telles et al., 2013). Nowadays, yoga has become widely accepted all over the world as a productive method of refining overall health and well-being (Woodyard, 2011; Field, 2016). Evidence indicates that yoga is capable of enhancing flexibility, muscular endurance, balance, and cardiovascular efficiency (Ross and Thomas, 2010; Pascoe et al., 2017). Besides physical advantages, yoga has been reported to have decreased psychological issues like stress, anxiety and depressive symptoms (Goyal et al., 2014; Streeter et al., 2012). As both physical preparedness and psychological stability are essential in order to achieve successful performance in sports, yoga has become an increasingly important part of sports science and athletic conditioning (Birrer and Morgan, 2010; Schmalzl et al., 2015).

Athletes frequently experience the psychological stress caused by the training regimen, competition, success expectations and fear of failure (Gould and Maynard, 2009; Weinberg and Gould, 2019). High levels of stress can have negative effects in the areas of attention, emotional regulation, decision-making ability, and neuromuscular coordination, which in turn may impact performance (Jones, 2003; Nicholls and Polman, 2007). Stress management is thus deemed to play a critical role in performance consistency as well as improvement in psychological well-being of sportspersons (Anshel, 2001).

Perceived stress is defined as the cognitive assessment of a situation by an individual as demanding, unpredictable or difficult to handle (Cohen et al., 1983; Lazarus and Folkman, 1984). One of the most common tools that is utilized to measure the extent

to which people perceive experiences in their lives as being traumatic in a given time frame is the Perceived Stress Scale (PSS) (Cohen et al., 1983). Elevated levels of perceived stress have been linked to poorer concentration, mental fatigue, less efficient in performing tasks, and at increased risk of injury among athletes (McEwen, 2007; Pascoe et al., 2017).

Practices based on yoga are reported to have an influence on the psychophysiological mechanisms by improving the equilibrium of the autonomic nervous system, reducing cortisol secretion and enhancing emotional regulation (Jerath et al., 2006; Streeter et al., 2012). Such techniques as controlled breathing, relaxation practices, and meditation have a remarkable effect on better mindfulness and cognitive functioning (Brown and Ryan, 2003; Tang et al., 2015). These psychological advantages can help athletes to be more capable of handling competitive stress and becoming emotionally more resilient (Gard et al., 2014; Gross, 2015). Bearing these possible benefits in mind, the present study was conducted to evaluate the usefulness of a structured 24-week programme of yoga-based intervention in the reduction of perceived levels of stress in sprinters, middle distance runners and jumpers.

2. Literature Review

High levels of sports performance cannot be achieved without both psychological stability and physical conditioning (Weinberg and Gould, 2019). Competitive sport often places athletes under psychological pressures related to success expectations, performance appraisals, and doubts about their performance (Gould & Maynard, 2009). Such competitive pressures could be subjected to individuals, and this might cause mental strain, which in turn may affect attentional control, emotional regulation and decision-making ability when faced with a performance situation (Jones, 2003). Stress management can thus be regarded to be crucial in terms of sustaining consistency in performance as well as providing support to the overall psychological well-being of sportspersons (Nicholls and Polman, 2207).

Perceived stress is the cognitive evaluation of a situation by an individual as challenging, unpredictable or impossible to manage (Cohen et al., 1983). This subjective exposure is viewed as more significant than objective exposure to stress, as individuals can have diverse responses to the same situation based on coping resources and psychological resilience (Lazarus and Folkman, 1984). The Perceived Stress Scale (PSS) is a widely used measurement to determine the level of stress people perceive in their lives. It was developed by Cohen and his colleagues (1983). The perceived stress levels have been found to be linked with reduced concentration, mental fatigue, diminished performance efficiency, and increased vulnerability to the experience of psychological distress (Anshel, 2001; McEwen, 2007).

The use of mind-body interventions has become the focus of great attention due to its possible role in the enhancement of psychological functioning and emotional balance (Gard et al., 2014). Yoga combines physical activity, breathing, and mindfulness,

thus interacting between physiological and mental processes (Iyengar, 2015; Telles et al., 2013). Consistent practice of yoga has been linked to better relaxation, emotional regulation, and attentional regulation (Field, 2016; Ross and Thomas, 2010). With practice, individuals can become more aware of the sensations in the body, as well as patterns of cognition, which may have a role in better coping with stress (Brown and Ryan, 2003).

Empirical data indicate that the practice of yogic breathing might have an effect on the functioning of the autonomic nervous system by promoting the prevalence of the parasympathetic system, which is related to the processes of relaxation and recovery (Jerath et al., 2006; Streeter et al., 2012). Yoga meditation elements can help to decrease cognitive distractions and enhance emotional regulation, thus improving clarity of thought (Davidson et al., 2003; Tang et al., 2015). Such psychophysiological adjustments are especially pertinent to the sport context where athletes have to keep their focus and composure in the competitive environment (Birrer and Morgan, 2010).

Past studies point out that yoga could be helpful with psychological flexibility by promoting mindfulness and better self-management skills (Gard et al., 2014; Kabat-Zinn, 2003). Through better emotional regulation, athletes might be able to respond more positively to performance-related problems and competitive stressors (Gross, 2015). Moreover, the development of better body awareness related to yoga practice can lead to more efficient, coordinated, and confident movement during athletic performance (Schmalzl et al., 2015).

While there is growing concern in the field of mind-body interventions, there is limited research that specifically focuses on perceived stress among track and field athletes who belong to various categories of events. The performance demands of sprinting, middle-distance running, and jumping events might be different in relation to physiological and psychological requirements (Bompa & Buzzichelli, 2019). Such differences can cause disparity in the perception of stress and stress coping mechanisms in athletes. Thus, it is important to conduct further research to find out whether it is possible to affect perceived stress in athletes involved in various athletic activities with the help of structured yoga interventions. The following research will make a contribution to this field by studying how a systematic yoga training programme affects the perceived stress levels in sprinters, middle-distance runners and jumpers.

3. Materials and Methods

3.1 Participants

A total of 120 healthy volunteers aged between 18–25 years were selected for the study. Sprinters, middle-distance runners and jumpers were used, as well as normal controls. Each group would have 20 members (10 men and 10 women). Participation was determined by age and the number of years they had been exposed to athletics.

3.2 Research Design

The research study adhered to an experimental research design using pre-test and post-test. The participants were separated into experimental and control groups. The experimental arm of the study went through an organized program of yoga intervention training over a period of 24 weeks, whereas the control group proceeded with ordinary training programs, but not yoga practices.

3.3 Yoga Intervention Schedule

The yoga intervention was administered for one hour per day and five days per week for 24 weeks. The yoga program was comprised of the following:

Practice	Duration
Initial Relaxation	5 min
Abdominal Breathing	6 min
Loosening Exercises	15 min
Paschimottanasana	2 min
Purvottanasana	30 sec
Makarasana	30 sec
Bhujangasana	30 sec
Dhanurasana	30 sec
Shalabasana	1 min
Cat and Cow Stretch	1 min
Ardhamatyendrasana	1 min
Balancing Asanas	1 min
Trikonasana	1 min
Padahastasana	30 sec
Savasana	15 min
Meditation	8 min

3.4 Measurement of Psychological Variable

The Perceived Stress Scale (PSS) created by Cohen, Kamarck and Mermelstein (1983) was used to measure perceived stress. One of the most popular psychological tools that can be employed to evaluate the extent to which individuals view conditions in their lives as stressful, unpredictable, uncontrollable and overwhelming. The scale measures the subjective judgement of stress as opposed to the objective occurrence of the stressful events, making it especially appropriate in the process of assessing the psychological responses among the athletes who are exposed to competitive pressure and training demands. The PSS is designed as a group of items that indicate the prevalence of feelings and thoughts associated with stress in the past month. The participants will answer each item on a Likert-type scale of 0 (never) to 4 (very often). The complete score is calculated by adding the responses to all of the questions after inverting the scores on the positively stated items. An increase in the scores means an increase in the perceived levels of stress. The PSS is reliable and valid with a wide range of populations such as young adults and athletes, and it has been extensively utilized in research on sports psychology.

In the current research, the PSS was given to all the participants before the initiation of the yoga intervention (pre-test) and after the completion of the 24-week training period (post-test). The scale was applied to measure the efficacy of the yogic practices in the alleviation of perceived stress in sprinters, middle-distance runners and jumpers. The participants were asked to carefully read each statement and provide the frequency at which they experienced the described feelings during the past month.

Perceived stress is a significant mental aspect affecting athletic performance in that high levels of stress can negatively affect concentration, decision-making ability, emotional control and neuromuscular coordination. Interventions based on yoga have been known to control the autonomic nervous system, decrease the amount of cortisol, as well as enhance emotional stability. Hence, the perceived stress measured via the PSS was an efficient measure to use in the analysis of the psychological effects of the 24-week yogic program on athletes.

3.5 Statistical Analysis

Data were analyzed using SPSS software. Statistical methods included:

- Paired samples t-test,
- Independent samples t-test,
- Two-way repeated measures ANOVA.

4. Results and Discussion

Table 1: Descriptive Statistics of Perceived Stress Scores

Group	Time	Control Mean ± SD	Experimental Mean ± SD
Sprinters	Pre	18.80 ± 4.895	19.85 ± 5.547
	Post	20.30 ± 4.028	16.10 ± 5.812
Middle-distance runners	Pre	15.80 ± 5.699	21.40 ± 4.210
	Post	21.75 ± 3.242	17.00 ± 3.212
Jumpers	Pre	19.20 ± 3.302	21.45 ± 4.298
	Post	21.90 ± 3.655	16.00 ± 2.513

The descriptive statistics showed that during the pre-test phase, the mean perceived stress scores of both control and experimental groups were relatively similar across all three athletic groups, indicating the possibility of comparing baseline scores before the intervention. The experimental groups showed a linear decrease in perceived stress scores relative to their pre-test scores.

Among sprinters, the experimental group showed a decrease in mean perceived stress score from pre-test (M = 19.85, SD = 5.55) to post-test (M = 16.10, SD = 5.81), whereas the control group showed an increase from pre-test (M = 18.80, SD = 4.90) to post-test (M = 20.30, SD = 4.03). Likewise, in the case of middle-distance runners, there was a decrease in the perceived stress scores of the experimental group (M = 17.00, SD = 3.21) compared to the control group (M = 21.75, SD = 3.24). The experimental group also demonstrated a decline in mean perceived stress scores between pre-test (M = 21.45, SD = 4.30) and the

post-test (M = 16.00, SD = 2.51) in the experimental group only, as opposed to the control group, which exhibited an increase between pre-test (M = 19.20, SD = 3.30) and post-test (M = 21.90, SD = 3.66).

The apparent decrease in perceived stress in the experimental group could be explained by the physiological and psychological advantages of yoga practices like abdominal breathing, relaxation methods, and meditation, which help to regulate the stress response, reducing the activity of the sympathetic nervous system and increasing mental calmness. Asanas help increase flexibility and decrease muscle tension, whereas meditation helps improve emotional regulation and focus. Conversely, the control group was not improving, perhaps because their regular training program lacked organised relaxation and breathing exercises. Altogether, the descriptive results indicate that the 24-week structured yoga program could be beneficial in reducing the perceived stress levels among sprinters, middle-distance runners, and jumpers, which is why yoga as a complementary training regime can be suggested as an effective tool in improving the psychological well-being of athletes.

Table 2: Repeated Measures ANOVA for PSS Scores

Effect	Group	Sum of Squares	df	Mean Square	F	P
Time	Sprinters	25.31	1	25.31	1.002	0.323
	Middle-distance	12.01	1	12.01	0.705	0.407
	Jumpers	37.81	1	37.81	4.134	.049*
Time × Group	Sprinters	137.8	1	137.8	5.453	.025*
	Middle-distance	535.6	1	535.6	31.42	<.001***
	Jumpers	332.1	1	332.1	36.31	<.001***
Between Subjects (Group)	Sprinters	49.61	1	49.61	1.831	0.184
	Middle-distance	3.61	1	3.61	0.196	0.661
	Jumpers	66.61	1	66.61	4.332	.044*

Note. *p < .05, **p < .01, ***p < .001.

The ANOVA was a repeated-measures test to determine the effect of the 24-week structured yoga intervention on the perceived stress scores of sprinters, middle-distance runners, and jumpers under pre-test and post-test conditions.

The significant difference between the overall perceived stress scores in sprinters and in middle-distance runners was not statistically significant concerning the change of the overall perceived stress scores across the time span when no consideration was made for the difference between the two groups. Nonetheless, a significant main effect of time was observed among jumpers, F(1,38) = 4.134, p =.049, which suggests that there was a significant change in perceived stress scores between pre-test and post-test regardless of group.

Notably, the time and group interaction effect was statistically significant across the three athletic groups. They found that among sprinters, a significant interaction effect was observed, F(1,38) = 5.453, p =.025, which means that the difference in the perceived stress scores between the two time periods was significantly different between the

experimental and control groups. Similarly, a highly significant interaction effect was observed among middle-distance runners, $F(1,38) = 31.42$, $p < .001$, and jumpers, $F(1,38) = 36.31$, $p < .001$. The results show that there was a difference between the yoga intervention and the perceived stress scores when the yoga intervention was used alone (as opposed to regular training alone).

The between-subjects effect (group) was non-significant when time was not a factor in sprinters, $F(1,38) = 1.831$, $p = .184$, and middle-distance runners, $F(1,38) = 0.196$, $p = .661$. Nevertheless, a substantial between-subjects effect was observed between jumpers, $F(1,38) = 4.332$, $p = .044$, indicating that there was a significant difference between experimental and control groups in terms of perceived stress levels.

On the whole, the high time × group interaction effects of the 24-week yoga intervention over sprinters, middle-distance runners, and jumpers suggest the effectiveness of the 24-week yoga intervention in reducing perceived stress scores relative to the control condition. The decrease in the levels of stress that were found in the experimental group may be explained by the joint influence of the relaxation techniques, abdominal breathing, asanas, and meditation that were included in the yoga program, and which are known to increase the level of parasympathetic activation, reduce the level of physiological arousal, and elevate the level of emotional regulation. These results affirm the usefulness of yoga as a useful complementary training technique in enhancing the psychological well-being of athletes.

Table 3: Paired Sample t-test for PSS Scores (Pre vs Post)

Group	Category	Pre Mean ± SD	Post Mean ± SD	t	df	p
Sprinters	Experimental	19.85 ± 5.547	16.10 ± 5.812	2.145	19	.045*
	Control	18.80 ± 4.895	20.30 ± 4.028	-1.061	19	0.302
Middle distance runners	Experimental	21.40 ± 4.210	17.00 ± 3.212	7.74	19	<.001***
	Control	15.80 ± 5.699	21.75 ± 3.242	-3.387	19	.003**
Jumpers	Experimental	21.45 ± 4.298	16.00 ± 2.513	5.254	19	<.001***
	Control	19.20 ± 3.302	21.90 ± 3.655	-3.111	19	.006**

Paired sample t-tests were used to test the pre-test to post-test changes in perceived stress scores (PSS) between experimental and control groups among sprinters, middle-distance runners, and jumpers following the 24-week yoga intervention program.

The experimental group of sprinters demonstrated a statistically significant decrease in perceived stress scores between pre-test ($M = 19.85$, $SD = 5.55$) and post-test ($M = 16.10$, $SD = 5.81$), $t(19) = 2.145$, $p = .045$. This means that the yoga intervention was useful in alleviating stress levels in sprinters. Conversely, the control group did not report any significant difference in the perceived stress scores in the pre-test ($M = 18.80$, $SD = 4.90$) and the post-test ($M = 20.30$, $SD = 4.03$) after the regular training.

In the case of middle-distance runners, the experimental group showed a highly significant result in the reduction of perceived stress scores from the pre-test ($M = 21.40$, $SD = 4.21$) to the post-test ($M = 17.00$, $SD = 3.21$). $t(19) = 7.74$, $p < .001$. This indicates that there is a strong positive impact of the yoga intervention in managing stress. On the other

hand, the pre-test (M = 15.80, SD = 5.70) and post-test (M = 21.75, SD = 3.24) scores of the perceived stress are significantly different between the control group and the yoga group, t(19) = -3.387, p =. 003.

The same result holds true among jumpers, as there is a highly significant difference in the means of perceived stress scores between the pre-test (M = 21.45, SD = 4.30) and post-test (M = 16.00, SD = 2.51) groups, t(19) = 5.254, p < .001. In contrast, the control group showed a significant increase in perceived stress scores from pre-test (M = 19.20, SD = 3.30) to post-test (M = 21.90, SD = 3.66), t(19) = -3.111, p = .006.

Overall, the results of the paired sample t-test indicate that the 24-week structured yoga intervention had a significant impact on reducing the perceived stress level among sprinters, middle-distance runners, and jumpers in the experimental groups, but had no significant effect on the control groups (similar to no significant effect but significantly different). The results validate the usefulness of yoga practices, such as breathing exercises, asanas, relaxation techniques, and meditation, in reducing perceived stress and improving psychological well-being in athletes.

Table 4: Independent Sample t-test for Post-test PSS Scores

Group	Control Mean ± SD	Experimental Mean ± SD	t	df	p
Sprinters	20.30 ± 4.028	16.10 ± 5.812	2.656	38	.011*
Middle-distance runners	21.75 ± 3.242	17.00 ± 3.212	4.655	38	<.001***
Jumpers	21.90 ± 3.655	16.00 ± 2.513	5.949	38	<.001***

The independent variables were the comparison of the post-test scores of perceived stress (PSS) between the experimental group, which went through the structured yoga intervention (24 weeks) and the control group, which continued with regular training but did not practice yoga.

The findings indicated that there was a statistically significant difference between the post-test perceived stress scores of the experimental and control groups among sprinters, t(38) = 2.656, p =.011. The experimental group (M = 16.10, SD = 5.81) showed significantly lower scores on perceived stress than did the control group (M = 20.30, SD = 4.03), implying that the yoga intervention is indeed effective in reducing perceived stress in sprinters.

Likewise, a very important difference was observed in the middle-distance runners, where t(38) = 4.655, p < .001. According to the experimental group (M = 17.00, SD = 3.21), the perceived stress scores were significantly lower than those reported by the control group (M = 21.75, SD = 3.24), which can be explained by the fact that the yoga intervention was a strong positive intervention, which influenced stress reduction scores significantly among this group of athletes.

The results also showed that there was a highly significant difference between groups, t(38) = 5.949, p<.001. The lower perceived stress scores in the experimental group (M = 16.00, SD = 2.51) compared to the control group (M = 21.90, SD = 3.66) also indicate the effectiveness of the yoga intervention program. In general, the results of the

independent samples t-test show that the level of perceived stress in athletes who attended the 24-week structured yoga intervention was significantly lower than the level of perceived stress in athletes who participated in regular training alone. The steady decreases in stress scores among sprinters, middle-distance runners, and jumpers confirm the positive effect of yoga practices, including breathing exercises, asanas, relaxation techniques, and meditation, on improving the psychological well-being and emotional control of athletes.

5. Recommendations

1) **Integration of Yoga in Training Programs:** Coaches and physical education professionals can integrate structured yoga practices in regular training schedules to enhance psychological well-being and perceived stress among athletes.
2) **Breathing and Relaxation Techniques:** Breathing techniques, meditation, and relaxation techniques are some of the practices that can be regularly incorporated in athletic training to promote mental calmness, concentration, and emotional stability.
3) **Application in the Context of Different Sports Events:** As it was found that positive effects were observed among sprinters, middle-distance runners and jumpers, yoga intervention programs can be useful in various disciplines of the track and field.
4) **Long-term Implementation:** It is recommended that a longer period of yoga practice be implemented, which in the present study is 24 weeks.
5) **Holistic Athlete Development:** Sports training programs must focus on both the physical and the psychological aspects of performance since enhanced mental health leads to enhanced focus, recovery and overall performance.
6) **Future Research:** Future research can be conducted with bigger sample sizes, various age groups, and other sports disciplines to generalise the results and to study how yoga influences other psychological variables like anxiety, motivation and emotional resilience.
7) **Educational Institutions and Sports Academies:** Universities, colleges, and sports academies can add yoga-based wellness modules to their athlete development programs to promote mental health and stress management.

6. Conclusion

The current research found that yogic exercises have a significant effect on the perceived level of stress among sprinters, middle-distance runners and jumpers. The findings reveal that yoga enhances psychological health and mental strength among athletes. Thus, yoga can be regarded as an effective complementary training technique to improve athletic performance and mental health. The statistical tests are consistent in supporting the conclusion that yoga is an effective intervention to reduce perceived stress among

competitive athletes. Implementing the introduction of yogic practices into the training programs can potentially result in the improvement of psychological resilience, emotional control, and the achievement of improved performance outcomes.

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Conflict of Interest Statement
The authors declare no conflicts of interest.

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