Effect of Yogic Relaxation on Competitive Anxiety Levels of College Athletes

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ABSTRACT

Background : *Competitive anxiety has traditionally been defined as increased worry, somatic tension and attentional interference related to competition. Competitive anxiety can manifest as increased perceived stress. The effect of yogic relaxation and slow breathing has been found to reduce perceived stress and anxiety in clinical, student and community populations (Granath et al., 2006; Kirkwood et al., 2005; Sharma et al., 2013).*

Purpose : *To assess if a 6-week yogic relaxation program can reduce perceived stress (an indicator of competitive anxiety) among college athletes.*

Method : *The research design used was a non-randomized quasi-experimental pretest-posttest design. The sample size was 40, with 18-23 years of age and 28 males and 12 females from disciplines such as Athletics, Volleyball, Cricket and Hockey. The independent variable was yogic relaxation, with 5 sessions per week for 6 weeks. Each session had 30-45 minutes. The dependent variable used was the Perceived Stress Scale (PSS). The PSS is a widely used scale with good reliability and validity. The scale has 10 items with 5-point Likert scales. The test was conducted before and after 6 weeks and was administered 24-72 hours before a competition.*

Results : *The results showed that baseline perceived stress levels were equivalent between groups. The experimental group showed a large effect size, with $\Delta M=-9.20$, $t(19)=-12.97$, $p<.001$, $d=-2.90$. The control group showed a very small effect size, with $\Delta M=-1.00$, $t(19)=-1.18$, $p=.251$, $d=-0.26$. ANCOVA found the adjusted group effect to be significant at posttest, $F(1,37) = 143.32$, $p<.001$, partial $\eta^2 = 0.795$.*

Conclusion : A brief high-frequency yogic relaxation intervention was related to significant reductions in pre-competition perceived stress.

Keywords: yogic relaxation; perceived stress; competitive anxiety; college athletes; pranayama; quasi-experimental design

Introduction

The term "sports anxiety" usually refers to a combination of factors, such as cognitive anxiety, physiological changes and attention shifts or interruptions associated with the demands of the sport, which are likely to be relevant to athletes' perceptions of stress and tension prior to a competition (Charmandari *et al.*, 2005; Davidson & McEwen, 2012; Kyrou *et al.*, 2006). Stress is considered a psychophysiological construct in which a coordinated series of responses in the neuroendocrine and the autonomic system can have a coordinated effect on cognitive functions including attention, emotional regulation and performance readiness (Sapolsky *et al.*, 1983). These mechanisms have similarities with other anxiety-related mechanisms, such as neuroimmune and inflammatory mechanisms, which have been found to relate to anxiety and stress-related psychopathology (Bower & Irwin, 2016; Furtado & Katzman, 2015; Hou & Baldwin, 2012; Salim *et al.*, 2012).

There are various populations that have been tested to seek the feasibility of using mind-body therapies such as yoga as a means of stress management and anxiety reduction (Chen *et al.*, 2012; da Silva *et al.*, 2009; Kirkwood *et al.*, 2005). Reviews and meta-analyses of the effects of yoga suggest that it can be effective for reducing the symptoms and stress outcomes of anxiety, though effect sizes vary by population, intervention and other factors (Hofmann *et al.*, 2016). Importantly for practical sport programs, yoga based techniques can be used in short time periods, with little equipment (Atkinson & Permuth-Levine, 2009; Raub, 2002) and even in mixed formats with other sport programs (Atkinson & Permuth-Levine, 2009). Also, yoga can help reduce stress, which is another major factor to consider in terms of stress-reduction programs (Granath *et al.*, 2006).

Mechanistic models suggest that slow breathing and relaxation could affect autonomic balance (parasympathetic activity and heart rate variability) which is related to pre-competition arousal regulation (Bernardi *et al.*, 2000; Jerath *et al.*, 2006; Khattab *et al.*, 2007; Muralikrishnan *et al.*, 2012). Alternate nostril breathing and slow pranayama have been found to impact subjective outcomes of stress and cardiovascular/ autonomic responses in young adult samples, potentially to be applicable to young athletes (Sharma *et al.*, 2013; Sinha *et al.*, 2013; Telles *et al.*, 2013). In addition

to these psychophysiological models, yoga and meditation interventions have been linked to other neurobiological markers and stress pathways (Cahn & Polich, 2006; Kaliman et al., 2014; Rubia, 2009).

The aim of this study is to find out if a 6 week yogic relaxation program can decrease the intensity of the competitive anxiety state of 18-23 year old college athletes, measured in terms of their perception of pre-competition stress. It was hypothesized that athletes who practiced yogic relaxation would show a larger difference between pretest and posttest on the perceived stress scale than would a control group who continued with regular training.

Conceptual Framework

The conceptual framework of the study incorporates an integration of psychophysiology and cognitive self-regulation. The six-week yoga-based relaxation program is the independent variable in the study, while the perceived stress prior to competition forms the principal dependent variable.

According to the framework, the use of yogic relaxation can lead to the reduction of pre-competition perceived stress through two interconnected paths. The first one involves the use of gentle body postures, breathing and relaxation that can help in the regulation of excessive arousal and the activation of the parasympathetic regulation system (Bernardi et al., 2000; Jerath et al., 2006; Khattab et al., 2007). The second path concerns the improvement of attentional control and self-perception of competition challenges due to breath awareness, attention focusing, mindfulness and relaxation exercises (Cahn & Polich, 2006; Rubia, 2009).

Physiological and cognitive mechanisms suggested above were not measured in this study and have to be considered as theoretical mediators.

The Perceived Stress Scale is not a sport-specific measure of competitive anxiety. Thus, the PSS scores collected 24-72 hours prior to competition were considered to be an indicator of pre-competition perceived stress related to competitive anxiety.

Methodology

A quasi-experimental pretest-posttest design was employed. This design is appropriate for pragmatic research in collegiate sport and mirrors comparative approaches used in other stress-management intervention studies. The level of statistical significance was established a priori as $p < .05$ and all tests were two-tailed.

Sampling

The sample composed of 40 college athletes from the sports of Athletics, Volleyball, Cricket and Hockey, with mixed genders (28 males and 12 females), equally representing the control and experimental groups (14 males and 6 females in each group).

The participants were assigned to either experimental or control group after the process of eligibility criteria checking, informed consent and pre-testing. First of all, participants were sorted according to sport and sex to make sure that the samples would be similar. In each sport and sex category, allocation was done on the basis of availability of training schedules and willingness of participants. Consequently, the first group included five members each from Athletics, Volleyball, Cricket and Hockey, which meant that there were 14 males and six females in total. These individuals were then selected for the experimental group depending on their readiness to participate in the training program. After this, the control group was formed using the same distribution as the experimental group, including 14 males and six females in total. No methods of random assignment were used such as random numbers generating and concealed allocation method. The experimental group took part in six weeks yoga relaxation training program in addition to sport activities while the control group only trained.

Intervention

The yogic relaxation program was conducted for 6 weeks, with 5 sessions per week of 30-45 minutes each. Each session included gentle asanas, pranayama and meditation/relaxation techniques suitable for down-regulating physiological arousal and supporting self-regulation (Raub, 2002). The program emphasized slow breathing, as controlled respiration has been shown to influence autonomic nervous function and stress physiology (Bernardi et al., 2000; Jerath et al., 2006; Khattab et al., 2007).

Weekly schedule

Week	Asanas focus (12–15 min)	Pranayama focus (8–10 min)	Guided practice (10–12 min)
1	gentle mobility + basic restorative holds	diaphragmatic slow breathing	body-scan relaxation
2	longer holds + hip/ hamstring opening	paced breathing (slow count)	breath-awareness meditation
3	restorative sequencing (recovery emphasis)	alternate nostril breathing (skill progression)	guided relaxation + attention anchoring
4	stability + balanced mobility	extended exhale pacing	mindfulness of body sensations
5	pre-competition recovery flow	competition-day breathing routine	non-judgmental awareness practice
6	consolidation + taper	individualized slow-breath script	integrated relaxation rehearsal

Control condition

The control group was asked to follow their regular training sessions without the yogic relaxation sessions.

Measurement tool and timing

The main measure of change for self-report was the Perceived Stress Scale (PSS) (Cohen et al., 1983), which was chosen for its established psychometric support (Lee, 2012) and its prior use in young-adult training contexts relevant to breathing-based practices (Sharma et al., 2013). It was administered before (pretest) and after (posttest) the 6-week period, which corresponded to a pre-competition window of 24-72 hours before an actual competition event.

Attendance was monitored during each session. Compliance was defined as attending ≥80% of sessions, i.e., ≥24 of 30 sessions.

Ethical Consideration

The study included informed consent, maintenance of confidentiality of the questionnaires, penalty-free withdrawal of participants and provision of counseling services in case of elevated levels of distress, given that anxiety and stress were being measured in this study (Mathew et al., 2011; Nerurkar et al., 2013).

Results and Findings

All 40 participants (20 per group) had complete pretest and posttest outcome data. The control and experimental groups were closely matched at baseline. Each group consisted of 14 males (70%) and 6 females (30%), drawn equally from Athletics, Volleyball, Cricket and Hockey, with 5 participants (25%) from each sport represented in each group. Mean age was 20.25 years (SD = 1.55) in the control group and 19.80 years (SD = 1.91) in the experimental group and the groups did not differ significantly in age, t(36.48) = 0.818, p = .419. Baseline perceived stress was also comparable between groups, with a mean PSS score of 23.60 (SD = 1.90) for the control group and 23.90 (SD = 1.59) for the experimental group. Overall, the two groups did not differ meaningfully in gender distribution, sport, age, or baseline perceived stress prior to the intervention.

Table 1: *Pre/post perceived stress, paired t-tests and within-group effect sizes (Cohen's d)*

Group	n	Pre M (SD)	Post M (SD)	ΔM (SD)	t(df)	p	d
Control	20	23.60 (1.90)	22.60 (2.56)	-1.00 (3.78)	-1.18 (19)	.251	-0.26
Experimental	20	23.90 (1.59)	14.70 (1.98)	-9.20 (3.17)	-12.97 (19)	<.001	-2.90

The experimental group showed a substantial reduction in perceived stress from pretest to posttest ($p < .001$), whereas the control group showed no significant change ($p = .251$).

Table 2 : *ANCOVA predicting post-test perceived stress with baseline covariate (n=40)*

Source	SS	df	MS	F	p	partial η^2
Group (Experimental vs Control)	589.906	1	589.906	143.323	<.001	0.795
Baseline PSS covariate	46.710	1	46.710	11.349	.002	0.235
Error	152.290	37	4.116			

The ANCOVA results showed that the effect of group was statistically significant at posttest after adjusting for baseline perceived stress, $F(1,37) = 143.32$, $p < .001$, partial $\eta^2 = 0.795$.

Attendance and Compliance

Based on the attendance for 30 sessions, the experimental group had a mean attendance of 25.55 sessions (SD = 3.80, range = 17-30). Sixteen of the 20 participants in the experimental group (80.0%) met the criterion of ≥80% compliance. Participants in the control condition received no yogic sessions.

Discussion

This study sought to examine the effect of a structured yogic relaxation program on college-level athletes' competitive anxiety (measured as pre-competition perceived stress). The experimental group reported a significant decrease in perceived stress as compared to the usual-training control group and the ANCOVA results corroborated a strong experimental group effect post test.

This finding direction is in line with other evidence suggesting that yoga-based interventions might be effective in decreasing anxiety and stress-related outcomes (Kirkwood et al., 2005; Hofmann et al., 2016). Comparative stress-management studies also lend credence to the potential applicability of yoga as a complementary intervention to the more traditional ones, providing further evidence of the intervention's practical feasibility and applicability for use with athletes in the real world, where self-regulation techniques could be useful (Granath et al., 2006). This mechanical aspect is parallel with physiology such as the slow breathing and autonomic regulation, including parasympathetic influences (Bernardi et al., 2000; Jerath et al., 2006). Results obtained for young-adult samples indicated that PRA may influence perceived stress and cardiovascular responses and this might be expected in collegiate athlete samples (Sharma et al., 2013).

The operationalization of perceived stress as an indicator of competitive anxiety is appropriate, as it reflects the cognitive dimension of stress and as such, there is existing psychometric support for this type of perceived stress (Cohen et al., 1983; Lee, 2012). Appraisal of stress and stress systems (hormonal and sympathetic) are also interrelated and useful for explaining anxiety states (Charmandari et al., 2005). However, perceived stress is not sport-specific and sport anxiety as a trait/state could be more properly measured with sport-specific measures in future studies.

Limitations

The use of a quasi-experimental design does not allow the drawing of conclusions about cause-and-effect relationships. Despite the fact that the groups were comparable by age, sex, type of sport and baseline perceived stress scale scores, comparability with respect to these criteria is not a proof of comparability with respect to such characteristics as motivation, expectations from the intervention, coaching atmosphere, load level, experience in relaxation practices, etc. Adjustment for the baseline PSS using ANCOVA helped to reduce variance.

Implications

Despite these limitations, the findings suggest practical promise in integrating brief yogic relaxation exercises into collegiate athlete training programs. Mind-body approaches may also extend broader stress-counseling efforts and help address the need for stress management and mental health support in general populations (Whiteford et al., 2015). As Taylor et al. (2012) note, real-world effectiveness may depend on adherence; monitoring attendance and addressing non-adherence should therefore be considered in future programs.

Future Research

Future studies could incorporate randomization where feasible, larger samples for adequately powered analyses and multi-method outcomes that combine sport-specific anxiety measures, perceived stress and physiological indicators (Kirkwood et al., 2005). Longer-term follow-up would help assess the sustainability of intervention effects and a mechanistic approach examining changes in autonomic function and inflammatory markers alongside psychological outcomes could clarify underlying pathways (Bower & Irwin, 2016; Kiecolt-Glaser et al., 2010; Kaliman et al., 2014). Future work could also evaluate the relative contributions of different intervention components (e.g., asana, pranayama, meditation) in athlete populations.

Conclusion

In this study that is neither random nor experimental, 6 weeks of yoga-based relaxation was found to have caused a statistically significant decrease in pre-competition perceived stress levels when compared with training alone. The level of pre-competition perceived stress was a predictor related to competition anxiety, but not sport-specific anxiety.

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