

The effects of yoga-psychological skills training on mental health coping in injured young athletes. A Case Study

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Sports injuries among young athletes are associated with increased mental health risks. This case study explored the effects of a 10-week yoga program combined with psychological skills training (PST) on mental health coping in injured young athletes. Ten male soccer players (Mage = 16.2 ± 0.92) who had sustained sports injuries in the past year participated in the yoga-PST program. Pre- and post-intervention questionnaires assessed coping skills tailored to athletes' mental health (e.g., learned resourcefulness, psychological skills in sports, and post-sport injury stress). The intervention led to significant improvements in mental health coping skills, including problem-focused coping (+14%), goal setting (+19%), hyperarousal reduction (-40%), and re-experience reduction (-35%). Cohen's d results indicated positive impacts on the sub-domains of coping skills. The study suggests that yoga-PST intervention can enhance mental health coping in injured young athletes, fostering positive coping responses and potentially preventing long-term mental health issues.

KEY WORDS: Yoga interventions, psychological skills training, Mental health coping strategies, injured young athletes, sports injury stress.

1. Introduction

Engagement in sports from an early age furnishes individuals with a multitude of opportunities to acquire physical, cognitive, and psychosocial

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health benefits (Brown et al., 2017; Collins et al., 2018; Doherty et al., 2019). However, the growing concerns regarding adverse mental health outcomes stemming from sports injuries should not be overlooked, especially given the reported prevalence of sport-related injuries (approximately 28%–69.1% in overuse injury) among young athletes (i.e., youth athletes) across various sports (Fabricant et al., 2016; Hess et al., 2019; Myer et al., 2015). For instance, a longitudinal study spanning over nine years among youth soccer teams revealed that more than 3% of injuries transpired per 1,000 participations in both practices and competitions (Khodaei et al., 2017). During the period of injury, athletes often grapple with negative emotional responses such as anxiety, burnout, depression, isolation, severe stress, and lack of motivation (Aron et al., 2019; Arvinen-Barrow & Walker, 2013; Putukian, 2014). These emotional states not only impede the rehabilitation process and delay recovery (Myer et al., 2015; Rice et al., 2016), but can also catalyze decisions to withdraw from sports altogether (Maffulli et al., 2010).

While athletes commonly exhibit patterns of adaptation following injuries, a subset may undergo maladaptation, escalating the risk of serious mental health conditions such as major depression and post-traumatic stress disorder (PTSD; Aron et al., 2019; Maffulli et al., 2010; Padaki et al., 2018). These severe stress disorders can hinder both rehabilitation efforts and athletic performance, often manifesting as extreme fatigue, exhaustion, aggression, and maladjustment within the team environment (Baron et al., 2013). The ramifications of these mental health issues, stemming from sports injuries, are particularly alarming, especially considering their adverse effects on the mental well-being of young athletes (Houston et al., 2016; Padaki et al., 2018). Given the high incidence of sport-related injuries among youth athletes – largely due to year-round intensive training and overuse of muscles in a single sport from an early age (Fabricant et al., 2016; Khodaei et al., 2017) – there is a corresponding risk of escalating mental health disorders within this group (Myer et al., 2015; Rice et al., 2016). Therefore, it is imperative for injured young athletes to address and mitigate negative thoughts and moods to prevent the onset of prolonged, severe mental illness.

Yoga plays a vital role in enhancing awareness of physical and mental conditions (Kusuma & Bin, 2017; Polsgrove et al., 2016), a factor that may be key in improving athletes' mental health and recovery from sports injuries (Sharma, 2015). Systematic reviews and meta-analyses have highlighted the significant benefits of yoga in fostering positive emotional responses (e.g., enhancing positive emotions and reducing anxiety and depression) compared to aerobic exercise (Cramer et al., 2013; Ross & Thomas, 2010). An increasing body of empirical evidence supports the positive effects of yoga

in alleviating negative emotional reactions (e.g., anxiety, stress, depression) and aiding recovery in injured athletes (Arbo et al., 2020; Mohammed et al., 2018). This growing evidence underscores that interventions in mental health, including yoga practices, may assist athletes in their recovery process by mitigating negative emotional responses.

Concurrently, psychological skills training (PST), utilizing techniques like relaxation, imagery, positive self-talk, and concentration, has been recognized for bolstering mental resilience and coping abilities among athletes (Foster et al., 2016; Golby & Wood, 2016; Mattie & Munroe-Chandler, 2012; Sheard & Golby, 2006). These skills are fundamental in providing athletes with robust mental health coping mechanisms (Arvinen-Barrow & Walker, 2013). The innovative combination of yoga practices with PST techniques may present a holistic and comprehensive approach. However, despite this potential, a notable gap exists in research regarding the effectiveness of combined yoga and PST interventions for young athletes, especially considering the high risk of adverse mental health outcomes due to sports injuries within this group. This gap represents a marked scarcity of research specifically exploring the efficacy of yoga-based mental health interventions. This uncharted area emphasizes the need for additional studies to validate and build upon the promising initial findings, leading to more efficacious mental health interventions for injured athletes.

As of now, there are minimal or possibly no comprehensive studies published that explore the specific effects of yoga interventions on young athletes who have sustained injuries. Only one study has been published that explores the impact of yoga intervention on adolescents with persistent concussions in a clinical setting (Paniccia et al., 2019). The research gap identified in previous literature underscores a limited investigation into the effectiveness of combining yoga with PST interventions, specifically targeting young athletes. While considerable empirical evidence supports the positive effects of yoga on adult athletes' mental health and recovery from injuries (Mistretta et al., 2017; Mohammed et al., 2018), there is a conspicuous absence of research focusing on the youth cohort. Consequently, there is an urgent need for further studies to investigate how yoga practices, when paired with PST techniques, can be adapted to aid mental health and injury rehabilitation specifically in young athletes.

The present study seeks to address this gap by centering on injured young athletes, aiming to determine the impact of an integrated yoga intervention with PST techniques on enhancing their mental health coping abilities. The objective of this case study is to scrutinize the effects of a 10-week yoga intervention on the mental health coping strategies of these injured

youth athletes. The hypothesis guiding this research posits that these athletes will experience an enhancement in their mental health coping abilities following their participation in the 10-week yoga intervention.

Method

PARTICIPANTS AND PROCEDURE

This study employed a 10-week yoga intervention and consisted of ten individual case studies, using a one-group pre-and-post-test design. Participants were recruited through purposive sampling (Johnson & Christensen, 2019), a process facilitated by the South Korean Sports & Olympic Committee. After a one-month recruitment process, a youth soccer team in an urban area was selected, and consent was obtained. Ten male youth athletes ($Mage = 16.2 \pm 0.92$) participated, including five midfielders, two defenders, two forwards, and one goalkeeper. Their sports injuries, mainly related to soccer, involved the legs ($n = 8$), lower back ($n = 1$), or both ($n = 1$), with none requiring surgery; all recovered within a month (Table I).

All procedures complied with ethical guidelines, and parental consent and assent forms were obtained. We visited the secondary school soccer team, explained the purpose and procedure to the coaches and staff, and recruited participants who had experienced sports injuries within the past year. Participants and staff were informed of their right to withdraw without penalty. The yoga interventions, combined with PST techniques, were conducted before practice or training sessions in a private indoor space near the soccer field. The participants committed to a 10-week yoga program, with a 98% attendance rate.

Two qualified yoga instructors supervised the yoga sessions. The primary author holds a first-class qualification as a sports psychologist from the Korean Society of Sport Psychology

TABLE I
Participant Demographics.

#	Participant	Age	Position in the soccer	Part(s) of previous body injury
1	A	17	Defender	Legs
2	B	17	Defender	Legs
3	C	16	Middle fielder	Legs
4	D	15	Middle fielder	Legs
5	E	16	Forward	Legs
6	F	15	Forward	Lower back
7	G	15	Middle fielder	Legs and lower back
8	H	17	Goalkeeper	Legs
9	I	17	Middle fielder	Legs
10	J	17	Middle fielder	Legs

and has earned a doctoral degree in sports psychology. With more than 15 years of yoga practice experience, the author brings substantial expertise to the intervention. The yoga instructor is certified and possesses a second-level qualification as a sports psychologist, along with should be lower-case master's degree in sports psychology.

YOGA-PST INTERVENTION

The yoga program was devised based on Moon and Lee's yoga training program (Moon & Lee, 2017), previously applied to high school soccer teams, which demonstrated the effect of reducing stress among youth athletes. Participants took part in the program once a week, and it comprised a total of 10 sessions, each lasting 40 minutes. The sessions were structured as follows: (a) 5 minutes of breathing and meditation, (b) 30 minutes of yoga (Yoga Asana, encompassing various body postures such as standing, sitting, rolling, twisting, and balancing poses), and (c) 5 minutes of concluding activities (e.g., breathing, relaxation, and imagery). Specifically, the program's introduction began with breathing and centering through meditation. The participants were guided to breathe mainly through the nose, with an emphasis on abdominal breathing. To aid in stimulating participants' breathing and focus during meditation, aromatherapy scents (e.g., lemon) were employed, and the accompanying meditation music featured nature sounds and new-age compositions. Table II presents a detailed overview of the 10-week yoga-PST intervention implemented in the study.

The yoga poses were executed in various positions – standing, sitting, and lying down – taking into account the participants' injured body parts. In sessions 1, 4, and 8, partner yoga was incorporated to foster teamwork, deepen stretches, and enhance trust and communication among teammates. Below are the definitions and descriptions of the specific yoga poses used:

Sun Salutations (Surya Namaskar): Sun Salutations are an effective warm-up involving dynamic, fluid movements that energize various muscle groups. The sequence elevates heart rate and blood flow, preparing the body for subsequent poses. Concurrently, rhythmic breathing enhances mental focus and cultivates grounding awareness.

Sitting Forward Bend Pose (Paschimottasana): This pose elongates the spine and stretches the hamstrings, aiding in posture improvement and lower-back tension relief. Psychologically, it fosters relaxation, introspection, and mental clarity, contributing to overall well-being.

Partner Yoga: Designed for pairs, partner yoga poses integrate stretching, balance, and coordination. They allow deeper stretches than solo yoga and facilitate trust and communication through synchronized breathing and movement.

Corpse Pose (Savasana): Corpse Pose concludes yoga sessions by encouraging deep relaxation and reflection. It aims to integrate the physical, emotional, and psychological benefits accrued during the practice. By focusing on breath and releasing tension, it prepares practitioners for reentry into daily activities with enhanced mental clarity and physical vitality.

During each session, a combination of PST techniques was implemented, including breathing exercises, relaxation, imagery, concentration, and team building. These techniques have been popularly utilized to enhance athletes' mental health coping abilities (Golby & Wood, 2016; Mattie & Munroe-Chandler, 2012; Takeuchi et al., 2023). For instance, participants were guided through visualization exercises, mentally rehearsing the successful execution of specific plays or maneuvers that aligned with their individual or team objectives. These exercises were meticulously designed in collaboration with researchers and coaches to corre-

TABLE II
The 10-weeks Yoga-PST Intervention

Session	Preparation (5 minutes)	Yoga-Asana (30 minutes)	Closing (5 minutes)
1	Breathing and meditation	<i>Surya Namaskar-Paschimottanasana-Savasana</i>	Breathing-Relaxation - Imagery
2	Breathing and meditation	<i>Surya Namaskar-spinal rolling-sitting and turning ankle-sitting and twisting-Savasana</i>	Breathing - Relaxation - Imagery
3	Breathing and meditation	<i>Surya Namaskar-spinal rolling-pelvic rotation-Savasana</i>	Breathing-Relaxation- Imagery
4	Breathing and meditation	<i>Surya Namaskar-leg open and forward bend pose-ankle rotation-sitting and twisting-partner yoga-Savasana</i>	Breathing-Relaxation- Imagery
5	Breathing and meditation	<i>Surya Namaskar-sitting leg opening-prayer pose-Paschimottanasana-partner yoga-Savasana</i>	Breathing-Relaxation- Imagery
6	Breathing and meditation	<i>Surya Namaskar-cat stretch pose-ankle rotation-sitting and twisting-Savasana</i>	Breathing-Relaxation- Imagery
7	Breathing and meditation	<i>Surya Namaskar-cat stretch pose-boat pose-ankle rotation-sitting and twisting-Savasana</i>	Breathing-Relaxation- Imagery
8	Breathing and meditation	<i>Surya Namaskar-cat stretch pose-cobra pose-plank pose-grasshoppers pose deformation-pelvic release-partner yoga-Savasana</i>	Breathing-Relaxation- Imagery
9	Breathing and meditation	<i>Surya Namaskar-cat stretch pose-cobra pose-plank pose-lying wiper pose-Savasana</i>	Breathing-Relaxation- Imagery
10	Breathing and meditation	<i>Surya Namaskar-warrior pose-extended side angle pose-wide legged forward bend-lying wiper pose-Savasana</i>	Breathing-Relaxation- Imagery

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Sample Descriptions of the PST Activities	
<i>Breathing and Meditation</i>	Close your eyes and focus intently on the sensation of your breath as it flows in and out. Temporarily put aside any distracting thoughts in your mind, and direct your attention solely to the pattern of your breathing. Inhale deeply and then exhale in a controlled and deliberate manner, fully immersing yourself in this process. Allow the rhythm of your breath to guide you, creating a calming and centered experience.
<i>Relaxation and Imagery</i>	(a) Please, envision tomorrow's game within your mind. Visualize the stadium, considering it as your personal domain. Imagine the sequence of play and creatively construct a scene in which you and your teammates triumph, sustaining success until the game's conclusion. (b) Focus on your own energy pervading the space around you. Consider this space as your very own, with you as its central figure. Picture yourself as the most formidable and resilient entity present, reassuring yourself with the affirming words: "I am getting better every day in every way."

Note. PST = psychological skills training; Each session includes 40 minutes, including preparation, yoga-asana, and closing activities.

spond with the athletes' specific positions and roles within the team. Relaxation techniques, such as progressive muscle relaxation or deep breathing, were also introduced to facilitate recovery and enhance mental resilience. The integration of PST within the yoga program aimed to provide a holistic approach to physical well-being, mental resilience, and team cohesion.

MEASURES

Participants' self-control in mental health behavior was assessed using the Korean version of the Learned Resourcefulness Scale (Lee & Hwang, 2015), originally developed by Rosenbaum (1990). Learned resourcefulness is recognized as a vital indicator, reflecting how individuals can positively and effectively manage anxiety and stress (Cowden et al., 2014; Moring et al., 2011). While the Rosenbaum's original scale comprises six domains, with a total of 36 items, and utilizes a 3-point Likert scale for responses (Rosenbaum, 1990), the Korean version extracted and validated 25 items among Korean athletes across the same six domains: (a) emotional control, (b) thought control, (c) impulse control, (d) problem-focused coping, (e) problem-solving ability, and (f) self-direction (Lee & Hwang, 2015). The Korean version expanded the scoring to a 6-point Likert scale to facilitate interpretation, particularly when predictive model testing is undertaken. Additionally, eight items required reverse scoring. The youth athletes' responses varied on a scale from 6 (*Very characteristic of me*) to 1 (*Very uncharacteristic of me*). Sample questions from the thought control domain include "When I feel physical pain, I try not to think of it," and from the problem-focused coping domain, "Even when I am terribly angry at someone, I consider my actions very carefully." The scale demonstrated sufficient reliability among the study sample across the six domains (α ranged from 0.65 to 0.76).

Psychological Skills in Sports

The Psychological Skills in Sport Questionnaire was utilized to assess participants' mental health as related to their sports environments (Yoo & Huh, 2002). This scale is composed of 28 items and encompasses seven domains: (a) will, (b) team unity, (c) goal-setting, (d) confidence, (e) concentration, (f) anxiety control, and (g) imagery ability. Each item is scored on a 5-point Likert scale, ranging from 5 (*Very much*) to 1 (*Not at all*). Examples of the questions include statements such as "I enjoy being with my teammates" (pertaining to team unity) and "I usually set goals when I train" (related to goal setting). This measurement has been shown to possess both reliability and validity for Korean youth athletes (Lee & Chang, 2015). Furthermore, it exhibited adequate reliability across the seven domains for the participants in this study (α ranged from 0.72 to 0.89).

Post-Sport Injury Stress

A 12-item Post-Sport Injury Stress Scale was utilized to investigate the injured youth athletes' stress after injury. The scale encompasses three domains: (a) social isolation, (b) hyperarousal, and (c) re-experience (Lee & Moon, 2020). Participants' responses were recorded on a 6-point Likert scale, with scoring ranging from 6 (Strongly agree) to 1 (Not at all). A representative question relating to hyperarousal, for example, inquired, "Even if I tried not to think about it, I was reminded of the injury situation." Lower scores serve as an indication of reduced post-sport injury stress. The questionnaire has demonstrated both reliability and validity in assessing injured athletes (Lee & Moon, 2020) and also demonstrated high reliability among the samples within this study for the three specified domains. The alpha coefficients ranged from 0.86 to 0.96, underscoring its consistency as a measure.

DATA ANALYSIS

A descriptive statistical analysis was undertaken to screen the data using SPSS 28.0 (IBM Corp., Armonk, NY, USA), and it revealed no missing values or outliers. Normal distributions were observed across all the study variables, with skewness and kurtosis values greater than -2 and less than 2 (Chou & Bentler, 1995). To calculate the percentage of change between the pre- and post-test results, the following formula was employed:

$$\frac{M_{post} - M_{Pre}}{M_{pre}} \times 100$$

Paired sample *t*-tests were conducted to compare the pre- and post-changes within specific subdomains of the study variables, namely the subdomains of learned resourcefulness, psychological skills in sports, and post-sport injury stress. Effect sizes for differences in pre- and post-tests were examined using Cohen's *d* values, with scores of ≥ 0.20 , ≥ 0.50 , and ≥ 0.80 signifying small, medium, and large effect sizes, respectively (Lakens, 2013). A statistically significant alpha level was set at $p < 0.05$.

Results

Table III summarizes the pre- and post-test scores and the percentage changes within the study variables, specifically learned resourcefulness, psychological skills in sports, and post-sport injury stress. For all 10 participants, improvements were observed in the subdomains of learned resourcefulness (ranging from 4% to 14%) and psychological skills (from 2% to 19%), alongside decreases in post-sport injury stress (from -27% to -40%). The mean comparison between pre- and post-tests demonstrated notable increases, particularly in problem-focused coping within the learned resourcefulness domain ($M_{pre} = 3.93 \pm 1.00$ vs. $M_{post} = 4.47 \pm 0.96$; $t(9) = -0.58$, $p < 0.01$, $d = 0.55$). However, no statistically significant changes were detected in participants' emotional control, thought control, impulse control, problem-solving ability, and self-direction ($p > 0.05$). Nonetheless, considering that effect size is an indicator of differences (Sullivan & Feinn, 2012), small and medium effects in the time differences between pre- and post-tests were found in thought control ($M_{pre} = 4.05 \pm 0.65$ vs. $M_{post} = 3.70 \pm 0.79$; $d = 0.48$) and self-direction ($M_{pre} = 4.57 \pm 1.04$ vs. $M_{post} = 5.10 \pm 0.67$; $d = 0.61$).

In terms of psychology skills in sports, significant enhancements in goal-setting ($M_{pre} = 3.73 \pm 0.67$ vs. $M_{post} = 4.43 \pm 0.79$; $t(9) = 2.81$, $p < 0.05$) were recorded after the intervention ($d = 0.96$). No significant disparities were noted between pre- and post-tests in other sport psychological skills ($p > 0.05$), yet the effect sizes indicated small to large time differences in participants' will ($M_{pre} = 4.35 \pm 0.50$ vs. $M_{post} = 4.45 \pm 0.48$; $d = 0.20$), team unity ($M_{pre} = 4.48 \pm 0.49$ vs. $M_{post} = 4.85 \pm 0.32$; $d = 0.89$), confidence ($M_{pre} = 4.35 \pm 0.53$ vs. $M_{post} = 4.60 \pm 0.57$; $d = 0.45$), and imagery ability ($M_{pre} = 4.50 \pm 0.49$ vs. $M_{post} = 4.78 \pm 0.32$; $d = 0.68$).

Finally, a marked reduction in participants' hyperarousal ($M_{pre} = 2.95 \pm 0.75$ vs. $M_{post} = 1.78 \pm 1.22$; $t(9) = 3.12$, $p < 0.01$) and re-experience ($M_{pre} = 2.60 \pm 1.04$ vs. $M_{post} = 1.68 \pm 0.76$; $t(9) = 2.45$, $p < 0.05$) was detected after the intervention, with large effect sizes of $d = 1.16$ and $d = 1.01$, respectively. While no significant change in social isolation in post-sport injury stress was observed between the pre- and post-tests ($p > 0.05$), there was a notable time difference in social isolation ($M_{pre} = 1.55 \pm 0.63$ vs. $M_{post} = 1.13 \pm 0.32$), reflected in a large effect size of $d = 0.84$.

Discussion



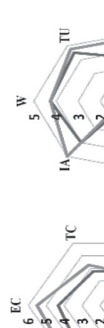
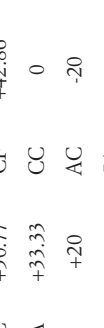

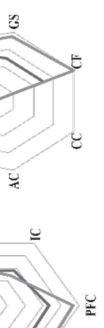


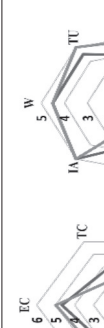
During the recovery phase from an injury, athletes may find their performance hindered by memories of the injury or negative emotional reac-

TABLE III
Pre-and Post-Scores and Percentage Changes in the Study Variables for Each Participant.

Participant	Pre and Post Scores			Psychological Skills in Sports (%)	Post-Sport Injury Stress (%)	
	Learned Resourcefulness (%)	Psychological Skills in Sports (%)	Post-Sport Injury Stress (%)			
Participant A	EC	-13.79	W	+25	SI	+25
	TC	+11.11	TU	0	HA	0
	IC	+10	GS	+25	RE	+25
	PFC	0	CF	+17.65		
	PSA	-5	CC	0		
	SD	+60	AC	-33.33		
			IA	+11.11		
Participant B	EC	+4.17	W	-5.56	SI	+50
	TC	-25	TU	0	HA	-13.33
	IC	+4.17	GS	0	RE	-13.33
	PFC	+20	CF	-5		
	PSA	-30	CC	0		
	SD	+16.67	AC	-16.67		
			IA	0		
Participant C	EC	-14.81	W	+5.26	SI	+25
	TC	-11.11	TU	+42.86	HA	-73.33
	IC	-4.17	GS	+17.65	RE	-60
	PFC	0	CF	+25		
	PSA	+4.55	CC	-20		
	SD	0	AC	0		
			IA	+11.11		


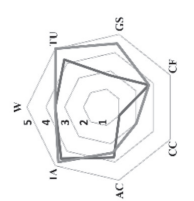
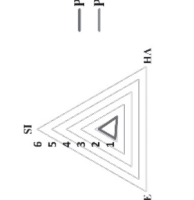
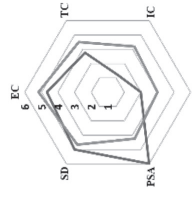
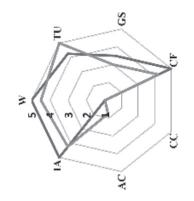
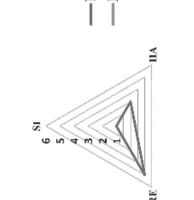
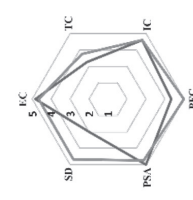
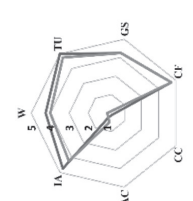
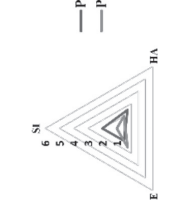
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Participant	Pre and Post Scores			Learned Resourcefulness (%)	Psychological Skills in Sports (%)	Post-Sport Injury Stress (%)		
Participant D				EC +26.92 TC +13.33 IC -10.53 PFC +30.77 PSA +33.33 SD +20 IA +25	W 0 TU +5.56 GS +35.71 CF +42.86 CC 0 AC -20 IA +25	SI -63.64 HA -75 RE -27.27		
	Participant E				EC +7.14 TC -20 IC +4.76 PFC +7.14 PSA -9.52 SD +16.67 IA 0	W 0 TU +11.11 GS +26.67 CF +11.11 CC 0 AC -38.46 IA 0	SI 0 HA -60 RE -25	
		Participant F				EC 0 TC -17.65 IC -22.73 PFC +22.22 PSA +27.27 SD 0 IA 0	W -10 TU -15.79 GS 0 CF -12.50 CC -22.22 AC +6.67 IA +5.88	SI -50 HA -50 RE -50

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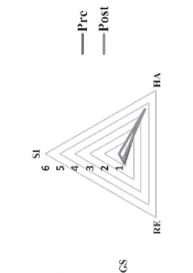
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Participant	Pre and Post Scores			Learned Resourcefulness (%)	Psychological Skills in Sports (%)	Post-Sport Injury Stress (%)		
Participant G				EC +4.55 TC -8.33 IC +5.56 PFC +7.14 PSA 0 SD -5.88	W 0 TU +17.65 GS +63.64 CF 0 CC +50 AC -6.67 IA +5.56	SI -42.86 HA -50 RE -42.86		
	Participant H				EC +10.71 TC +20 IC +90.91 PFC +33.33 PSA -29.17 SD -6.67	W -10 TU 17.65 GS -14.29 CF -15 CC 0 AC +75 IA -15	SI 0 HA -66.67 RE -80	
		Participant I				EC -3.45 TC +15.38 IC 0 PFC +15.38 PSA -5 SD +55.56	W -5.88 TU -5 GS 0 CF 0 CC -20 AC 20 IA -10.53	SI -50 HA -20 RE +25

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(Continued) - TABLE III

Participant	Pre and Post Scores			Post-Sport Injury Stress (%)		
	Learned Resourcefulness (%)	Psychological Skills in Sports (%)	Psychological Skills in Sports (%)			
Participant J	EC	-4.55	W	+33.33	SI	0
	TC	-47.37	TU	+25	HA	+28.57
	IC	0	GS	+53.85	RE	-14.29
	PFC	+14.29	CF	+5.26		
	PSA	0	CC	-60		
	SD	0	AC	-20		
			IA	+42.68		



Note. EC = emotional control, TC = thought control, IC = impulse control, PFC = problem-solving coping, PSA = problem-solving ability, SD = self-direction, W = will, TU = team unity, GS = goal settings, CF = confidence, CC = concentration, AC = anxiety control, IA = imagery ability, SI = social isolation, HA = hyperarousal, RE = re-experience

tions (Aron et al., 2019; Putukian, 2014). Such injuries can lead to passivity and loss of confidence, with withdrawal persisting even after returning to the sport. These negative psychological responses can compound the challenge of reintegration into competitive activities (Aron et al., 2019; Putukian, 2014). Therefore, mental health interventions may assist in successful rehabilitation and reduce the risk of mental health disorders. This study explored the effects of a 10-week yoga-PST program, focusing on enhancing injured young athletes' coping abilities. The investigation specifically assessed factors relevant to sports contexts, such as learned resourcefulness, psychological skills in sports, and stress related to post-sport injuries.

The results of this study yield substantial insights into the multifaceted impact of yoga interventions on injured youth athletes. Significant enhancements were observed in specific areas such as learned resourcefulness (14% improvement in problem-focused coping), psychological skills in sports (19% increase in goal-setting), and reductions in post-sport injury stress (40% decrease in hyperarousal and 35% reduction in re-experience). These findings align with prior research that emphasized the role of yoga in enhancing problem-related coping skills (Richter et al., 2016), boosting confidence (Kusuma & Bin, 2017), sharpening concentration (Serwacki & Cook-Cottone, 2012), and facilitating goal-setting (Goodman et al., 2014).

While not all sub-domains within the study variables demonstrated statistically significant changes, the analysis identified small to large effect sizes (ranging from 0.20 to 0.89) in most areas. The incremental increases in learned resourcefulness (9% increase in thought control, 12% in self-direction) and psychological skills in sports (2% in will, 8% in team unity, 6% in confidence, 10% in concentration, 6% in imagery ability) suggest the potential of a more nuanced impact. Furthermore, the 27% reduction in social isolation as a facet of post-sport injury stress highlights the holistic benefits of the yoga-PST intervention. The increase in the sense of team unity and reductions in stress align with previous literature, indicating that group yoga may be an effective method for fostering cohesiveness within team sports (Goodman et al., 2014; Harper, 2010). This evidence also supports the potential of yoga interventions combined with PST techniques to alleviate stress resulting from sports-related injuries (Arbo et al., 2020; Goodman et al., 2014; Mohammed et al., 2018). Noteworthy are the areas where no significant effects were found, such as emotional control, impulse control, problem-solving ability, or anxiety control. The lack of significant findings in these areas may present a rich avenue for further exploration, seeking to understand the limitations or contextual factors that might influence these outcomes.

This study adds to existing literature by examining the effects of yoga-PST

intervention on injured youth soccer players. However, certain limitations inherent in the research design necessitate acknowledgment and consideration for future studies. The absence of random assignment to groups may impede the ability of this preliminary case study to establish causality, thus underscoring the need for subsequent research to engage larger samples. Future endeavors should carefully examine the differential impacts of yoga between distinct groups of youth athletes, such as comparing a treatment group with a control group. Furthermore, the exclusive focus on Korean male soccer players in this study introduces potential limitations. Factors such as gender (including consideration of female participants), ethnicity, and engagement in various sport types may serve as extraneous variables, constraining the generalizability of the findings. Future investigations should strive to control these variables, including a balance of gender, the inclusion of diverse ethnic backgrounds, and consideration of different sports, to enhance the scope and applicability of the research.

Conclusions

The existing literature presents a noticeable scarcity of studies that investigate the impact of yoga intervention integrated with PST on the development of coping skills among young athletes, particularly in the context of mental health improvement following injury. Alleviating negative emotional responses is vital for overall well-being and long-term health. This case study highlights the potential of yoga-PST programs to enhance mental resilience and team cohesion among injured youth athletes. These findings bolster the understanding that a meticulously designed and skillfully implemented yoga program may serve as a promising intervention for injured young athletes.

However, further research is essential to elucidate the full spectrum of benefits and ascertain its applicability across diverse contexts and demographics. While the study's sample consisted of injured athletes, the severity of the injuries among the participants was not substantial, as they had physically recovered enough to engage in yoga practices. Therefore, caution must be exercised when implementing yoga poses, taking into consideration the specific severity of each client's injury. In cases where athletes may have difficulty holding yoga poses due to the pain from previous injuries, participants may engage in modified versions of yoga practices that require fewer poses, with an emphasis on PST techniques (e.g., breathing, meditation, relaxation, and imagery). Additionally, we recommend that the implementation of yoga practices should be guided or supervised by experienced yoga practitioners to ensure safety and effectiveness.

Given the documented mental health challenges faced by injured athletes (Aron et al., 2019; Fabricant et al., 2016; Hess et al., 2019), enhancing coping skills is imperative, especially for younger athletes, to mitigate the risk of chronic mental health issues (Myer et al., 2015; Rice et al., 2016). This preliminary research suggests that yoga-PST interventions could be integrated into current rehabilitation protocols to achieve this aim.

For young athletes in educational and athletic settings, a well-structured, multi-disciplinary approach is crucial. It should amalgamate not just educational, medical, and community resources but also incorporate empirically-supported interventions like yoga-PST, which has shown effectiveness in improving mental resilience. The adoption of such evidence-based practices would facilitate comprehensive recovery, addressing both the physical and psychological dimensions.

In practical terms, implementing this within the school ecosystem necessitates a robust framework that integrates varied domains (Lee et al., 2021, 2022). This framework should include educational policies, medical advice, and community resources. The demonstrated impact of yoga-PST in fortifying mental resilience and coping abilities provides a rationale for its inclusion in a multidimensional recovery protocol. Collaborations with local wellness centers and healthcare services could further augment the specialized support available to schools.

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REFERENCES

- Arbo, G., Brems, C., & Tasker, T. (2020). Mitigating the antecedents of sports-related injury through yoga. *International Journal of Yoga, 13*(2), 120. https://doi.org/10.4103/ijoy.IJOY_93_19
- Aron, C. M., Harvey, S., Hainline, B., Hitchcock, M. E., & Reardon, C. L. (2019). Post-traumatic stress disorder (PTSD) and other trauma-related mental disorders in elite athletes: A narrative review. *British Journal of Sports Medicine, 53*(12), 779-784. <https://doi.org/10.1136/bjsports-2019-100695>
- Arvinen-Barrow, M., & Walker, N. (2013). *The psychology of sport injury and rehabilitation* (1st ed.). Routledge.

- Baron, D. A., Reardon, C. L., & Baron, S. H. (2013). *Clinical sports psychiatry: An international perspective*. John Wiley & Sons.
- Brown, K. A., Patel, D. R., & Darmawan, D. (2017). Participation in sports in relation to adolescent growth and development. *Translational Pediatrics*, 6(3), 150-159. <https://doi.org/10.21037/tp.2017.04.03>
- Chou, C.-P., & Bentler, P. M. (1995). Estimates and tests in structural equation modeling. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications* (pp. 37-55). Sage Publications.
- Collins, N. M., Cromartie, F., Butler, S., & Bae, J. (2018). Effects of early sport participation on self-esteem and happiness. *The Sport Journal*, 20, 1-20.
- Cowden, R. G., Fuller, D. K., & Anshel, M. H. (2014). Psychological predictors of mental toughness in elite tennis: An exploratory study in learned resourcefulness and competitive trait anxiety. *Perceptual and Motor Skills*, 119(3), 661-678. <https://doi.org/10.2466/30.PMS.119c27z0>
- Cramer, H., Lauche, R., Langhorst, J., & Dobos, G. (2013). Yoga for depression: A systematic review and meta-analysis. *Depression and Anxiety*, 30(11), 1068-1083. <https://doi.org/10.1002/da.22166>
- Doherty, B., Lee, J., Keller, J., & Zhang, T. (2019). Promoting school-aged children's physical literacy in schools: A brief review. *Journal of Teaching, Research, and Media in Kinesiology*, 45-49.
- Fabricant, P. D., Lakomkin, N., Sugimoto, D., Tepolt, F. A., Stracciolini, A., & Kocher, M. S. (2016). Youth sports specialization and musculoskeletal injury: A systematic review of the literature. *Physician and Sportsmedicine*, 44(3), 257-262. <https://doi.org/10.1080/00913847.2016.1177476>
- Foster, D., Maynard, I., Butt, J., & Hays, K. (2016). Delivery of psychological skills training to youngsters. *Journal of Applied Sport Psychology*, 28(1), 62-77. <https://doi.org/10.1080/10413200.2015.1063097>
- Golby, J., & Wood, P. (2016). The effects of psychological skills training on mental toughness and psychological well-being of student-athletes. *Psychology*, 07(06), 901-913. <https://doi.org/10.4236/psych.2016.76092>
- Goodman, F. R., Kashdan, T. B., Mallard, T. T., & Schumann, M. (2014). A brief mindfulness and yoga intervention with an entire NCAA Division I athletic team: An initial investigation. *Psychology of Consciousness: Theory, Research, and Practice*, 1(4), 339-356. <https://doi.org/10.1037/cns0000022>
- Harper, J. C. (2010). Teaching yoga in urban elementary schools. *International Journal of Yoga Therapy*, 20(1), 99-109. <https://doi.org/10.17761/ijyt.20.1.x8373458w8140810>
- Hess, C. W., Gnacinski, S. L., & Meyer, B. B. (2019). A review of the sport-injury and -rehabilitation literature: From abstraction to application. *The Sport Psychologist*, 33(3), 232-243. <https://doi.org/10.1123/tsp.2018-0043>
- Houston, M. N., Hoch, M. C., & Hoch, J. M. (2016). Health-related quality of life in athletes: A systematic review with meta-analysis. *Journal of Athletic Training*, 51(6), 442-453. <https://doi.org/10.4085/1062-6050-51.7.03>
- Johnson, R. B., & Christensen, L. (2019). *Educational research: Quantitative, qualitative, and mixed approaches* (7th ed.). Sage Publications.
- Khodae, M., Currie, D. W., Asif, I. M., & Comstock, R. D. (2017). Nine-year study of US high school soccer injuries: Data from a national sports injury surveillance programme. *British Journal of Sports Medicine*, 51(3), 185-193. <https://doi.org/10.1136/bjsports-2015-095946>
- Kusuma, D. W. Y., & Bin, W. (2017). Effect of yoga program on mental health: Competitive anxiety In Semarang badminton athletes. *Jurnal Kesehatan Masyarakat*, 13(1), 121-130. <https://doi.org/10.15294/kemas.v13i1.9862>
- Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: A practical primer for t-tests and ANOVAs. *Frontiers in Psychology*, 4(NOV), 1-12. <https://doi.org/10.3389/fpsyg.2013.00863>

- Lee, H., & Chang, D. (2015). The change of psychological skills strategy and self-management behavior according to the level of resourcefulness of fencing-athlete. *Korean Journal of Sport Studies*, 54(5), 251-260.
- Lee, H., & Hwang, H. (2015). Change of resourcefulness, psychological skills, and self-management through psychological education of based on the somatic of college male shooting team. *The Official Journal of the Korean Academy of Kinesiology*, 17(2), 11-20.
- Lee, H., & Moon, J. (2020). The concept and structure verification of sport injury post-traumatic stress of athletes. *Korean Journal of Sport Psychology*, 31(2), 15-25.
- Lee, J., Park, J. H., & Lee, H. Y. (2022). Construction of Bodyfulness program for improving athlete leaders' psychosocial health: A grounded theory approach. *Journal of Korean Society for Rhythmic Exercises*, 15(1), 33-47. <https://doi.org/10.34270/JKSRE.2022.15.1.33>
- Lee, J., Zhang, T., Zhang, X., Chu, T. L., & Weiller-Abels, K. H. (2021). Preservice classroom teachers' perspectives on a comprehensive school physical activity programme. *Health Education Journal*, 80(2), 145-159. <https://doi.org/10.1177/0017896920958047>
- Maffulli, N., Longo, U. G., Gougoulias, N., Loppini, M., & Denaro, V. (2010). Long-term health outcomes of youth sports injuries. *British Journal of Sports Medicine*, 44(1), 21-25. <https://doi.org/10.1136/bjism.2009.069526>
- Mattie, P., & Munroe-Chandler, K. (2012). Examining the relationship between mental toughness and imagery use. *Journal of Applied Sport Psychology*, 24(2), 144-156. <https://doi.org/10.1080/10413200.2011.605422>
- Mistretta, E. G., Glass, C. R., Spears, C. A., Perskaudas, R., Kaufman, K. A., & Hoyer, D. (2017). Collegiate athletes' expectations and experiences with mindful sport performance enhancement. *Journal of Clinical Sport Psychology*, 11(3), 201-221. <https://doi.org/10.1123/jcsp.2016-0043>
- Mohammed, W. A., Pappous, A., & Sharma, D. (2018). Effect of mindfulness based stress reduction (MBSR) in Increasing pain tolerance and improving the mental health of injured athletes. *Frontiers in Psychology*, 9, 722. <https://doi.org/10.3389/fpsyg.2018.00722>
- Moon, J., & Lee, H. (2017). The process and effects of yoga training in high school soccer team. *Journal of Korean Society for Rhythmic Exercises*, 10(1), 1-10.
- Moring, J., Fuhrman, R., & Zauszniewski, J. A. (2011). Interrelatedness of proactive coping, reactive coping, and learned resourcefulness. *Measurement and Evaluation in Counseling and Development*, 44(4), 204-214. <https://doi.org/10.1177/0748175611414722>
- Myer, G. D., Jayanthi, N., Difiori, J. P., Faigenbaum, A. D., Kiefer, A. W., Logerstedt, D., & Micheli, L. J. (2015). Sport specialization, part I: Does early sports specialization increase negative outcomes and reduce the opportunity for success in young athletes? *Sports Health: A Multidisciplinary Approach*, 7(5), 437-442. <https://doi.org/10.1177/1941738115598747>
- Padaki, A. S., Noticewala, M. S., Levine, W. N., Ahmad, C. S., Popkin, M. K., & Popkin, C. A. (2018). Prevalence of posttraumatic stress disorder symptoms among young athletes after anterior cruciate ligament rupture. *Orthopaedic Journal of Sports Medicine*, 6(7). <https://doi.org/10.1177/2325967118787159>
- Paniccia, M., Knafo, R., Thomas, S., Taha, T., Ladha, A., Thompson, L., & Reed, N. (2019). Mindfulness-based yoga for youth with persistent concussion: A pilot study. *American Journal of Occupational Therapy*, 73(1), 1-12. <https://doi.org/10.5014/ajot.2019.027672>
- Polsgrove, M. J., Eggleston, B., & Lockyer, R. (2016). Impact of 10-weeks of yoga practice on flexibility and balance of college athletes. *International Journal of Yoga*, 9(1), 27. <https://doi.org/10.4103/0973-6131.171710>
- Putukian, M. (2014). How being injured affects mental health. In G. T. Brown (Ed.), *Mind, Body and Sport – Understanding and Supporting Student-Athlete Mental Wellness* (pp. 61-64). National Collegiate Athletic Association.

- Rice, S. M., Purcell, R., De Silva, S., Mawren, D., McGorry, P. D., & Parker, A. G. (2016). The mental health of elite athletes: A narrative systematic review. *Sports Medicine*, 46(9), 1333-1353. <https://doi.org/10.1007/s40279-016-0492-2>
- Richter, S., Tietjens, M., Ziereis, S., Querfurth, S., & Jansen, P. (2016). Yoga training in junior primary school-aged children has an impact on physical self-perceptions and problem-related behavior. *Frontiers in Psychology*, 7, 1-17. <https://doi.org/10.3389/fpsyg.2016.00203>
- Rosenbaum, M. (1990). The role of learned resourcefulness in the self-control of health behavior. In M. Rosenbaum (Ed.), *Learned resourcefulness: On coping skills, self-control, and adaptive behavior* (pp. 3-30). Springer Publishing Co.
- Ross, A., & Thomas, S. (2010). The health benefits of yoga and exercise: A review of comparison studies. *Journal of Alternative and Complementary Medicine*, 16(1), 3-12. <https://doi.org/10.1089/acm.2009.0044>
- Serwacki, M. L., & Cook-Cottone, C. (2012). Yoga in the schools: A systematic review of the literature. *International Journal of Yoga Therapy*, 22, 101-109. <https://doi.org/10.17761/ijyt.22.1.7716244t75u4l702>
- Sharma, L. (2015). Benefits of yoga in sports – A study. *International Journal of Physical Education Sports and Health*, 1(13), 30-32.
- Sheard, M., & Golby, J. (2006). Effect of a psychological skills training program on swimming performance and positive psychological development. *International Journal of Sport and Exercise Psychology*, 4(2), 149-169. <https://doi.org/10.1080/1612197X.2006.9671790>
- Sullivan, G. M., & Feinn, R. (2012). Using effect size – Or why the value is not enough. *Journal of Graduate Medical Education*, 4(3), 279-282. <https://doi.org/10.4300/JGME-D-12-00156.1>
- Takeuchi, E., Lacerda, S. S., Brech, G. C., & Kozasa, E. H. (2023). An integrated mind–body training intervention on an elite surfing athlete: A case study. *Case Studies in Sport and Exercise Psychology*, 7(1), 1-7. <https://doi.org/10.1123/cssep.2022-0006>
- Yoo, J., & Huh, J. (2002). Development and validation of the psychological skill questionnaire in sport. *Korean Journal of Physical Education*, 4(3), 41-50.