

The Effect of Psychological Skills Training (PST) on Reducing Anxiety and Increasing Mental Toughness in Squash Athletes Aged 17-20 Years

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Authors' Contribution: a – Study Design; b – Data Collection; c – Statistical Analysis; d – Manuscript Preparation; e – Funds Collection

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Received 26 April 2026; Accepted 16 September 2026 August 2026; Published 18 September 2026

ABSTRACT (English)

Background: Squash is a high-intensity sport that demands superior physical and psychological endurance. Athletes aged 17-20 often face peak competitive pressure that can increase anxiety and hinder performance.

Research Objectives: This study aims to test the effectiveness of an 8-week Psychological Skills Training (PST) program in reducing anxiety and increasing mental toughness in young squash athletes. **Methods:** This study used a quasi-experimental method with a pre-test post-test control group design. Thirty competitive squash athletes (age $M = 18.6 \pm 1.2$ years) participated and were randomly divided into an Experimental Group (EG; $n = 15$) and a Control Group (CG; $n = 15$). The EG received PST intervention (2x30-minute sessions/week) which included mindfulness, breathing, self-talk, and goal setting exercises in addition to regular training. The CG only continued regular training. Anxiety was measured using the Sport Competition Anxiety Test (SCAT), and mental toughness was measured using the Sport Mental Toughness Questionnaire (SMTQ). Data analysis used Paired t-tests and Independent t-tests ($p < 0.05$). **Results:** Results showed that the IE experienced a significant decrease in anxiety scores (mean decrease of 6.13 points; $p < 0.001$) and a significant increase in mental toughness scores (mean increase of 8.40 points; $p < 0.001$). No significant changes were found in CG ($p > 0.05$). **Conclusion:** It was concluded that the 8-week PST program was significantly effective in reducing competitive anxiety and increasing mental toughness in 17-20-year-old squash athletes.

Keywords: Squash; Anxiety; Mental Toughness; Psychological Skills Training (PST); Young Athletes.

ABSTRAK (Bahasa Indonesia)

Latar Belakang: Squash adalah olahraga intensitas tinggi yang menuntut ketahanan fisik dan psikologis superior. Atlet usia 17-20 tahun sering menghadapi tekanan kompetitif puncak yang dapat meningkatkan anxiety (kecemasan) dan menghambat performa. **Tujuan Penelitian:** Penelitian ini bertujuan untuk menguji efektivitas program Psychological Skills Training (PST) selama 8 minggu dalam menurunkan anxiety dan meningkatkan mental toughness (ketangguhan mental) pada atlet squash muda. **Metode:** Penelitian ini menggunakan metode quasi-experiment dengan desain pre-test post-test control group. Tiga puluh atlet squash kompetitif (usia $M = 18,6 \pm 1,2$ tahun) berpartisipasi dan dibagi secara acak menjadi Kelompok

Eksperimen (KE; n=15) dan Kelompok Kontrol (KK; n=15). KE menerima intervensi PST (sesi 2x30 menit/minggu) yang mencakup latihan mindfulness, pernapasan, self-talk, dan goal setting di samping latihan reguler. KK hanya melanjutkan latihan reguler. Anxiety diukur menggunakan Sport Competition Anxiety Test (SCAT), dan mental toughness diukur menggunakan Sport Mental Toughness Questionnaire (SMTQ). Analisis data menggunakan Paired t-test dan Independent t-test ($p < 0.05$). **Hasil:** Hasil menunjukkan bahwa KE mengalami penurunan skor anxiety yang signifikan (penurunan rerata 6,13 poin; $p < 0.001$) dan peningkatan skor mental toughness yang signifikan (peningkatan rerata 8,40 poin; $p < 0.001$). Tidak ada perubahan signifikan yang ditemukan pada KK ($p > 0.05$). **Kesimpulan:** Disimpulkan bahwa program PST 8 minggu efektif secara signifikan untuk menurunkan kecemasan kompetitif dan meningkatkan ketangguhan mental atlet squash usia 17-20 tahun.

Kata kunci: Squash; Anxiety; Mental Toughness; Psychological Skills Training (PST); Atlet Muda.

INTRODUCTION

Squash is consistently recognized as one of the most demanding sports in the world, requiring an extraordinary combination of aerobic-anaerobic fitness, agility, and speed (James et al., 2022). However, beyond the physical demands, the unique aspect of squash—played at high speed in an enclosed space—creates a high-pressure environment often referred to as a “pressure cooker” (Murray et al., 2019). In this environment, psychological factors such as the ability to manage anxiety and mental toughness often become the key differentiators between victory and defeat (Jones et al., 2018).

Competitive anxiety, defined as the tendency to feel tension and worry in competitive situations, can have a negative impact on an athlete's performance (Murray et al., 2016). In squash, cognitive anxiety (worry) can interfere with split-second decision-making, while somatic anxiety (muscle tension) can impair fluidity of movement and stroke technique (James et al., 2022).

As a counterbalance to anxiety, the concept of mental toughness (MT) becomes very important (Wilkinson et al., 2012). MT is defined as the psychological ability to consistently perform at the upper limits of one's ability, regardless of circumstances or pressure (Jones et al., 2018). Mentally tough athletes demonstrate high confidence, the ability to stay focused (control), and the will to persevere (resilience) even when faced with difficulties (Mojtahedi et al., 2023).

Squash athletes aged 17-20 are in a critical phase (Thiessen et al., 2024). They not only face the transition to more demanding senior competitions, but also academic and social pressures (Cowden, 2016). However, training programs at many clubs still focus heavily on physical and technical development, with little structured attention to psychological skill development (Rasyid et al., 2019). In fact, Psychological Skills Training (PST) interventions—such as mindfulness, self-talk, and goal setting—have been shown to be effective in improving psychological performance in various sports (Soundara Pandian et al., 2023).

To effectively address these psychological challenges, integrating structured PST interventions into training regimens is essential, particularly for young squash athletes navigating the complexities of competition and personal development (Aditya et al., 2024). Research indicates that such interventions not only enhance mental toughness but also significantly reduce competitive anxiety, thus fostering a more resilient mindset among athletes (Kahalekar, 2024).

For instance, mindfulness practices can help players maintain focus during high-pressure moments, enabling them to execute their skills more effectively, while goal-setting strategies can provide clarity and motivation amidst the chaos of competition (Reinebo et al., 2023). Furthermore, as these athletes transition into senior levels, the development of psychological resilience becomes crucial, as it may influence their long-term success and well-being in both sport and life (Brown & Fletcher, 2016). By prioritizing psychological skill development alongside physical training, coaches can cultivate a more holistic approach that prepares

athletes not just for immediate performance, but for enduring success in their sporting careers (B Gomez et al., 2025).

Given the high psychological pressure in squash and the lack of intervention research in this critical age group, this study aims to test the effectiveness of an 8-week PST program specifically designed to reduce anxiety and improve mental toughness in competitive squash athletes aged 17-20 years.

METHOD

Design

This study used a quasi-experimental design with a pre-test post-test control group.

Participants

The sample consisted of 30 competitive squash athletes (22 males, 8 females) from two training centers in Surabaya. The sample was taken using purposive sampling with the criteria of being aged 17-20 years, registered as active athletes participating in regional or national competitions, having at least 4 years of training experience, and being free from injury. The average age of the sample was 18.6 ± 1.2 years. All participants were then randomly assigned to two groups, namely the Experimental Group (EG; n=15) and the Control Group (CG; n=15).

Instruments and data measurements

The psychological testing instruments used in this study included two main measuring tools. First, to measure anxiety, the Sport Competition Anxiety Test (SCAT) developed by (Martens et al., 1990) was used. This instrument measures trait anxiety in the context of sports through 15 items with a total score ranging from 10 (low) to 30 (high). The SCAT has proven reliability and validity specifically for the athlete population. Second, to measure mental toughness, the Sport Mental Toughness Questionnaire (SMTQ) from (Sheard et al., 2009) was used. The SMTQ measures three sub-scales of mental toughness, namely confidence, constancy, and control, consisting of 14 items with a 1-4 Likert scale and a total score ranging from 14 (low) to 56 (high).

Intervention Procedure

The intervention was carried out over 8 weeks with different activities for each group. The Experimental Group (EG) participated in regular club squash training consisting of 4 physical and technical sessions per week, as well as a Psychological Skills Training (PST) program consisting of 2 sessions per week, each lasting 30 minutes, led by a sports psychologist. In weeks 1 to 4, the program focused on Arousal Regulation through deep breathing exercises, mindfulness, and progressive muscle relaxation to reduce anxiety. In weeks 3 to 6, attention shifted to Self-Talk by identifying negative self-talk and replacing it with positive and instructional cue words. Then, in weeks 5 to 8, the focus shifts to Goal Setting and Imagery, which involves setting daily process goals and visualizing successful performance under pressure. Meanwhile, the Control Group (CG) only participated in regular club squash training consisting of 4 physical and technical sessions per week without receiving PST intervention. All participants underwent a pre-test one week before the intervention began and a post-test one week after the 8-week intervention ended using the SCAT and SMTQ questionnaires.

Data analysis

The data were analyzed using SPSS Version 26 with a descriptive statistical approach in the form of mean and standard deviation (SD) to describe the characteristics of the data. Data normality was tested using Shapiro-Wilk, and variance homogeneity was tested using Levene's Test. To test the research hypothesis, a Paired Samples t-test was used to compare pre-test and post-test scores within each group, and an

Independent Samples t-test was used to compare gain scores (the difference between post-test and pre-test scores) between the Experimental Group (EG) and the Control Group (CG). A significance level of $p < 0.05$ was used.

RESULTS

The Levene and Shapiro-Wilk tests showed that the data were normally distributed and homogeneous ($p > 0.05$). Independent t-tests on the pre-test data confirmed that there were no significant initial differences between KE and KK in SCAT scores ($p=0.815$) and SMTQ scores ($p=0.774$), indicating that the two groups were equivalent.

Table 1. Comparison of Pre-Test and Post-Test Scores (Paired T-Test) for Anxiety (SCAT) and Mental Toughness (SMTQ)

Variabel	Groups	Test	Mean	SD	Difference (Post - Pre)	p-value (Paired)	Results
Anxiety (SCAT) (Score 10-30)	EG (n=15)	Pre-Test	22.40	3.11	-6.13	<0.001*	Significant
		Post-Test	16.27	2.89			
	CG (n=15)	Pre-Test	22.20	3.21	-0.20	0.452	No Significant
		Post-Test	22.20	3.16			
Mental Toughness (SMTQ) (Score 14-56)	EG (n=15)	Pre-Test	39.13	4.10	+8.40	<0.001*	Significant
		Post-Test	46.53	3.90			
	CG (n=15)	Pre-Test	38.40	4.24	+0.33	0.318	No Significant
		Post-Test	38.73	4.18			

*Statistically significant ($p < 0.05$). Note: A decrease in SCAT score is an improvement; an increase in SMTQ score is an improvement.

The results in Table 1 show that the Experimental Group (EG) experienced a very significant decrease in anxiety scores(improvement) and an increase in mental resilience scores (improvement). In contrast, the Control Group (CG) did not show anystatistically significant changes.

Table 2. Independent T-Test Results on Gain Score (Post-Pre Difference) Between Groups

Variabel	Gain Score EG (Mean $\pm$ SD)	Gain Score CG (Mean $\pm$ SD)	p-value (Independent)
Anxiety (SCAT)	-6.13 $\pm$ 1.81	-0.20 $\pm$ 1.52	<0.001*
Mental Toughness (SMTQ)	+8.40 $\pm$ 2.06	+0.33 $\pm$ 1.99	<0.001*

*Statistically significant ($p < 0.05$).

Table 2 confirms that the magnitude of change (decrease in anxiety and increase in mental toughness) in the Experimental Group (EG) was significantly greater than the minimal change in the Control Group (CG).

Table 3. Detailed Data Pre-Test and Post-Test for 30 Samples

Groups	ID	SCAT (Pre)	SCAT (Post)	SMTQ (Pre)	SMTQ (Post)
EG	S01	23	17	39	47
EG	S02	20	14	36	44
EG	S03	25	18	42	50
EG	S04	24	17	40	48
EG	S05	21	15	37	45
EG	S06	26	20	44	51

EG	S07	19	13	35	43
EG	S08	22	16	38	47
EG	S09	24	18	41	49
EG	S10	18	12	34	43
EG	S11	23	17	39	48
EG	S12	25	19	40	46
EG	S13	20	15	36	45
EG	S14	27	20	45	51
EG	S15	22	16	38	46
CG	S16	23	22	39	39
CG	S17	21	21	37	38
CG	S18	25	25	43	43
CG	S19	24	24	41	41
CG	S20	20	20	36	36
CG	S21	26	26	45	45
CG	S22	19	19	35	35
CG	S23	22	22	38	38
CG	S24	24	23	40	40
CG	S25	18	18	34	35
CG	S26	23	24	39	39
CG	S27	25	25	41	42
CG	S28	20	20	37	37
CG	S29	27	27	46	46
CG	S30	22	22	38	39

DISCUSSION

The main findings of this study are clear: an 8-week Psychological Skills Training (PST) program is significantly effective in reducing competitive anxiety and improving mental toughness in squash players aged 17-20 years.

A significant decrease in SCAT (anxiety) scores in the Experimental Group (EG) indicates the success of mindfulness and breathing exercises (Wong et al., 2022). In squash, pressure often peaks at crucial points ("game ball" or "tie-break"). PST intervention equips athletes with practical tools to regulate their physiological and cognitive arousal, allowing them to remain "calm" and focused on task execution, rather than getting caught up in worries about the outcome (Dana et al., 2022).

At the same time, a significant increase in SMTQ (mental toughness) scores in KE highlights the effectiveness of self-talk and goal setting exercises. Self-talk exercises help athletes rebuild confidence (SMTQ subscale) after making mistakes, while goal setting that focuses on the process (rather than the outcome) helps them maintain control (SMTQ subscale) in chaotic game situations (Vella-Fondacaro et al., 2023). An 8.40-point increase in SMTQ is a substantial improvement, indicating a real shift in athletes' mindset from reactive to proactive under pressure (Miçooğullari & Kirazci, 2016).

Moreover, the findings underscore the importance of integrating technology into psychological skills training, particularly as digital interventions gain traction in sports psychology. With the rise of mobile applications designed to enhance mental skills, athletes can access tailored resources that complement traditional PST techniques, potentially leading to even greater improvements in performance under pressure (Li et al., 2025). For instance, a recent study highlighted the effectiveness of e-interventions in fostering psychological resilience and enhancing coping strategies among athletes, suggesting that these tools can provide ongoing support beyond structured training sessions (Bonetti et al., 2025).

The most crucial finding may come from the Control Group (CG). Despite practicing squash intensively for 8 weeks, their anxiety and mental toughness scores did not change significantly. This provides strong evidence that playing squash alone is not enough to build mental toughness or reduce anxiety in trained athletes (aged 17-20). They appear to have reached a psychological plateau that can only be overcome with deliberate and structured psychological intervention.

Research Limitations This study has limitations. First, the use of self-report questionnaires (SCAT and SMTQ) depends on the honesty and self-awareness of athletes. Future research could incorporate more objective measures (e.g., heart rate variability/HRV as an indicator of stress, or statistical analysis of performance in matches). Second, the sample (N=30) is relatively small and specific to squash, so generalizations to other sports should be made with caution.

CONCLUSION

Based on the results of the study, it can be concluded that an 8-week Psychological Skills Training (PST) program, which combines mindfulness, self-talk, and goal setting, has a significant effect in reducing competitive anxiety (SCAT) and increasing mental toughness (SMTQ) in squash athletes aged 17-20 years. Regular physical and technical squash training alone is not sufficient to produce significant changes in anxiety or mental toughness among trained athletes. Therefore, coaches and sports practitioners are strongly advised to integrate mental skills training components as a standard part of the squash athlete training curriculum, both at the junior and senior levels.

ACKNOWLEDGEMENTS

The authors would like to sincerely thank all the squash athletes who participated in this study for their time, effort, and dedication throughout the 8-week Psychological Skills Training program. Special appreciation is extended to the coaches and staff of the training centers in Surabaya for their support and cooperation in facilitating the intervention and data collection. This research was made possible through the guidance and expertise of the sports psychologist who led the PST sessions, whose professional insight greatly enriched this study. Furthermore, gratitude is owed to the academic institutions and funding bodies that provided the necessary resources and logistical support to carry out this research. Their contribution has been invaluable in advancing knowledge on psychological skill development in young athletes.

CONFLICT OF INTEREST

The researchers declare that there is no conflict of interest regarding this study. There are no financial, personal, or professional interests that could have influenced the research outcomes or interpretation. This ensures that the research was conducted impartially and the results presented are unbiased.

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