Mental toughness in team sports: the impact of training on self-concept and psychological adaptation

Fortaleza mental en los deportes de equipo: el impacto del entrenamiento en el autoconcepto y la adaptación psicológica

Authors

Ahmed K. Hassan [1]

1 Department of Physical Education, College of Education, King Faisal University, Al-Ahsa 31982, Saudi Arabia.

Corresponding author:
Ahmed K. Hassan
amohhamed@kfu.edu.sa
https://orcid.org/my-orcid?orcid=0000-0002-2918-7572

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Abstract

Introduction: The research focused on developing structured methods to enhance mental toughness as a critical factor for overcoming challenges and promoting psychological adaptation among team sports players.
Objective: This study aimed to investigate the effectiveness of a mental toughness training program in improving physical self-concept and psychological adaptation among athletes in sports clubs in Al-Ahsa region. We hypothesized that a statistically significant difference was expected, with the experimental group expected to perform better based on the adoption of the training program.
Methodology: An experimental approach was adopted for this study. A total of 80 athletes were selected and randomly divided into experimental and control groups, each consisting of 40 participants. Data collection relied on standardized questionnaires designed to measure mental toughness, physical self-concept, and psychological adaptation. The experimental group underwent a structured mental toughness training program, while the control group did not receive any specific intervention.
Results: The findings revealed significant improvements in the experimental group compared to the control group across all measured variables. Athletes who participated in the mental toughness training program demonstrated enhanced physical self-concept, increased psychological resilience, and better overall psychological adaptation to the demands of team sports.
Discussion: Mental toughness training as a staple of athletic development blueprints leads to the overall growth developing on all platforms making difference in the aspect of psychological strength and physical sensitivity towards the optimum performance in the pressure field and sustainable success among players of team games.

Keywords

Physical self-concept; psychological adaptation; basketball; volleyball, handball.

Resumen

Introducción: La investigación se centró en el desarrollo de métodos estructurados para mejorar la fortaleza mental, factor crítico para superar desafíos y promover la adaptación psicológica en deportistas de equipo.
Objetivo: Este estudio tuvo como objetivo investigar la eficacia de un programa de entrenamiento de fortaleza mental para mejorar el autoconcepto físico y la adaptación psicológica en atletas de clubes deportivos de la región de Al-Ahsa. Planteamos la hipótesis de que se esperaba una diferencia estadísticamente significativa, y que se esperaba que el grupo experimental tuviera un mejor rendimiento tras la adopción del programa de entrenamiento.
Metodología: Se adoptó un enfoque experimental para este estudio. Se seleccionó a un total de 80 atletas y se dividieron aleatoriamente en grupos experimental y de control, cada uno compuesto por 40 participantes. La recopilación de datos se basó en cuestionarios estandarizados diseñados para medir la fortaleza mental, el autoconcepto físico y la adaptación psicológica. El grupo experimental se sometió a un programa estructurado de entrenamiento de fortaleza mental, mientras que el grupo control no recibió ninguna intervención específica.
Resultados: Los hallazgos revelaron mejoras significativas en el grupo experimental en comparación con el grupo control en todas las variables medidas. Los atletas que participaron en el programa de entrenamiento de fortaleza mental demostraron un mejor autoconcepto físico, mayor resiliencia psicológica y una mejor adaptación psicológica general a las exigencias de los deportes de equipo.
Discusión: El entrenamiento de fortaleza mental, como elemento fundamental en los planes de desarrollo atlético, conduce al crecimiento general en todas las áreas, marcando la diferencia en la fuerza psicológica y la sensibilidad física para lograr un rendimiento óptimo en situaciones de presión y el éxito sostenible de los jugadores de equipo.

Palabras clave

Autoconcepto físico; adaptación psicológica; baloncesto; voleibol, balonmano.

Introduction

The fundamental skill set of mental toughness aids athletes in a team in pressure management circumstances, and it aids in maintaining stress (Akbar et al., 2025; Putra et al., 2025; González-Hernández et al., 2024). Mental toughness drives personal game improvement in team sports and develops cooperative behavior along with leadership qualities and emotional intelligence competencies inside teams (Mireku et al., 2024). Athletes with strong mental toughness enhance their performance since they excel at handling challenges while staying focused on potential sport requirements. The traits that make up mental toughness include determination, together with composure, resilience, and emotional regulation (Akbar et al., 2024), for success in high-pressure situations.

Team sports depend heavily on mental toughness since it determines both singular achievement and combined team efforts. Guzmán-Muzante et al. (2024) define mental toughness as the ability of people to pursue their targets under different forms of pressure. People develop this ability through both constructive positive thinking and problem-solving skills so they can effectively handle physical and mental pressures, according to Akbar et al. (2024). Success in team sports depends heavily on possessing these essential features since both cooperation and communication remain vital aspects of sport. Team sports depend heavily on mental toughness since it determines both singular achievement and combined team efforts. Guzmán-Muzante et al. (2024) define mental toughness as the ability of people to pursue their targets under different forms of pressure. People develop this ability through both constructive positive thinking and problem-solving skills so they can effectively handle physical and mental pressures, according to Akbar et al. (2024).

Physical self-concept refers to individuals' perceptions of their physical abilities, body image, and overall fitness levels. In competitive team sports, athletes need positive physical self-concepts to keep their competitive spirit strong throughout games (Kartikasari et al., 2023). Consulting Gosteva (2023) studies reveal that mental toughness programs lead to major improvements of athletes' physical self-value because students become more aware of their personal abilities and experience decreased body image dissatisfaction. The positive shift overall affects athletic results while creating steady benefits to mental health. The direct connection between mental toughness enables people to develop precise and positive understandings about their bodily abilities and performance (Guilherme et al., 2024). Performance quality as well as mental health well-being suffers when disciplined athletes develop body dissatisfaction (Cherniakova et al., 2024). By participating in mental toughness training programs, athletes learn how to handle outside criticism regarding their appearance effectively, thus minimizing their potential for psychosocial maladjustment (Choudhary & Chaturvedi, 2024). Mental toughness serves to boost physical self-concept, which leads to enhanced overall health results as well as more enhanced academic and athletic achievements (Ferro et al., 2023).

Psychological adaptation includes the skills to cope with uncertain situations, stress control and stability of emotions. Athletic mental toughness training programs are essential as they are vital in developing these skills of psychological adaptation to changes of a very vital nature (Aditya et al., 2024). These programs instill attributes such as the resilience, composure, and determination among the athletes thus flourishing under pressurizing circumstances. The studies note that mental toughness not only improves mental health but also improves the satisfaction of athletes with their performance and decreases the level of anxiety (Julianty et al., 2024; Kumbar and Patil, 2024). As a result of mental toughness training, the training prepares athletes strategically with the instruments to effectively deal with stress, establish goals with an impact, and build interpersonal skills followed by tremendous mental adjustments (Jang et al., 2022). Psychological resilience, as it is defined by Pires et al. (2019), is one of the determinants that has to do with the ability of the respective athletes to deal with the stress associated with the training and competition processes. It helps them view negative circumstances in healthy ways so that they can perform best even when pressure builds up on them (Pires et al., 2019).

Since mental toughness emerged as a fundamental element for athletic success, the sports industry needs structured training programs designed for team sport athletes. Educational programs for athletes must combine stress management techniques with goal-setting exercises along with skills development activities for complete psychological readiness (Akbar et al., 2024). Sports organizations can boost athlete development through organized mental toughness training, which builds beneficial environments for complete athlete growth and potential optimization. Team sports require psychological skills, which

structured mental toughness programs that teach systematically to athletes. The programs teach athletes valuable methods to deal with stress while setting attainable objectives and developing resistance to setbacks (Farzad & Karami, 2023). The programs stress the necessity of developing emotional intelligence as well as leadership qualities because these abilities drive successful teamwork and communication (Mireku et al., 2024). Research demonstrates that athletes who complete organized training regimens develop enhanced mental fortitude together with enhanced physical body opinions and better psychological well-being (Caamaño-Navarrete et al., 2024). Educational institutions combined with sports organizations should adopt these programs to support athletes in reaching their maximum potential while simultaneously enhancing their whole-being quality.

This research provides new scientific insights as it develops and tests training procedures to optimize mental toughness, physical self-concept, and psychological readiness among athletes in team sports in the Al-Ahsa area. The key objective of this study was to explore the effectiveness of a mental toughness training program in enhancing physical self-perception and psychological adaptation in athletes within sports clubs. Based on an experimental design, the paper compares mental toughness, physical self-concept scores, and scores of psychological adaptations between an experimental and control group, both in the pre- and post-test conditions. It was hypothesized that a statistically significant difference was expected, with the experimental group expected to perform better based on the adoption of the training program. The results incline to the validity of significant enhancement in experimental groups, and the value of such programs as mental toughness as an important instrument of shaping both physical and mental performance of athletes. These findings support the necessity of such programs in facilitating the ability of athletes to deal with the demands of competitions as well as maximizing their own psychological and social adaptation.

Method

Participants

The study involved 80 young athletes from team sports (basketball, handball, and volleyball) at Al-Adalah Sports Club in Al-Ahsa, Saudi Arabia. The participants' ages ranged between 18 and 20 years. The sample size was calculated using Stephen K. Thompson's equation (Thompson, 2012), with a 95% confidence level (Z = 1.96), a margin of error of 0.05 (d = 0.05), and an estimated proportion of variability (p = 0.5). Initially, 110 athletes were selected using purposive non-probability sampling; however, 30 athletes were excluded due to failure to meet inclusion criteria or withdrawal from the study. The final sample consisted of 80 athletes divided equally into two groups: an experimental group (n = 40) and a control group (n = 40). Athletes in the experimental group participated in a mental toughness training program, while the control group did not receive any specific intervention.

The study participants needed to provide consent while being enrolled as undergraduate students in the College of Education for inclusion. Participants were excluded from the study because either (1) their medical condition created obstacles for completing assessments, (2) they failed to carry out data instruments properly, or (3) they were absent from assessments when data was recorded. The project received approval from the Ethics Committee of King Faisal University (CEC No. 18-23 Act) under the framework of the Declaration of Helsinki (2013). The research assistants with pre-training assisted individually for scale completion at university facilities to address any uncertainties that might arise. The scales were distributed to participants within academic year while being conducted in morning classroom sessions.

Procedure

The College of Education students from King Faisal University in Saudi Arabia participated in an organized mental toughness training program during their intervention phase. All participants received pre-assessment measures, which were gathered between August 26 and 27 of the year 2024 for baseline measurement. This study included two groups: An experimental group that received mental toughness training for eight weeks through the program in Appendix A, while the control group participated in a traditional general program running for eight weeks without mental toughness training. The experimental training program ran from September 1 to October 17 of 2024 before extending across Sundays,

Tuesdays, and Thursdays three times per week. Post-intervention measurements of both groups occurred on October 20 and 21, 2024, by implementing equivalent procedures that matched the pre-implementation assessment protocols. The study's participants learned about everything from goals to dangers, along with ethical frameworks, before the research began. All participants needed to authorize their participation by signing voluntary consent forms relating to their commitment to uphold the research guidelines. The research protocol secured both the participants' ethical rights and their well-being through minimal risks from the beginning to the end of the study. The Ethics Committee of King Faisal University (protocol Ref. No. KFU-REC-2024-ABR-ETHICS2*14*1) acknowledged this work.

Instrument

Mental Toughness Scale

The researcher used the conceptual framework used by Gucciardi et al. (2015) to develop the Mental Toughness Scale, according to which significant dimensions of mental toughness involve challenge, social confidence, confidence in abilities, emotional self-control, and commitment. First, 34 items had been formulated to resonate with these characteristics, including characteristics like challenge (7 items), social confidence (6 items), confidence in abilities (6 items), emotional control (6 items), and commitment (7 items). Four university educators were requested to reject, revise, or confirm an item to make it clear and relevant, as well as extend the scale by 14 other items based on the original framework provided by Gucciardi et al. The last version of the scale includes 48 items and 5 dimensions (challenge, 9 items, e.g., It is part of my life to stretch boundaries of my strengths (I always attempt to extend my potential) and social confidence (e.g., I always attempt to extend my potential). Confidence in the strength of abilities (e.g., I talk well in the company of other people"). Emotional control Inventory (e.g., I trust my capability to learn and develop new skills). This is because of the following reasons: e.g., I display a commitment to the job and remain steady enough not to lose control over setbacks/failures. "I do not get distracted when encountering challenges"). The survey was answered by the participants on a five-point Likert scale (with only seven items being reverse-scored to reduce the possibility of a response bias (see Appendix A): from 1 (strongly disagree) to 5 (strongly agree). Reliability is significantly high with a Cronbach's alpha of 0.86; hence, this scale interferes with mental toughness.

Physical Self-Concept

The researcher utilized the Physical Self-concept Questionnaire (PSQ) (Marsh et al., 2006) to establish students' physical self-concept. The positive wording structure and phrase format of items best suited students, so the questionnaire was designed in this manner in Appendix B. The survey used a five-point Likert scale from 1 = "does not apply to me strongly", 5 ="applies to me strongly." This measurement achieved good reliability ($\alpha = 0.85$).

Psychological Adaptation Scale

The Psychological Adaptation Scale (PAS) provides students with an assessment tool (Biesecker et al., 2013) for adaptation. The PAS contains 24 items. The four domains focused on the PAS assessment measure (1) coping efficacy, (2) self-esteem, (3) spiritual/existential meaning, and (4) social integration. Each domain included 6 items (see Appendix C). The Likert-type rating system used a 5-point scale where participants selected between 1 = strongly does not apply, 2 = does not apply, 3 = somewhat applies, up to 4 = applies, and 5 = strongly applies. The measured reliability of the scale reached 0.77.

Experimental Procedures

The program rolled out through systematic implementation of mental toughness exercises over eight weeks. The experimental subjects spent 30–35 minutes in training sessions through 24 sessions that took place three times each week. The experimental group received mental toughness training that incorporated specific exercises to build capabilities in a challenge, social confidence, confidence in abilities, emotional control, and commitment. Combining theoretical content with practical work followed by reflective periods strengthened how participants applied their learned concepts. The standard curriculum choices of the control group served as the baseline for evaluating how mental toughness interventions impacted the program. Standardized test conditions were implemented to achieve result validity and reliability in every measurement. The researchers used detailed timelines and methodological planning to evaluate mental toughness training effects on participant students. (see Appendix D).

Data analysis

The IBM-SPSS 26 (Chicago, IL, USA) software was used to analyze the data obtained in this work. A number of statistical estimates were generated, such as the mean, standard deviation, coefficient of variation, confidence interval (95% CI, lower and upper limits), and effect size, to guarantee the rigidity and dependability of the results. Inferential analyses were only run after determining the normality of data distribution based on skewness, kurtosis, and Shapiro-Wilk test to ensure that assumptions used in parametric analyses were met. The mean difference calculations between the experimental group and control group then followed by an independent t-test analysis. In this study, statistical significance was set at a reference value of $p < .05$ and this made the results meaningful and reliable.

Results

Presents the descriptive statistics of the mean age of the participants of the experimental group (EG) and the control group (CG) in table 1.

Table 1. Descriptive statistics.

	EG		CG	
	Mean	Std.	Mean	Std.
Age	18.25	0.51	18.27	0.47

EG—Experimental Group; CG—Control Group.

The descriptive statistics of the mean age of those people who participated in experimental group (EG) and those in control group (CG) appear in Table 1. The EG had an average of 18.25 age and Standard Deviation (Std.) of 0.51 whereas the CG had an average age of 18.27 with a Std. of 0.47. These values show that both the groups were very similar in age and hence they could be compared. The low standard deviations indicate that age is not much different in each group, which made the analysis more reliable.

The data in Tables 1 and 2 display the mean score evaluation from pre-study and post-study periods for experimental versus control groups, alongside subsequent measurement variations showing better outcomes with the experimental group.

Table 2. Descriptive statistics of experimental and control groups

Group	Outcome measures		Pre			Post			t	ES	Sig.
			Mean	Std.	Variance	Mean	Std.	Variance			
EG	Mental Toughness	Challenge	2.17	0.20	0.04	3.23	0.16	0.03	31.57	0.96	0.001
		Interpersonal Confidence	2.10	0.21	0.04	3.09	0.20	0.04	18.01	0.89	0.001
		Confidence in Abilities	2.22	0.21	0.04	3.24	0.20	0.04	27.14	0.95	0.001
		Emotion Control	2.15	0.20	0.04	3.11	0.22	0.05	20.76	0.92	0.001
		Commitment	2.00	0.18	0.03	2.92	0.19	0.04	27.05	0.95	0.001
		TOTAL (MT)	2.12	0.09	0.01	3.11	0.08	0.01	53.85	0.99	0.001
	Physical Self-Concept		1.81	0.15	0.02	2.80	0.13	0.02	22.45	0.93	0.001
	Psychological Adaptation	Coping Efficacy	1.95	0.33	0.11	3.07	0.21	0.04	30.31	0.96	0.001
		Self-Esteem	2.00	0.22	0.05	3.10	0.18	0.03	25.40	0.94	0.001
		Spiritual/Existential Meaning	1.79	0.19	0.04	2.97	0.16	0.03	49.48	0.98	0.001
		Social Integration	1.84	0.23	0.05	3.05	0.18	0.03	30.31	0.96	0.001
		TOTAL	1.90	0.12	0.01	3.05	0.10	0.01	25.40	0.94	0.001
CG	Mental Toughness	Challenge	2.16	0.19	0.03	2.56	0.11	0.01	18.73	0.90	0.001
		Interpersonal Confidence	2.09	0.21	0.04	2.34	0.14	0.02	13.44	0.82	0.001
		Confidence in Abilities	2.22	0.20	0.04	2.55	0.14	0.02	14.16	0.84	0.001
		Emotion Control	2.14	0.20	0.04	2.33	0.16	0.03	15.93	0.87	0.001
		Commitment	2.02	0.19	0.03	2.30	0.10	0.01	14.20	0.84	0.001
		TOTAL (MT)	2.12	0.09	0.01	2.41	0.06	0.00	31.22	0.96	0.001
	Physical Self-Concept		1.81	0.14	0.02	2.07	0.12	0.01	18.73	0.90	0.001
	Psychological Adaptation	Coping Efficacy	1.95	0.31	0.10	2.34	0.26	0.07	13.44	0.82	0.001
		Self-Esteem	2.00	0.21	0.04	2.36	0.12	0.01	14.16	0.84	0.001
		Spiritual/Existential Meaning	1.78	0.20	0.04	2.18	0.16	0.02	15.93	0.87	0.001
		Social Integration	1.84	0.23	0.05	2.22	0.17	0.03	14.20	0.84	0.001
		TOTAL	1.89	0.11	0.01	2.27	0.09	0.01	31.22	0.96	0.001

Significant differences, $p < .05$.

Key: EG—Experimental Group; CG—Control Group; ES— Effect size.

Table 2 contains results that confirm that participants from the experimental group (EG) showed better outcomes in mental toughness, physical self-concept, and psychological adaptation as opposed to the control group (CG). All dimensions of mental toughness showed substantial improvements among experimental group participants because their post-test scores (3.11) significantly surpassed pre-test measurements (2.12) with a large effect size of ES = 0.99, $p < 0.001$. The experimental group showed significant physical self-concept enhancement from 1.81 to 2.80 (ES = 0.93, $p < 0.001$), but the control group participants demonstrated less substantial progress (from 1.81 to 2.07). The enrolled athletes in the experimental group showcased notable psychological advancements as their coping abilities (ES = 0.96) rose from 1.95 to 3.07 while their spiritual and existential perception of life (ES = 0.98) shifted from 1.79 to 2.97 during the study period. The training intervention proved successful in developing mental toughness together with self-concept growth and psychological adjustment in team sports teams because the EG participants maintained consistently larger effect sizes and notable statistical differences than the CG participants.

Table 3. Mean, standard deviation, and ES in post-test measurements of experimental and control groups.

Scales	Outcome measures	Experimental		Control		t	ES	CI		P
		Mean	Std. Deviation	Mean	Std. Deviation			Lower	Upper	
Mental Toughness	Challenge	3.23	0.16	2.56	0.11	21.12	0.85	0.60	0.73	<0.01
	Interpersonal Confidence	3.09	0.20	2.34	0.14	19.59	0.83	0.67	0.83	<0.01
	Confidence in Abilities	3.24	0.20	2.55	0.14	17.41	0.80	0.61	0.76	<0.01
	Emotion Control	3.11	0.22	2.33	0.16	18.24	0.81	0.69	0.87	<0.01
	Commitment	2.92	0.19	2.30	0.10	18.17	0.81	0.55	0.69	<0.01
	TOTAL (MT)	3.11	0.08	2.41	0.06	45.52	0.96	0.67	0.73	<0.01
Physical Self-Concept		2.80	0.13	2.07	0.12	25.88	0.90	0.67	0.78	<0.01
Psychological Adaptation	Coping Efficacy	3.07	0.21	2.34	0.26	13.94	0.71	0.63	0.83	<0.01
	Self-Esteem	3.10	0.18	2.36	0.12	22.20	0.86	0.68	0.81	<0.01
	Spiritual/Existential Meaning	2.97	0.16	2.18	0.16	22.59	0.87	0.73	0.87	<0.01
	Social Integration	3.05	0.18	2.22	0.17	21.02	0.85	0.76	0.92	<0.01
	TOTAL	3.05	0.10	2.27	0.09	36.17	0.94	0.73	0.82	<0.01

Significant differences, p< .05.

The experimental group (EG) participating in the intervention achieved significantly higher gains compared to the control group (CG) according to results from Table 3 across all evaluated scales. The experimental group surpassed the control group in mental toughness scores to such an extent that substantial effect sizes between 0.80 and 0.85 emerged. Analysis revealed a statistically significant difference ($t = 21.12$, $p < 0.01$) between groups as the EG scored 3.23 (SD = 0.16) while the CG scored 2.56 (SD = 0.11). Both measurements in psychological adaptation showed that the EG achieved better results than the CG with coping efficacy (EG: 3.07, SD = 0.21 vs. CG: 2.34, SD = 0.26; $t = 13.94$, ES = 0.71, $p < 0.01$) and spiritual/existential meaning (EG: 2.97, SD = 0.16 vs. CG: 2.18, SD = 0.16; $t = 22.59$, ES = 0.87, $p < 0$. The physical self-concept scores indicated a significant difference between groups as participants in the EG reported 2.80 (SD = 0.13) compared to 2.07 (SD = 0.12) reported by participants in the CG. This difference demonstrated a large effect size of ES = 0.90 at $p < 0.01$. These research results demonstrate that the intervention delivered significant and substantial benefits since performance metrics along with effect sizes between 0.71 and 0.96 showed statistically meaningful increases in mental toughness, physical self-concept, and psychological adaptation.

Discussion

The experimental team assessment along with the control group evaluation in Tables 2 and 3 demonstrates remarkable growth in psychological aspects for the experimental section. Scores from the two-time measurements demonstrate noticeable improvements in the five psychological dimensions that comprise challenge and interpersonal confidence, with confidence in abilities and emotional control and commitment. The mental toughness training program proves its effectiveness by developing positive

psychological characteristics within its participants. Participants in the mental toughness training achieved successful program outcomes as the training proved its usefulness for building mental durability together with better physical self-identity development and psychological adjustment. Research revealed significant variations between the experimental and control subjects through strong statistical outcomes and powerful effect measurements. Research findings regarding performance success and well-being match the results, which show the intervention effectively developed important psychological attributes. Research from Guzmán-Muzante et al. (2024) shows that people with strong mental toughness create better connections with others and develop higher self-control and self-assurance, through which they handle challenging situations efficiently. According to Greinert et al. (2024) and Hutomo (2025), mental toughness depends on three key elements, which are resilience together with focus and motivation that help sports performers succeed. The research findings presented in Hudaniah and Masturah (2024), Dorling and Bahr (2024), and Zhao et al. (2025) show that athletes who possess greater mental toughness experience decreased competitive anxiety and superior sports performance.

According to McLoughlin et al. (2023), positive stress perception as a challenge benefits mental health and overall wellness for individuals. The positive stress mental approach directly relates to athletic competency outcomes because it arises from attributes acquired through the training protocol leading to improved sports results. Research demonstrates the training program enables development of mental toughness and physical self-perception while advancing psychological adaptation in athletes, therefore offering practical learning for coaches and practitioners who assist athletes in their complete growth.

The study conducted by Hernández et al. (2024) demonstrates that self-confidence helps participants resist high perfectionism levels and anxiety, thus improving their total performance results. Studies by Ponomaryov et al. (2024) and Hidayat et al. (2023) proved that mental toughness serves as a fundamental factor that helps participants stay competitive when facing obstacles and pressure situations. According to Hidayat et al. (2023), psychological techniques, including self-talk and mental imagery, led to improvements in motor skills development while boosting self-confidence. The observed results demonstrate the need for psychological training implementation because participants in the experimental group outperformed their counterparts from the control group.

Farzad and Karami (2024) conducted research that showed participants who received mental toughness interventions achieved major progress with their goal-setting abilities, thus demonstrating how the program supports vital mental skills for academic achievement. The Siswa Tangguh Training program, according to Julianty et al. (2024), led students to increase their mental toughness levels by 60.5%. Proof regarding the effectiveness of individualized mental toughness training came from Pocius and Malinauskas (2024), when they demonstrated how the program enhanced numerous psychological traits such as emotional regulation abilities and personal confidence. The research conducted by Dahiya and Kumar (2023) and Julvanichpong et al. (2022) demonstrates that strategic skills training enhances mental strength and preparedness within different student groups. Data from this study proves the identified trends by demonstrating improved mental toughness abilities in challenge alongside interpersonal confidence and confidence in abilities and emotional control and commitment within participants of the experimental group compared to those in the control group. Research findings indicate that formal mental toughness training establishes itself as an effective educational strategy to build complete psychological abilities that let students control stress better while focusing better and obtaining better academic results with extracurricular success.

The results of the current study align with existing research, indicating that structured mental toughness programs play a pivotal role in enhancing psychological compatibility among students. For instance, Julianty et al. (2024) demonstrated a significant 60.5% improvement in mental toughness following the Siswa Tangguh Training program, underscoring its importance for academic success and psychological well-being. Similarly, Andreeva et al. (2024) reported that a mental fitness program for female students effectively reduced stress-related conditions, leading to improved mood and overall well-being. Interventions aimed at developing mental toughness have also yielded promising outcomes. Pocius & Malinauskas (2024) highlighted substantial improvements in self-confidence and emotional control among basketball athletes, emphasizing the program's potential to foster resilience in high-pressure environments. These findings are further supported by studies such as those conducted by Lee et al. (2024) and Sofyan et al. (2024), which suggest that mental toughness training not only enhances self-

confidence but also mitigates negative emotional experiences, thereby improving cognitive performance and adaptability in challenging university settings. Overall, the integration of mental toughness programs into educational frameworks appears to be a critical strategy for cultivating resilience, promoting emotional regulation, and enhancing students' psychological compatibility. The observed improvements in both psychological and physical dimensions highlight the necessity of adopting comprehensive, targeted interventions to support holistic student development. This study's findings reinforce the importance of mental toughness as a foundational skill for navigating the demands of modern education and achieving long-term success.

Implications for sport Institutions

The research findings emphasize that sports organizations must incorporate mental toughness training programs to enhance athlete resilience. These programs should be integrated through both structured training sessions and extracurricular activities to help athletes develop skills in challenge management, emotional control, and commitment, thereby maximizing their athletic and personal development. Systematically designed programs that improve interpersonal confidence and self-esteem enable athletes to adapt more effectively to new competitive environments and maintain mental strength in high-pressure situations. By prioritizing mental toughness, sports clubs like Al-Adalah create holistic developmental environments that equip athletes with critical stress-management resources for success in demanding competitive contexts. This strategic approach not only enhances individual performance but also aligns with organizational goals dedicated to fostering sustainable well-being within the sports community. The findings highlight the necessity of implementing comprehensive mental health programs to prepare athletes for upcoming challenges and future career demands in complex professional settings. Such programs require continuous evaluation and refinement to ensure they deliver optimal benefits for athlete success. By doing so, Al-Adalah Sports Club can establish itself as a leader in promoting mental wellness and holistic development among its athletes, ultimately contributing to long-term success both on and off the field.

Future Research

Findings of the present study need to be explored in future because of the limitations of the study because it has only focused on the sample group of athletes of the same age and expertise level as well as their participation in sports. Long-term research is required to understand how the long-term impacts of mental toughness programs lead to a better psychological adaptation and the perception of a self in sports, especially the team-related ones such as basketball, handball, or volleyball. Also, the use of complex digital technologies, including artificial intelligence (AI) and virtual reality (VR) during the development of mental training processes can improve the results of these programs, providing new directions in athletic training. Subsequent research can also examine the implementation of mental toughness programs in different sports organizations on the regional, national, and international levels with a particular emphasis on such an institution as Al-Adalah Sports Club in Al-Ahsa. The applicability of the testing programs in various settings will enable one to look at adaptability and effectiveness of the tests in different settings. In addition, the existence of implementation issues, as well as their solution, will make this kind of initiative more scalable and sustainable in cases when such initiatives are widely adopted and become successful in the long term.

Study Limitations

The limitations in this study that sought to examine the effects of a mental toughness training program on both physical self-concept and psychological adaptation of young athletes in Al-Ahsa, Saudi Arabia included the following. First, the number of participants was rather small, with 80 participants aged 18 20 years of team sports (basketball, handball, and volleyball) of one sports club, Al-Adalah Sports Club, which could leave the results limited to other age groups, sports divisions, or regions. Second, the dependability on the purposive non-probability sampling method presents possible selection bias as the sample was not selected at random, which can also challenge the representativeness of the sample. Third, the duration of the study and the emphasis on short-term results might not be sufficient to comprehend the long-term implications of mental toughness training regarding self-concept and psychological adjustment. Lastly, extraneous factors, which include differences in personal motivation, prior exposure to mental training, or other uncontrolled psychological factors might have affected the outcome impacting the necessity of future research with a broader sample base and longitudinal studies.

Conclusions

The research successfully demonstrates the effects of intentional mental toughness preparation methods on athletes' mental and physical development. The mental toughness training program delivered noticeable advancements to every aspect of mental toughness in athletes, including their abilities to handle challenges and enhance interpersonal confidence while improving emotional control, building confidence in their skillsets, and making improved commitments. The intervention achieved effectiveness as statistical analysis proved significant results ($p < 0.01$) between pre-test scores and post-test scores. Mental toughness training brought significant improvements to experimental group athletes' perception of their physical capabilities besides reinforcing their psychological attributes. Participants demonstrated better psychological adaptation through the program because they gained improved coping skills as well as stronger self-esteem, deeper spiritual values, and better social connections. Research evidence indicates that sports training programs that include mental toughness training give athletes standardized assessment methods that aid their personal advancement. Training programs exist to develop essential abilities that athletes need for coping with stress and keeping focus while maximizing their performance during intense situations. Regular mental toughness training must be incorporated into sports club activities at Al-Adalah Sports Club in Al-Ahsa because it creates comprehensive athlete growth leading to sustained performance excellence in athletic competitions.

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Authors' and translators' details:

Ahmed K. Hassan amohhamed@kfu.edu.sa Author