



INTERNATIONAL GRADUATE COLLOQUIUM

i-SPEAK 2025

SPORTS AND PHYSICAL EXERCISE ASSEMBLY OF KNOWLEDGE SHARING

COLLOQUIUM PROCEEDINGS

EXTENDED
ABSTRACT

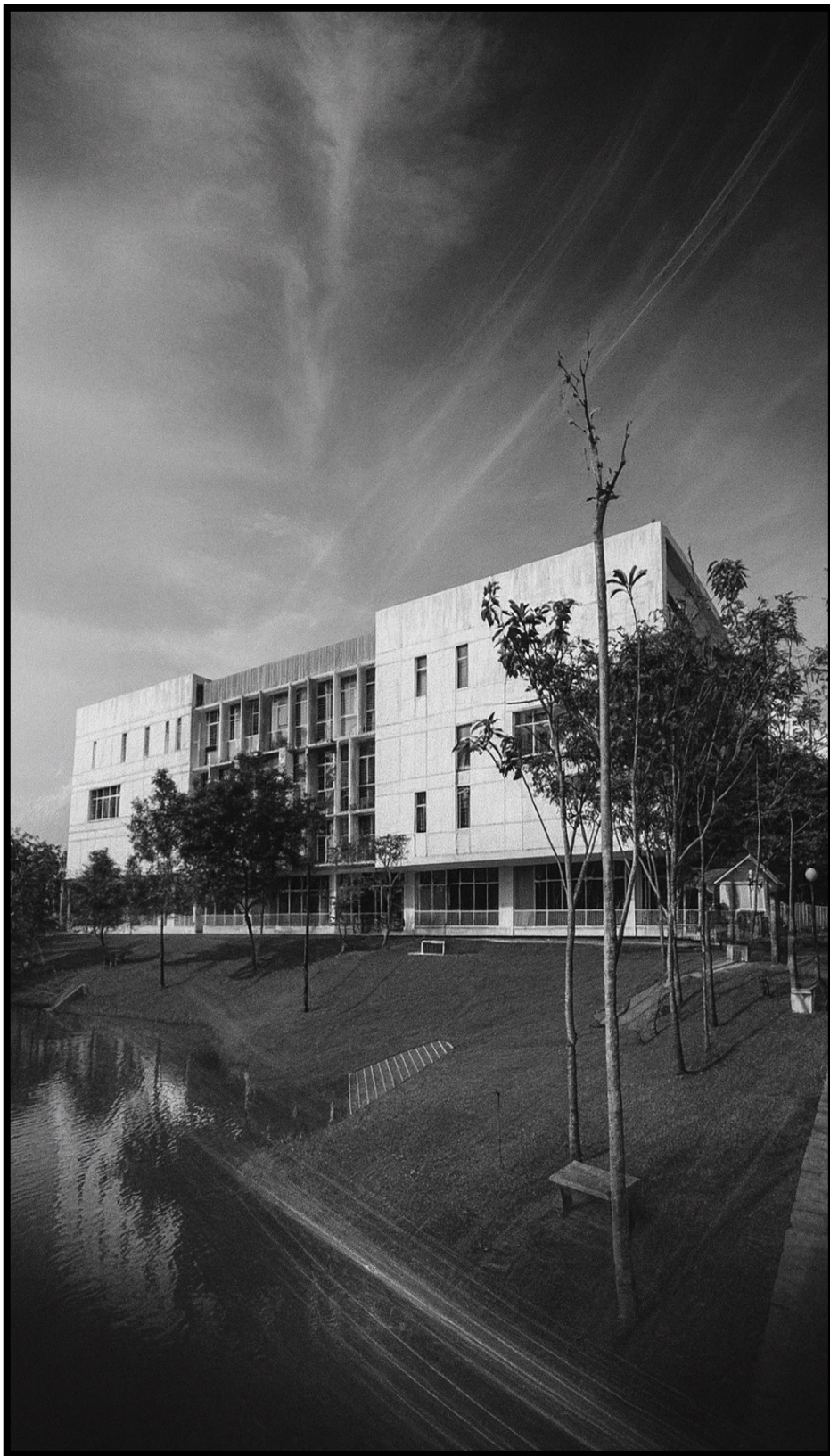
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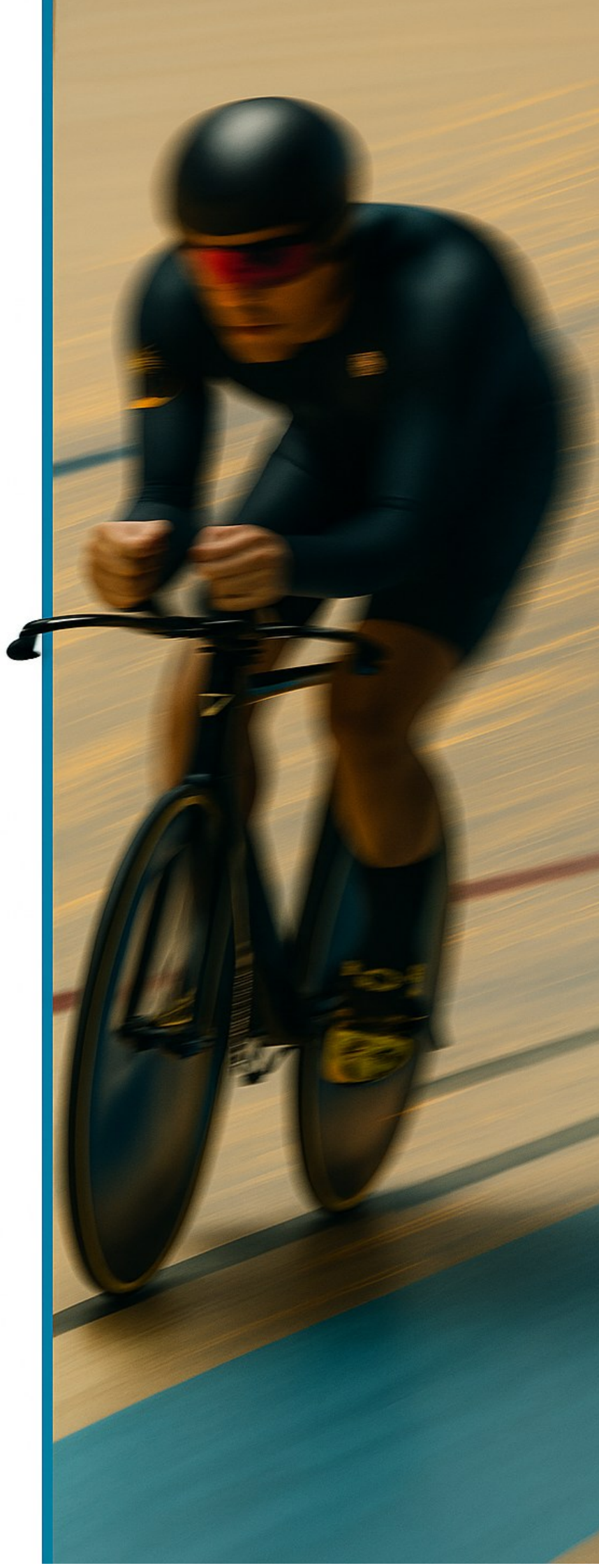
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*“Where sports and knowledge
come together”*



CHAIR MESSAGE

Wahidah Tumijan

Dear colleagues and participants,

It is with great pride and gratitude that I welcome you to the proceedings of the *International Graduate Colloquium: Sports and Physical Exercise Assembly of Knowledge Sharing (i-SPEAK) 2025*. As Chair of this program and Head of our Study Centre, I am delighted to witness this remarkable gathering of scholars from diverse backgrounds, all united by a shared commitment to advancing research in sports science and sports management.

Our goal has been to nurture a research culture that celebrates academic achievement while emphasizing scholarly responsibility and ethical inquiry.

What distinguishes this colloquium is the range of expertise represented, from exercise physiology and biomechanics to sports governance and outdoor studies. Each abstract and presentation reflect not only academic excellence but also the personal dedication of those involved, making this event a truly collaborative and transformative experience.

Thank you for joining us on this journey of discovery and learning. I hope these proceedings inspire new ideas and foster meaningful partnerships as we continue to explore the evolving landscape of sports and physical exercise research.

Wahidah Tumijan is the Head of the Study Center at the Faculty of Sports Science & Recreation, UiTM Negeri Sembilan, and her research focuses on physical activity, health and quality of life.

EDITORIAL PREFACE

Muhamad Noor Mohamed



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Foreword

It is with great pleasure that I present the proceedings of the *International Graduate Colloquium: Sports and Physical Exercise Assembly of Knowledge Sharing (i-SPEAK) 2025*. This virtual event, held on 23rd –24th July 2025 via Google Meet, has been a journey of discovery, collaboration, and passion for research that I am honoured to share with you.

The colloquium was conceived to showcase the research of graduate scholars from our faculty while providing a vibrant platform for graduate and postgraduate researchers from across the country. It is truly heartening to see such diverse minds come together to share innovative insights and engage in meaningful dialogue that enriches our collective understanding.

The breadth of topics from exercise physiology, biomechanics, and sports psychology to sports business administration, governance, and outdoor leadership reflects our commitment to advancing research in sports science and sports management. Each extended abstract and discussion stand as a testament to the dedication of our contributors and the enduring spirit of academic inquiry.

Thank you for taking the time to engage with these proceedings. I hope you find the research as inspiring and thought-provoking as I have. Your participation is vital to nurturing a dynamic academic community that continues to expand the boundaries of knowledge.

Muhamad Noor Mohamed is a Senior Lecturer at UiTM Negeri Sembilan, and his research interests focus on emerging motor control and learning, and sports biomechanics.

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Acute Effects of a Plyometric Training Session on Speed and Balance Among Futsal Players

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Keywords: Acute plyometric effects, Futsal performance, Speed, Balance, Plyometric training

I. INTRODUCTION

Most sports science studies focus on long-term training, overlooking the acute effects of plyometric exercises [1]. This study investigates the immediate impact of a single plyometric training session on speed and balance among futsal players, addressing critical short-term performance dynamics that remain underexplored [2].

II. METHODS

Twenty futsal players (aged 18–25) completed a 20-minute plyometric session including countermovement jump (CMJ), side jump (SJ), and double-leg bounding jump (DBLJ). Speed and balance were assessed using 20-meter sprint and single-leg stance tests, respectively, conducted before and five minutes after the session. Standard tools included cones, futsal balls, and stopwatches [5].

III. RESULTS AND DISCUSSION

A. Speed

Plyometric training resulted in a slight, non-significant improvement in 20-meter sprint times (pre: 3.7025s; post: 3.5185s; $p = 0.063$). While most players improved, fatigue was noted [4]. However, the change did not reach statistical significance, suggesting a single session may not sufficiently influence speed in trained futsal players [3].

TABLE I
PAIRED SAMPLES STATISTICS

Pair 1	Pre-test	Post-test
Mean	3.7025	3.5185
N	20	20
Std. Deviation	0.55872	0.44786
Std. Error Mean	0.12493	0.10015

($p = 0.063$)

B. Balance

Balance scores improved from 52.68 to 61.36, showing a strong positive correlation ($r = 0.670$, $p = 0.001$). However, the improvement was not statistically significant ($p = 0.122$). Most players showed increased balance despite mild fatigue, indicating that acute plyometric training may promote short-term balance trends without producing immediate, meaningful enhancement [5].

TABLE II
PAIRED SAMPLES STATISTICS

Pair 1	Pre-test	Post-test
Mean	52.6805	61.3600
N	20	20
Std. Deviation	30.02940	28.92303
Std. Error Mean	6.71478	6.46739

($p = 0.122$)

IV. CONCLUSIONS

A single plyometric training session showed non-significant yet positive trends in speed and balance among futsal players. While improvements were observed, they were not statistically significant, indicating that acute plyometric exposure may not be sufficient for immediate performance gains but holds promise for short-term physical responsiveness.

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Acute Effects of Dark Chocolate on Perceived Exertion and Short-Distance Running Performance in Active Young Adults

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Keywords: Dark chocolate, Perceived exertion, Sprint performance, Anaerobic exercise, Nutritional ergogenic aid

I. INTRODUCTION

Dark chocolate (DC) is rich in flavanols, theobromine, and caffeine compounds known to improve vascular function, alertness, and fatigue resistance. While existing research highlights chronic benefits for endurance performance, there is limited evidence on its acute effects in anaerobic contexts like sprinting. Most prior studies also emphasize female or endurance-trained populations. This study investigates whether a single 40g dose of dark chocolate ($\geq 70\%$ cocoa) influences perceived exertion and 400-meter sprint performance in active young adults. A randomized, controlled, crossover design was used to assess its short-term ergogenic potential in non-elite, physically active males.

II. METHODS

This study utilized a randomized, controlled, crossover design to examine the acute effects of dark chocolate on perceived exertion and sprint performance. 20 physically active young male participants aged 18 to 25 were recruited based on strict inclusion criteria, ensuring they were free from cardiovascular, metabolic, or neurological disorders and had no allergies to cocoa or lactose. Participants were randomly assigned to begin with either the intervention (dark chocolate) or the control condition. The intervention consisted of consuming 30–40g of dark chocolate containing at least 70% cocoa, exactly one hour before a maximal 400-meter sprint. All participants adhered to a 10-hour pre-trial fast and avoided caffeine, dark chocolate, and nitrate-rich foods for 24 hours prior.

Performance was measured using a digital stopwatch on a standard athletics track. Immediately after the sprint, participants rated their exertion using the Borg 1–10 Rating of Perceived Exertion (RPE) scale. After a 7-day washout period, participants switched conditions and repeated the protocol to control for order effects.

III. RESULTS AND DISCUSSION

Table I presents descriptive statistics for perceived exertion (RPE) under dark chocolate and control conditions among active young adult males. The analysis indicates that the standard deviation is smaller in the dark chocolate group ($SD = 0.852$ vs. 1.100), and the Mean RPE is lower with dark chocolate (6.10) than with control (6.50), indicating reduced perceived effort. Participants had more consistent perceptions of exertion when supplemented with dark chocolate.

Next, the descriptive statistics for Short-Distance Running Performance under dark chocolate and control conditions among active young adult males. The analysis indicates the standard deviations were similar ($SD = 12.56 - 12.61$) and Mean time after dark chocolate ingestion ($M = 84.74s$) compared to control ($M = 86.66s$). Participants completed the 400-meter sprint faster after dark chocolate ingestion compared to the control.

TABLE I
DESCRIPTIVE TABLE FOR PERCEIVED EXERTION (RPE) AND SHORT-DISTANCE RUNNING PERFORMANCE BETWEEN DARK CHOCOLATE VS CONTROL (NON-SUPPLEMENTED)

	N	MEAN	MEDIAN	SD	SE
RPE_DC	20	6.10	6.00	0.852	0.191
RPE_CONTROL	20	6.50	6.00	1.100	0.246
TIME_DC (S)	20	84.74	85.63	12.559	2.808
TIME_CONTROL (S)	20	86.66	87.63	12.607	2.819

Based on Table 2, the results revealed a statistically significant reduction in Rating of Perceived Exertion (RPE) following dark chocolate ingestion compared to the control condition. Participants reported a mean RPE of 6.10 after consuming dark chocolate, versus 6.50 in the non-supplemented trial, with a mean difference of -0.40 $t(19) = -2.99$, $p = 0.008$). These compounds are known to inhibit adenosine receptors, which may reduce mental fatigue and enhance arousal. Furthermore, participants completed the trials during nighttime hours, a time when external distractions and heat stress were minimized, factors that may also influence perceived exertion. Additionally, participants were already engaged in regular physical activity such as futsal, jogging, and fitness training, which may have enhanced their capacity to interpret physical effort more efficiently.

Next, running performance statistical analysis showed a highly significant improvement in 400-meter sprint performance under the dark chocolate condition compared to the control. The mean completion time was 84.74 seconds after dark chocolate ingestion, compared to 86.66 seconds in

the control group, with a mean difference of -1.914 seconds ($t(19) = -12.04, p < 0.001$). This performance enhancement can be attributed to several physiological mechanisms. Catecholamine modulation, particularly increased epinephrine and norepinephrine activity, may heighten sympathetic arousal, reaction time, and motor unit recruitment. These effects support anaerobic performance and delay the onset of muscular fatigue. Additionally, improved cerebral oxygenation may enhance pacing, focus, and motor coordination throughout the sprint.

TABLE II
DIFFERENCE BETWEEN PERCEIVED EXERTION (RPE) AND SHORT-DISTANCE
RUNNING PERFORMANCE BETWEEN DARK CHOCOLATE VS CONTROL
(NON-SUPPLEMENTED)

VARIABLES	MEAN (SD)	T	DF	P
RPE_DC	6.10 (0.852)	-2.99	19	0.008
RPE_ CONTROL	6.50 (1.100)			
TIME_DC	84.74 (12.559)	-12.04	19	<0.001
TIME_ CONTROL	86.66 (12.607)			

IV. CONCLUSIONS

This study demonstrated that acute ingestion of dark chocolate significantly reduced perceived exertion and enhanced 400-meter sprint performance in active young males. The observed improvements are likely due to the synergistic effects of cocoa flavanols, caffeine, and theobromine, which promote vasodilation, reduce central fatigue, and enhance mental focus. These results suggest that dark chocolate may serve as a practical, natural ergogenic aid for short-duration, high-intensity exercise. Given its accessibility, safety, and palatability, dark chocolate presents a promising alternative to synthetic supplements for recreational athletes seeking performance and recovery enhancements.

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Comparison in Attacking & Defending Patterns Between Spain & England Football Teams in Euro 2024

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Keywords: UEFA Euro 2024, Spain vs England, Attacking and defending patterns, Football performance analysis, National team comparison

I. INTRODUCTION

Football is a popular sport that brings people together through skill, passion, and strategy. With millions of fans and players around the world, it helps create connections across countries [1]. Football matches possess many of the characteristics of complex sociotechnical systems, multiple interacting human and non-human components operating within a dynamic and constantly changing match environment [2]. A direct style of play focuses on fast counterattacks, while possession-based football emphasizes careful and planned moves [3].

This research analyzes Spain and England's attacking and defending patterns during UEFA Euro 2024. By using fresh, tournament-specific data, the study addresses gaps in national team analysis and provides a comprehensive view of performance [4]. While most prior studies isolate either attack or defense, this work integrates both to better understand tactical approaches across 11 matches, including each team's full campaign and the final.

II. METHODS

Teams were selected based on the final Euro 2024 ranking table from the official UEFA website. Spain and England were selected as they are the champions and runners-up of the tournament. Attacking & defending statistics, such as attacks, goals scored, and tackles, were downloaded from the official UEFA website [11]. Match data from UEFA Euro 2024 websites were used to compare Spain and England across 13 indicators: attacks, total attempts, attempts on target, attempts off target, goals scored, goals inside area, goals outside area, tackles, tackles won, tackles lost, clearance attempted, clearance completed, and balls recovered.

The data are extracted and structured into datasets using Microsoft Excel. Using Jamovi, a quantitative analysis was conducted to assess attacking and defending differences across 11 matches. The quantitative approach guarantees that all the data will be measurable and objective, enabling systematic comparisons of the two teams [5]. Comparative analysis was conducted to identify differences in attacking and defending patterns between Spain and England, using independent samples t-tests.

III. RESULTS AND DISCUSSION

A. Attacking Patterns

Spain recorded more attacks per match (58.71 ± 24.14) than England (49.14 ± 15.88), although the difference was not statistically significant ($p = 0.398$). Spain also registered more total attempts (17.57 ± 9.40) than England (10.71 ± 3.50), with no statistically significant difference ($p = 0.095$), indicating greater attacking activity. For attempts on target, Spain had more accurate shots per match (6.00 ± 3.65) than England (3.14 ± 0.69), with no statistically significant difference, p -value of 0.065, though Spain's accuracy varied more across matches. Similarly, Spain recorded more off-target attempts (7.00 ± 3.74) than England (3.43 ± 2.30), with a p -value of 0.052, suggesting higher shot frequency but also more missed opportunities. Spain scored more goals per match (2.14 ± 1.07) than England (1.14 ± 0.69), with a p -value of 0.060. For goals scored inside the area, Spain had a higher average (1.86 ± 1.35) than England (0.86 ± 0.90), though the difference was not statistically significant ($p = 0.128$). In goals scored from outside the area, Spain averaged more long-range goals (3.00 ± 7.51) than England (0.29 ± 0.49), with a p -value of 0.359.

B. Defending Patterns

England and Spain showed no significant differences across all defensive performance indicators. The average number of tackles was similar ($p = 0.919$), with England at 11.57 ± 3.05 and Spain at 11.43 ± 1.99 . For tackles won, England had a slightly higher average (5.43 ± 2.64) than Spain (4.57 ± 2.88), but the difference was not significant ($p = 0.572$). In tackles lost, Spain recorded a higher average (9.43 ± 5.62) than England (6.14 ± 1.57), yet the difference remained statistically non-significant ($p = 0.162$). Spain attempted more clearances (16.43 ± 10.41) than England (13.86 ± 8.86), with no significant difference ($p = 0.628$). Similarly, Spain completed more clearances (16.00 ± 13.80) than England (10.14 ± 6.12), but the difference was not statistically significant ($p = 0.325$). For balls recovered, Spain averaged more (41.43 ± 12.31) than England (36.00 ± 7.81), though this difference was also not significant ($p = 0.344$).

C. Overall Performance

Although Spain led in most statistical indicators, both teams reached the final. Spain's stronger attacking and

recovery stats suggest superior tactical balance. Key performances in critical matches likely contributed to tournament advancement. The integrated view of attacking and defending highlights Spain's more cohesive style, while England leaned more on defensive pressure [6].

D. Figure and Table

TABLE I
GROUP DESCRIPTIVE COMPARISON IN ATTACKING BETWEEN
ENGLAND & SPAIN

Indicators	England (Mean ± SD)	Spain (Mean ± SD)	Statistics (t)	Effect Size	p- value
Attacks	49.14 ± 15.88	58.71 ± 24.14	-0.877	-0.468	0.398
Total Attempts	10.71 ± 3.50	17.57 ± 9.40	-1.80	-0.967	0.095
Attempts on Target	3.14 ± 0.69	6.00 ± 3.65	-2.03	-1.087	0.065
Attempts off Target	3.43 ± 2.30	7.00 ± 3.74	-2.152	-1.150	0.052
Goals Scored	1.14 ± 0.69	2.14 ± 1.07	-2.079	-1.111	0.060
Goals Inside Area	0.86 ± 0.90	1.86 ± 1.35	-1.635	-0.873	0.128
Goals Outside Area	0.29 ± 0.49	3.00 ± 7.51	-0.955	-0.510	0.359

TABLE II
GROUP DESCRIPTIVE COMPARISON IN DEFENDING BETWEEN
ENGLAND & SPAIN

Indicators	England (Mean ± SD)	Spain (Mean ± SD)	Statistics (t)	Effect Size	p- value
Tackles	11.57 ± 3.05	11.43 ± 1.994	0.104	0.555	0.919
Tackles Won	5.43 ± 2.64	4.57 ± 2.88	0.581	0.310	0.572
Tackles Lost	6.14 ± 1.57	9.43 ± 5.62	-1.489	-0.795	0.162
Clearance Attempted	13.86 ± 8.86	16.43 ± 10.41	-0.498	-0.266	0.628
Clearance Completed	10.14 ± 6.12	16.00 ± 13.80	-1.027	-0.548	0.325
Balls Recovered	36.00 ± 7.81	41.43 ± 12.31	-0.985	-0.526	0.344

IV. CONCLUSIONS

This study shows that Spain, the UEFA Euro 2024 champions, outperformed runners-up England in both attacking and defensive indicators. Spain recorded more goal attempts, higher shooting efficiency, and greater goal conversion. Defensively, they recovered more balls and completed more clearances, reflecting stronger tactical discipline. While both teams reached the final, Spain's statistical superiority underscores their control and consistency. These results highlight the importance of evaluating both attacking and defending patterns when analyzing elite team performance. Such an integrated approach offers valuable insights for coaches, analysts, and

scholars studying high-level international football competitions [7].

Future studies should contextually analyze match performance by accounting for variables such as match phase, score status, and opponent strength to better reflect tactical adaptability [8]. Additionally, incorporating spatiotemporal data like player positioning and movement can provide deeper insights into structural organization and on-field decision-making [9]. It is also recommended to explore tactical transitions such as pressing intensity and counterattacks, which often determine success in high-stakes matches [10].

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Effects of Strapping Application on Agility Performance Among Rugby Players

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Keywords: Strapping, Agility performance, Rugby players

I. INTRODUCTION

Strapping is commonly used in rugby to enhance joint stability and reduce injury risk, yet its impact on agility remains underexplored [1]. This study investigates whether strapping affects agility performance among rugby players. By comparing performance with and without strapping, the research aims to clarify its functional implications and inform evidence-based practices for training and injury prevention.

II. METHODS

Sixteen amateur male rugby players aged 13–15 from Victoria Institution Rugby Club completed the T-Test agility protocol under two conditions: with and without strapping. Rigid athletic tape was applied using the closed basketweave technique to the ankle [2]. Each player performed the test with a stopwatch measurement. Trials were randomized and counterbalanced to ensure unbiased comparison of agility performance between conditions.

III. RESULTS AND DISCUSSION

A. Descriptive Statistics

The descriptive statistics show that the "No Strapping" group had a slightly higher mean age (14.9 years) and weight (65.0 kg) compared to the "Strapping" group (14.5 years and 61.3 kg), while both groups had almost identical average heights (168.6 cm and 168.4 cm, respectively). The Shapiro-Wilk test for normality revealed that age data for both groups were not normally distributed ($p < 0.001$), while height data in both groups were normally distributed ($p = 0.871$ for No Strapping and $p = 0.326$ for Strapping). Weight was normally distributed in the Strapping group ($p = 0.297$) but not in the No Strapping group ($p = 0.025$). These results suggest that most variables are approximately similar between the two groups, with slight differences in age and weight, and that some data distributions deviate from normality, which should be considered when interpreting statistical analyses.

TABLE I
DESCRIPTIVE STATISTICS FOR AGILITY PERFORMANCE

Variable	Group	N	Mean	SD
Age	No strapping	8	14.9	0.35
	Strapping	8	14.5	0.54
Height	No strapping	8	168.6	3.62
	Strapping	8	168.4	3.66
Weight	No strapping	8	65.0	8.38
	Strapping	8	61.3	7.03

B. Comparison Between Strapping vs Non Non-Strapping on Agility

Players with strapping averaged 10.30s versus 10.80s without strapping, but the difference was not statistically significant ($p = 0.269$). The findings suggest strapping may offer joint support without enhancing agility. This result may be due to limited ankle mobility caused by the strapping technique, which can restrict natural movement [4], and the structured nature of the T-Test, which may not reflect real-game reactive agility demands [5].

TABLE 2
INDEPENDENT SAMPLES T-TEST FOR BEST TIME BETWEEN STRAPPING VS NON-STRAPPING ON AGILITY

Variable	Mean	SD	t(df)	p
Best time	-0.456	0.397	-1.15(14)	0.269

IV. CONCLUSIONS

Ankle strapping did not significantly affect agility performance among amateur rugby players. While it may support injury prevention, it does not enhance performance in structured agility tasks. Coaches should consider using strapping primarily for protection rather than performance enhancement.

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Analysis of Biomechanical Parameters of Race Walking Between Trained and Untrained Among Pantai Running Club

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Keywords: Stride length, Stride frequency, Joint angle (knee, ankle, hip)

I. INTRODUCTION

Race walking is a technical Olympic sport requiring strict rules, like keeping both feet in contact with the ground and the supporting leg straight. Elite athletes excel in balancing speed and efficiency, while untrained walkers often struggle with technique and injury risks [1]. This study analyzes the biomechanical differences in race walking between trained and untrained participants from Pantai Runners Club. Focusing on stride length, stride frequency, and joint kinematics (hip, knee, and ankle), it aims to identify key performance factors contributing to efficiency and injury prevention [2]. By comparing trained and untrained walkers, the research provides insights into optimizing training techniques and improving race walking performance [3].

II. METHODS

This study involved 6 participants (3 trained and 3 untrained race walkers) from the Pantai Runner Club. Joint kinematics (hip, knee, ankle) were recorded using a digital camera during a 15-meter race walking trial from a sagittal plane view. Participants will complete three walking trials at varying speeds: slow, competitive, and maximum pace. Data consistency will be ensured by repeating each trial three times. Joint angles are derived by calculating segment-to-segment vectors (e.g., thigh vs. shank) on each frame, often using Kinovea software [4][1]. Stride frequency was calculated by dividing stride length by time. Kinovea was used to measure joint angles, while Jamovi performed descriptive statistics and independent t-tests to compare biomechanics between the two groups.

III. RESULTS AND DISCUSSION

A. Joint Kinematics

Trained athletes exhibited slightly more extended hip movement, leading to smoother propulsion. The knee joint in trained athletes showed closer-to-full extension, minimizing braking forces [5]. In contrast, untrained athletes displayed less hip extension, less efficient knee control, and excessive ankle flexion, which may increase injury risk [6]. The independent t-test revealed no significant differences for hip (163.90 ± 1.900), ($p = 0.421$) and knee (177.20 ± 2.401), ($p = 0.523$) joint kinematics. However, significant differences were found for ankle kinematics (90.60 ± 4.839), ($p = 0.021$).

B. Stride Length and Frequency

Trained athletes had shorter, consistent strides, contributing to efficiency, while untrained participants overstride [7]. Trained athletes also showed a higher stride frequency, which was linked to improved mechanics. Untrained athletes had slower cadences, with more variability and less efficiency, negatively affecting their performance [8]. The independent t-test reveals the significant level for stride length (102.58 ± 6.175), ($p = 0.002$), and stride frequency (2.65 ± 0.133) ($p < 0.001$), confirming that trained athletes have more efficient biomechanics than untrained athletes.

C. Figure and Table

Table 1 shows a comparison of joint kinematics and biomechanical parameters (hip, knee, ankle, stride length, and stride frequency) between trained and untrained race walkers, showing significant differences in ankle kinematics, stride length, and stride frequency, with trained athletes demonstrating more efficient biomechanics ($p < 0.05$). No significant differences were found in hip and knee joint kinematics.

TABLE I
COMPARISON BETWEEN TRAINED AND UNTRAINED IN JOINT KINEMATIC AND PARAMETER

Parameters	Statistic	Mean	df	SD	p
Joint Kinematic Hip	0.896	163.90	4.00	1.900	0.421
Joint Kinematic Knee	-0.696	177.20	4.00	2.401	0.525
Joint Kinematic Ankle	-3.705	90.60	4.00	4.839	0.021
Stride Length	-7.305	102.57	4.00	6.175	0.002
Stride Frequency	9.733	2.65	4.00	0.133	<0.001

IV. CONCLUSIONS

This study highlights significant biomechanical differences between trained and untrained race walkers. Trained athletes demonstrated more efficient joint kinematics and biomechanical parameters, including stride length and

frequency [9]. These findings emphasize the importance of targeted training to enhance race walking performance and reduce injury risks in untrained athletes [10]. Future research should focus on long-term training effects on novice athletes, using real-time biomechanical monitoring for technique improvement. Studies should explore injury prevention strategies, particularly for knee and ankle strains in beginners. Expanding athlete profiles to include various age groups and experience levels will help identify key progress factors. Collaboration between sports scientists, physiotherapists, and coaches can lead to more effective training programs that enhance performance and ensure long-term athlete health.

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Relationship Between Smartphone Addiction and Sleep Quality Among Office Workers in Johor

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Keywords: Pittsburgh Sleep Quality Index (PSQI), Smartphone Addiction Scale – Short Version (SAS-SV)

I. INTRODUCTION

Smartphone addiction has emerged as a growing concern, particularly in workplace populations, potentially affecting various aspects of health [1][2]. Sleep quality, a crucial factor in employee performance and well-being, may be significantly influenced by excessive smartphone use [3]. This study examines sleep quality, assesses smartphone addiction levels, and explores their relationship among office workers in Johor, aiming to inform health interventions and organizational wellness strategies.

II. METHODS

A correlational study was conducted among 113 office workers in Johor aged 20–50 who worked standard hours. Participants completed online questionnaires distributed via WhatsApp and Facebook, including the Pittsburgh Sleep Quality Index (PSQI) and Smartphone Addiction Scale–Short Version (SAS-SV). Descriptive statistics were calculated, normality was assessed using the Shapiro–Wilk test ($p < 0.001$), and associations were examined using Spearman's correlation.

III. RESULTS AND DISCUSSION

A. Scoring Summary for SAS-SV and PSQI

More than 95% of participants had poor sleep quality, with an average PSQI score of 12.4 ($SD = 1.95$). This score is much higher than the cut-off of 5, meaning most participants had serious sleep problems. The results suggest that poor sleep is a common issue affecting this group of office workers.

Approximately 70–80% of participants were classified as addicted to smartphones, with an average SAS-SV score of 41.8 ($SD = 14.73$), aligning with global reports on elevated usage among working adults [6].

TABLE I
SCORING SUMMARY FOR SAS-SV AND PSQI

Variables	Frequency (n)	Mean	Std. Dev.
SAS-SV	113	41.8	14.73
PSQI	113	12.4	1.95

B. Relationship Between SAS-SV and PSQI

The analysis showed no significant correlation between smartphone addiction and sleep quality ($r = -0.014$, $p = 0.883$) [7]. Despite high addiction rates and poor sleep, the data suggest these may not be directly linked. This implies that other environmental, psychological, or behavioral factors could more strongly influence sleep disturbances [8].

TABLE II
SPEARMAN'S CORRELATION BETWEEN SAS-SV AND PSQI

PSQI		
SAS-SV	Spearman's R	-0.014
	p-value	0.883
	N	113

IV. CONCLUSIONS

Most office workers in Johor experience poor sleep quality and exhibit high levels of smartphone addiction. However, no significant correlation was found between the two variables. These findings underscore the need for further investigation into other potential factors affecting sleep health in digitally connected working populations.

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The Relationship Between Academic Stress Towards Social Engagement and Mental Health Among UPM students (University Putra Malaysia)

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Keywords: Academic stress, Mental health, Social engagement, University students, UPM (Universiti Putra Malaysia).

I. INTRODUCTION

Students are currently under increasing pressure to meet high academic expectations, which can negatively affect their social engagement and mental health. Many students face stress from heavy workloads, exams, and the fear of failure. Research shows academic stress can lead to mental health problems such as anxiety, emotional imbalance, and burnout [1]. Furthermore, it can also reduce students' interest or ability to engage in social activities, which may further increase feelings of isolation [2]. Understanding how academic stress affects both mental health and social engagement is important for universities to develop effective support systems that promote a healthier and more balanced academic experience.

II. METHODS

This quantitative descriptive study investigated the relationship between UPM students' academic stress, social engagement, and mental health. Data were gathered from 84 students using a questionnaire, the Academic Stress scale, Social Engagement survey, and Mental Health assessment. Analysis of subgroups was made possible through demographic data, while statistical analysis evaluated relationships between factors by using Jamovi. This approach made it possible to fully understand academic stress and how it relates to students' social engagement and mental health.

III. RESULTS AND DISCUSSION

TABLE I
DESCRIPTIVE STATISTICS OF ACADEMIC STRESS

	Relating to other people	Personal factor	Academic factors	Environmental factors
N	84	84	84	84
Mean	3.84	3.94	3.88	3.87
Standard deviation	0.93	0.99	0.92	0.95

Personal factors were the most significant academic stressors among UPM students ($M = 3.94$, $SD = 0.99$), and academic and environmental factors followed closely. Based on Table 1, though stress was reported across all domains, individual and academic factors contributed most

significantly, showing how personal expectations and academic workload dominate student stress experiences.

TABLE II
RELATIONSHIP BETWEEN ACADEMIC STRESS AND SOCIAL ENGAGEMENT

Student's social Engagement	Relating to other people	Personal factor	Academic factors	Environmental factors
Spearman's rho	-0.0447	-0.088	-0.117	-0.081
df	82	82	82	82
p-value	0.669	0.425	0.291	0.462

Based on Table 2, Social engagement showed no significant correlation with any academic stress domain, as the p -values were more than 0.05. Spearman's analyses confirmed a non-significant relationship across personal, academic, environmental, and relating to other people-related factors. Thus, social activity levels did not appear to buffer or worsen stress. Students' engagement in social life was largely independent of the academic stress they encountered.

TABLE II I
RELATIONSHIP BETWEEN ACADEMIC STRESS AND MENTAL HEALTH

Mental Health	Relating to other people	Personal factor	Academic factors	Environmental factors
Spearman's rho	0.510	0.381	0.415	0.398
df	82	82	82	82
p-value	<0.001	<0.001	<0.001	<0.001

Based on Table 3, mental health was very significantly correlated with all academic stress factors. The strongest factor was stress from relating to other people's factors ($r = 0.510$), followed by academic, environmental, and personal stress. Students under greater stress in any domain reported more problems, underscoring stress as a major determinant of students' mental health.

IV. CONCLUSION

According to this survey, the main sources of stress for UPM students are personal and academic factors, which have a major impact on their mental health but not their social engagement. Improving students' mental health involves dealing with academic stress. Moreover, to reduce stress and improve students' academic experiences, universities should place a high priority on active mental health care and time-management techniques.

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The Effects of Hamstring Cooling and Cryostretching on Flexibility Among Healthy Young Adults

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Keywords: Cryostretching, Hamstring flexibility, Cooling intervention, Sit-and-Reach Test, Acute flexibility enhancement

I. INTRODUCTION

Improving hamstring flexibility is vital for injury prevention and athletic performance. While cryotherapy and stretching independently enhance flexibility, their combined effect of cryostretching still remains underexplored. This study examines the acute effects of hamstring cooling and cryostretching on flexibility in healthy young adults using a crossover design. By comparing these methods with a control condition, the research addresses gaps in combined-intervention studies and evaluates their relative effectiveness.

II. METHODS

Twenty-five healthy adults aged 18–25 underwent hamstring cooling, cryostretching, and control conditions in a randomized crossover design. Hamstring cooling involved ice application, while cryostretching combined icing with proprioceptive neuromuscular facilitation. Control involved rest only. Each condition was performed on separate days with rest intervals. Flexibility was assessed pre- and post-intervention using the Sit-and-Reach Test, with changes in scores used to evaluate effectiveness.

III. RESULTS AND DISCUSSION

Hamstring cooling yielded the lowest flexibility gain (32.6 ± 9.52 cm). Though it significantly differed from cryostretching ($p < 0.001$), its comparison with the control was not statistically significant ($p = 0.071$). This aligns with prior research indicating cooling may inhibit flexibility by reducing muscle spindle activity, suggesting it is less suitable for flexibility-focused warm-ups.

Cryostretching produced the greatest flexibility improvement (36.0 ± 9.06 cm), significantly outperforming both cooling ($p < 0.001$) and control ($p = 0.006$). The cold application likely reduced pain sensitivity, enabling deeper muscle stretch during PNF. This synergy supports prior findings and offers a potent, short-term flexibility enhancement method combining thermal and mechanical mechanisms.

Comparatively, cryostretching had the most pronounced impact on flexibility, followed by control (34.0 cm), and cooling. The control group's moderate improvement underscores the value of active intervention. Cryostretching's

superior performance indicates strong practical utility in athletic and rehabilitative settings for rapid flexibility gains.

Repeated Measures ANOVA revealed significant differences among interventions: $F(2, 48) = 23.2$, $p < 0.001$. Post hoc Tukey tests confirmed cryostretching significantly outperformed others. These findings support cryostretching as an effective, real-world strategy for enhancing acute flexibility, while suggesting hamstring cooling is better reserved for post-activity recovery contexts.

TABLE I
DESCRIPTIVE STATISTIC

Descriptives	Post_Hamstring Cooling	Post_Cryostretching	Post_Control
N	25	25	25
Missing	0	0	0
Mean	32.6	36.0	34.0
Median	35.0	37.5	35.3
Standard deviation	9.52	9.06	9.21
Minimum	14.9	16.4	16.0
Maximum	52.6	53.9	51.3
Skewness	-0.205	-0.516	-0.410
Std. error skewness	0.464	0.464	0.464
Shapiro-Wilk W	0.960	0.957	0.963
Shapiro-Wilk p	0.417	0.364	0.480

*Cryostretching showed the highest flexibility score (36.00 cm), significantly higher than Hamstring Cooling (32.60 cm) and Control (34.00 cm) groups ($p < 0.05$).

TABLE II
WITHIN AND BETWEEN-SUBJECT EFFECTS

Within Subjects Effects					
	Sum of Squares	df	Mean Square	F	p
Conditions	147	2	73.75	23.2	< .001
Residual	153	48	3.18		

Note. Type 3 Sums of Squares

[3]

Between Subjects Effects					
	Sum of Squares	df	Mean Square	F	p
Residual	6026	24	251		

Note. Type 3 Sums of Squares

*The ANOVA test showed a significant difference in flexibility between the three interventions ($p < 0.001$), and all groups met the test conditions, making the results valid.

TABLE III
POST HOC COMPARISON

Post Hoc Comparisons - Conditions						
Comparison		Mean Difference	SE	df	t	P-value
Conditions	Conditions					
Post_Hamstring Cooling	Post_Cryostretching	-3.42	0.554	24.0	-6.17	< .001
-	Post_Control	-1.43	0.505	24.0	-2.83	0.024
Post_Cryostretching	Post_Control	1.99	0.449	24.0	4.42	< .001

*Cryostretching improved flexibility more than cooling and control ($p < 0.001$). Cooling was also better than control ($p = 0.024$).

IV. CONCLUSIONS

Cryostretching significantly enhances hamstring flexibility in healthy young adults and outperforms both cooling and rest. While cooling may reduce flexibility acutely, cryostretching combines cold-induced analgesia and PNF to yield superior results. These findings support cryostretching as a practical intervention for rapid flexibility improvement in athletic and rehabilitative settings.

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Interplay Between Social Media Use and Mental Health Among UTM Student Athletes

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Keywords: Social media use, Mental health, Depression, Anxiety, Stress, Student athletes

I. INTRODUCTION

This study explores the interplay between social media use and mental health among UTM student athletes. With growing reliance on digital platforms, concerns about psychological effects have intensified. By measuring usage patterns and mental health levels, this research aims to investigate the link between social media use and student athletes' mental health, addressing limitations in prior studies.

II. METHODS

Data were collected via a Google Form questionnaire from a sample of 132 UTM student athletes. Social media use was measured using the Social Media Use Scale [1], and mental health was assessed using the DASS-21 instrument [2]. Participants were randomly selected from a population of 200 athletes registered with UTM's Sport Excellence Unit. The responses were analyzed to determine levels and the relationship between social media use and mental health among the student athletes.

III. RESULTS AND DISCUSSION

A. Level of Social Media Use Among UTM Student Athletes

UTM student athletes primarily engaged in consumption-based (4.66 ± 1.58) and image-based (4.11 ± 1.65) social media use, especially on TikTok and Instagram. These platforms support passive browsing and visual engagement. Comparison-based (3.93 ± 1.92) and belief-based (3.50 ± 2.20) activities were less common among the respondents. All subscales had a possible range of 1 to 9, with actual minimums and maximums reflecting this range, except for the consumption-based scale, which had a minimum of 1.6.

B. Level of Mental Health Among UTM Student Athletes

DASS-21 results showed high levels of emotional distress among participants, with 58.3% having depression symptoms, 65.2% anxiety, and 42.4% stress. Findings revealed that participants reported moderate levels of anxiety (2.95 ± 1.66), low to moderate levels of depression (2.47 ± 1.46), and low levels of stress (1.98 ± 1.33). Scores ranged from 1 to 5 across all three constructs, with anxiety showing the highest mean among the three psychological dimensions. This suggests that while stress was relatively low in the sample, anxiety was

more pronounced and may warrant further attention concerning social media usage.

C. Relationship Between Social Media Usage and Mental Health of Student Athletes

Spearman's correlation revealed that comparison-based use had the strongest links with depression ($r = 0.375$), stress ($r = 0.351$), and anxiety ($r = 0.227$). Image- and belief-based use also showed moderate, significant correlations. In addition, consumption-based use was significantly and positively correlated with depression, anxiety, and stress. These patterns highlight that emotionally taxing online behaviors, especially comparison, are associated with poorer mental health across multiple domains, underscoring the urgency of preventive interventions for student athletes.

IV. CONCLUSIONS

This study reveals that high social media use, particularly comparison-based, is significantly associated with poorer mental health among UTM student athletes. Findings highlight the psychological vulnerabilities of this group and underscore the importance of targeted interventions to manage social media habits and support mental well-being in high-performance academic-athletic environments.

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Evaluating Combined Intermittent Fasting and Resistance Training Effects on Body Composition in Physically Active University Students

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Keywords: Intermittent fasting, Resistance training, Body composition, Lean mass preservation, University students

I. INTRODUCTION

Intermittent fasting (IF) and resistance training (RT) have independently shown promise in weight management and body composition improvement (1). However, their combined short-term effects, especially among physically active individuals with normal body composition, remain underexplored. This study investigates how integrating IF and RT influences weight loss, fat reduction, and muscle preservation in UiTM Seremban FSR students, addressing crucial gaps in diet-exercise interaction research beyond obese populations.

II. METHODS

Twelve physically active UiTM Seremban FSR students underwent a 4-week intervention combining 16:8 intermittent fasting and thrice-weekly resistance training. Participants were grouped by body weight. Pre- and post-intervention assessments used foot Bioelectrical impedance analysis to measure body weight, fat percentage, and lean mass. Caloric intake followed the estimated energy requirement with a deficit. Circuit-based resistance sessions included upper and lower body exercises, with controlled fasting and standardized pre-measurement conditions.

III. RESULTS AND DISCUSSION

A. Combined IF and RT Yields Superior Weight Outcomes

The IF+RT group showed the only weight loss (−0.400 kg), while the IF-only and RT-only groups gained weight. Gender and Body mass index subgroup differences were not analyzed. These results suggest the combination of intermittent fasting and resistance training is more effective for short-term weight loss than either intervention used in isolation.

TABLE I
PAIRED SAMPLE T-TEST COMPARING PRE- AND POST- INTERVENTION ON BODY WEIGHT, FAT MASS AND LEAN MASS MUSCLE

Variables	M (Pre)	SD (Pre)	M (Post)	SD (Post)	t	df	p
Body weight	62.483	10.071	62.817	10.047	-1.22	11	0.001
Fat Mass	19.583	5.415	19.392	5.133	0.53	11	0.001
Lean Muscle Mass	33.683	3.218	33.317	3.443	0.92	11	0.001

B. Resistance Training Preserves Lean Muscle During Fasting

Lean body mass decreased slightly in the IF-only group (−0.233 kg) but remained unchanged in both RT and IF+RT groups. This suggests that resistance training preserves muscle mass during caloric restriction. No group increased muscle mass, likely due to limited intervention length, moderate training intensity, or suboptimal protein intake (3).

TABLE II
DESCRIPTIVE STATISTICS AND MEAN BETWEEN GROUPS ON LEAN MUSCLE MASS

Group	M	SD	N
IF	-0.233	0.351	3
RT	0.000	0.265	3
IF+RT	0.000	0.436	3

C. IF+RT Outperforms Other Methods in Body Composition

The combination of intermittent fasting and resistance training (IF+RT) resulted in favourable changes in body composition, including weight reduction, preservation of lean mass, and minimal fat gain (+0.133 kg). Although these changes did not reach statistical significance, the IF+RT group demonstrated the most positive overall trend.

IV. CONCLUSIONS

Combining intermittent fasting with resistance training resulted in modest weight loss and preserved lean mass among active university students. Although statistical significance was not reached, the IF+RT approach showed the most favourable trends. These findings support IF+RT as a promising short-term strategy for improving body composition in non-obese individuals [2].

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Effects of Augmented Feedback on Shooting Performances Among Netball Players

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Keywords: Augmented feedback, Shooting accuracy, Shooting consistency, Netball performances, Skill development

I. INTRODUCTION

Shooting accuracy and consistency are fundamental to success in netball, a skill-dependent sport that requires precise motor control and coordination. Augmented feedback (AF) has been shown to improve motor learning and performance in various sports, yet its application in netball remains limited [1]. Despite the promising results in other sports like golf and basketball, netball shooting, with its unique biomechanical and cognitive demands, requires further investigation. This study investigates the impact of augmented feedback on the shooting performance of netball players. Specifically, it compares the shooting accuracy and consistency between players receiving augmented feedback and those without it, assessed during pre-test and post-test phases. The findings aim to clarify how augmented feedback influences performance outcomes in netball shooting.

II. METHODS

A total of 24 netball players (12 in each group) participated in the study. The experimental group received verbal augmented feedback, while the control group did not. Shooting accuracy was measured using a scoring system: 0 for a miss, 1 for hitting the rim but missing, 2 for hitting the rim and making the shot, and 3 for a successful shot or clearing the basket [2]. Shooting consistency was assessed by the number of consecutive successful shots [1]. A true experimental design was employed with two groups: an experimental group receiving verbal augmented feedback, and a control group with traditional coaching. Participants (female netball players, aged 18–24) were selected via purposive sampling. The intervention involved three 60-minute training sessions over one week. Verbal feedback focused on correcting body posture and providing goal success feedback after each shot based on scoring [3]. Participants take 6 familiarization shots (2 from each position). Perform 12 test shots from three different positions (4 at left, 4 at right, 4 in the middle, 3m from the post). The Scoring System (0-3 points per shot) is used to evaluate accuracy performance. Meanwhile, for consistency scoring, it will be scored by how steady the player's shooting gets a clean basket, hit the rim and score the basket, hit the rim and miss, and a complete miss is across multiple attempts or training sessions. Pre- and post-test shooting assessments were conducted to measure accuracy and consistency. Data were analyzed using paired t-tests and independent t-tests.

III. RESULTS AND DISCUSSION

A. Shooting Accuracy

The experimental group that received augmented feedback (AF) demonstrated a significantly enhanced shooting accuracy, with the feedback group demonstrating a marked improvement from pre-test to post-test ($t = -4.51, p < 0.001$). In contrast, the no-feedback group showed no significant change ($t = 0.596, p = 0.563$). Critically, inter-group comparison revealed substantially greater accuracy gains (GainAc) in the feedback group ($Mean = 7.67, SD = 5.88$) versus the no-feedback group ($Mean = -0.83, SD = 4.84; t = -3.87, p < 0.001$). These results validate AF's immediate corrective role in refining technique, aligning with motor learning principles where extrinsic feedback accelerates error reduction [4]. These findings are supported by previous studies, which highlight that augmented feedback plays a crucial role in refining motor skills and enhancing performance outcomes by providing corrective information that complements intrinsic sensory feedback [5].

B. Shooting Consistency

The results show that neither group exhibited significant consistency improvements. The feedback group's pre-post consistency scores were statistically unchanged ($t = -0.277, p = 0.787$), paralleling the no-feedback group's results ($t = 1.349, p = 0.204$). Similarly, consistency gains (GainCo) did not differ between groups (feedback: $Mean = 0.17, SD = 2.08$; no-feedback: $Mean = 0.92, SD = 2.35; t = -1.19, p = 0.245$). This indicates that AF, while effective for accuracy, fails to enhance movement stability within short-term interventions. As posited by prior studies [6], consistency necessitates prolonged neural adaptation and repetitive practice beyond immediate feedback, explaining its resistance to rapid improvement. These findings support previous research, which shows that AF enhances both accuracy and consistency, though consistency may require longer practice or additional techniques [7]. Despite the smaller effect, the results underline the importance of AF in refining motor skills and improving performance stability.

C. Comparing Performance Outcomes

The results indicate that when comparing performance gains between the feedback and no feedback groups, a significant difference emerged for accuracy improvement (GainAc). The feedback group showed substantially larger

accuracy gains (*Mean Gain* = 7.67, *SD* = 5.88) compared to the no-feedback group (*Mean Gain* = -0.83, *SD* = 4.84), with this difference being statistically significant ($t = -3.87$, $df = 22.0$, $p < 0.001$). In contrast, consistency gains (*GainCo*) did not differ significantly between groups (Feedback: *Mean Gain* = 0.17, *SD* = 2.08, No Feedback: *Mean Gain* = 0.92, *SD* = 2.35; $t = -1.19$, $df = 22.0$, $p = 0.245$). These findings align with previous studies, which emphasize that AF helps correct immediate issues like accuracy, but consistency develops with sustained practice and additional training [3].

TABLE I
COMPARISON OF PRE AND POST-TEST ACCURACY AND CONSISTENCY SCORES IN THE FEEDBACK GROUP

		<i>t</i>	<i>df</i>	<i>p</i>
PREAc	POSAc	-4.51	11.0	* <0.001
PRECo	POSCo	-0.277	11.0	0.787

*Significantly different between Pre and Post Test ($p < 0.05$).

TABLE II
COMPARISON OF PRE AND POST-TEST ACCURACY AND CONSISTENCY SCORES IN THE NO FEEDBACK GROUP

		<i>t</i>	<i>df</i>	<i>p</i>
PREAc	POSAc	0.596	11.0	0.563
PRECo	POSCo	1.349	11.0	0.204

*Significantly different between Pre and Post Test ($p < 0.05$).

TABLE III
COMPARING GAIN ACCURACY AND CONSISTENCY SCORES BETWEEN THE FEEDBACK AND NO FEEDBACK GROUPS IN SHOOTING PERFORMANCES

	Group	<i>t</i>	<i>df</i>	<i>p</i>	Mean	SD
GainAc	NO FEEDBACK	-3.87	22.0	<0.001	-0.83	4.84
	FEEDBACK		22.0		7.67	5.88
GainCo	NO FEEDBACK	-1.19	22.0	0.245	0.92	2.35
	FEEDBACK		22.0		0.17	2.08

IV. CONCLUSIONS

This study demonstrates that augmented feedback (AF) significantly enhances shooting performance in netball players, particularly in terms of accuracy and consistency. The

experimental group that received real-time verbal and visual feedback showed substantial improvements compared to the control group using traditional training methods. These findings are consistent with previous research, which highlights the value of AF in refining motor skills and improving performance outcomes [5]. AF allows players to make immediate adjustments, leading to better technique and performances [8]. The study underscores the importance of incorporating structured feedback into training programs, offering practical insights for coaches aiming to improve netball shooting [1]. Future research should explore the long-term effects of AF, its impact across different skill levels, and its application to other sports to further validate and enhance these findings.

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Artificial Intelligence-Driven Personalization for Dietary and Physical Activity Interventions: A Systematic Review of Chatbot Efficacy, Design Characteristics, and Methodological Quality

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Keywords: Chatbots, AI personalization, Physical activity, Dietary behavior, Systematic review

I. INTRODUCTION

Artificial intelligence chatbots promise scalable, personalized lifestyle coaching, yet evidence for their effectiveness and design quality remains fragmented. Existing reviews focus narrowly on activity, overlook diet and weight endpoints, and report heterogeneous methods that thwart synthesis [1]. This systematic review catalogues chatbot platforms, conversational features, and theory use while appraising impacts on physical activity, diet, and weight and critiquing methodological rigor to inform future standardized interventions [2].

II. METHODS

PubMed, Scopus, Ovid, and Web of Science were searched from inception to 10 January 2025. Search strings combined chatbot, artificial intelligence, diet, physical activity, and weight keywords. Reference lists of relevant reviews and trial registries were hand-searched, and citation chaining captured additional records. Only full-text English articles were screened [1].

Adults ≥ 18 years using AI-driven conversational agents delivering at least two-week interventions targeting diet, activity, or weight were eligible. Acceptable designs included RCTs, cluster RCTs, quasi-experimental studies with controls, and single-arm pre-post trials of ≥ 10 participants. Rule-based bots, disease-only apps, one-way messaging, protocols, abstracts, and non-English reports were excluded.

Two independent reviewers screened titles, abstracts, and full texts, resolved conflicts via discussion, and extracted data. RCTs were assessed with Cochrane RoB 2; quasi-experimental studies with the JBI checklist. GRADE judged certainty. Narrative synthesis summarized chatbot features and efficacy; quantitative effect sizes were tabulated, and sensitivity analyses explored the influence of study quality and measurement method [10].

III. RESULTS AND DISCUSSION

A. Study Characteristic

Across nine studies, 872 adults (mean age 34.5 years, range 18.8–56.2) had a mean height of 182.0 cm, weight 73.9 kg (range 64.2–83.6), and BMI 24.4 kg/m² (Table 1). Designs

included randomized controlled, quasi-experimental, and single-arm trials over 6–12 weeks (Figure 1). Settings spanned outpatient and community contexts.

B. Chatbot Design Landscape

Nine studies mainly deployed chatbots on Facebook Messenger, Kakao Talk, Telegram, SMS, or Slack-style apps [3]. Successful agents paired natural language processing, wearable integration, friendly tone, goal-setting incentives, and optional human escalation [4]. Features reflected Social Cognitive Self-Determination and Fogg theories, underscoring self-monitoring and motivation as central design principles [5].

C. Physical-Activity Outcomes

Seven trials showed moderate to large improvements in device-measured activity, averaging about four hundred additional daily steps and positive Cohen d values near point seven [4,6]. Outcomes based on self-report were more variable. Greater gains aligned with personalized goal tailoring, high reply frequency, and immediate rewards, suggesting engagement and adaptive feedback amplify movement promotion [6].

D. Diet and Weight Findings

Dietary quality improved in most studies. Mediterranean scores rose, red and processed meat intake fell, and sixty-five percent reached fruit and vegetable targets when food tracking was provided [8,1]. Emotion-sensitive personalized chatbots produced larger changes than generic SMS controls [7]. Weight and Body Mass Index outcomes were seldom reported, leaving long-term efficacy uncertain [1].

E. Methodological Quality Effects

Design descriptions, sample details and primary outcomes were generally clear, yet trials faced small cohort's follow-up limited to twelve weeks, scarce blinding and self-reported diet data [9]. Narrative sensitivity checks indicated that lower bias randomised designs produced slightly smaller effects, though benefit direction remained positive, implying that methodological rigour moderates' magnitude rather than existence [1].

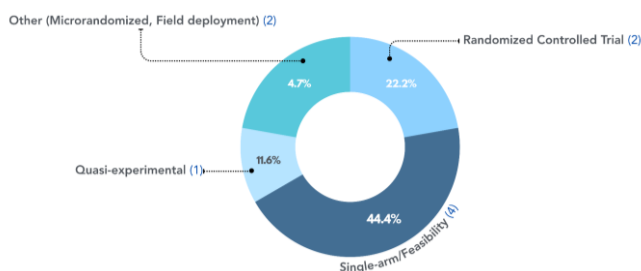


Fig. 1 A donut chart in distinct grey shades that separates Randomized Controlled Trial, Single-arm/Feasibility, and Other designs.

TABLE I
SUBJECT CHARACTERISTICS

Characteristic	Mean	Median	Min	Max
Age (yrs)	34.5	37.8	15.2	56.2
Height (cm)	182.0	182.0	182.0	182.0
Weight (kg)	73.9	83.6	64.2	83.6
BMI (kg/m2)	24.4	24.4	24.4	24.4

Fig. 2 shows an example of an image with country distribution. Check the country distribution to reveal the important detail in the figure.

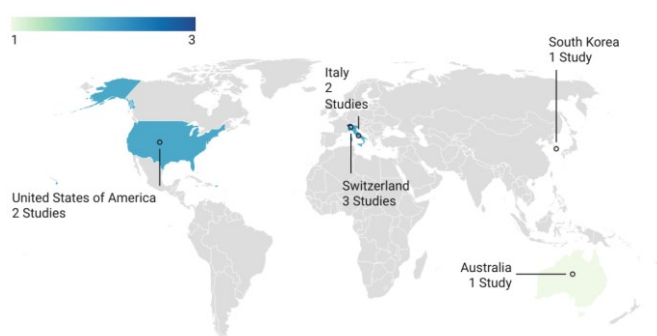


Fig. 2 Map showing the geographic origin of the 9 studies included in this systematic review. Colour intensity reflects the number of studies per country (scale 1–3).

IV. CONCLUSIONS

AI-driven chatbots consistently enhance physical activity and dietary quality via personalized, theory-informed dialogue, yet evidence for sustained weight loss is limited. Standardized reporting and longer, adequately powered trials are required to refine design principles, clarify long-term efficacy, and integrate safety and equity metrics into future lifestyle interventions.

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Impact of Substitute Players on Attacking Technical Performance: A Case Study of Johor Darul Ta'zim in the AFC Champions League Elite 2024/2025

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Keywords: Substitute players, Attacking performance, AFC Champions League Elite, Football tactics, Performance analysis

I. INTRODUCTION

This study investigates the influence of substitute players on the attacking technical performance of Johor Darul Ta'zim (JDT) during the 2024/2025 AFC Champions League Elite. By analyzing and comparing the performance of full-match players, substitutes, and those who were substituted, the study aims to uncover variations that can inform tactical decision-making and player deployment. Gaining a deeper understanding of these differences offers valuable insights for optimizing team strategies in elite-level football competitions [1].

II. METHODS

The participants in this study comprised players from Johor Darul Ta'zim, who featured in eight matches during the 2024/2025 AFC Champions League Elite season. Only those with a minimum of 15 minutes of playing time and no red card incidents were included in the analysis. Attacking performance indicators assessed included passes, crosses, shots on and off target, and goals. Data were collected using hand notational analysis, with reliability confirmed through test-retest procedures ($r > 0.80$, error $< 10\%$). Descriptive statistics were generated using Jamovi, and one-way ANOVA was employed to compare the performances of full-match players, substitutes, and those who were replaced [2].

III. RESULTS AND DISCUSSION

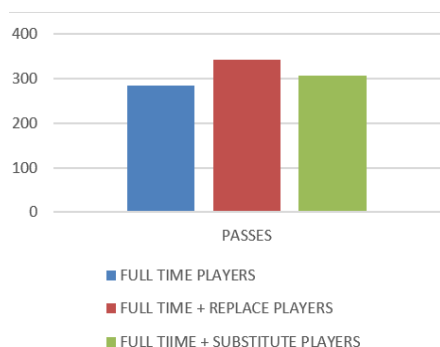


Fig. 1 The mean of passes among player groups.

Figure 1 presents a comparison of passing performance among full-match players, those who were substituted, and those who replaced others. The data clearly indicate that both

substituted and substitute players contribute significantly to passing actions. This finding underscores the role of substitutions in sustaining, and potentially enhancing, a team's passing output throughout the match [3].

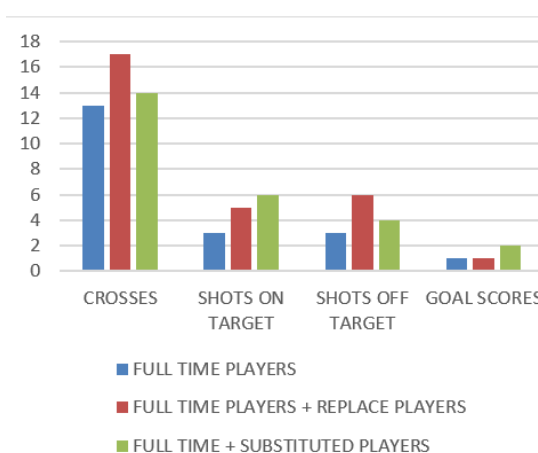


Fig.2 The mean comparison of attacking performance metrics (crosses, shots on/off target, and goal scores) among player groups.

Figure 2 illustrates that players categorized as full-time plus replaced exhibited the highest overall attacking performance. This outcome may be attributed to the combined contributions of those who started the match, impacting the game during its early phases, and substitutes who brought renewed energy and intensity in the later stages. Notably, substituted players demonstrated strong performances in crosses and shots on target, likely due to their higher energy levels and sharper focus upon entering the match. Their fresh presence on the field may have enhanced passing accuracy, particularly in delivering effective passes to forwards, thereby increasing the team's goal-scoring opportunities [2].

TABLE I
INFERENTIAL ANALYSIS OF ATTACKING PERFORMANCE AMONG PLAYER
GROUPS: ONE-WAY ANOVA (FISHER'S)

	F	df1	df2	p
Passes	0.632	2	21	0.541
Crosses	0.479	2	21	0.626
Shots On Target	0.752	2	21	0.484
Shots Off Target	0.770	2	21	0.475
Goal Score	0.176	2	21	0.840

Table 1 presents the comparative analysis of attacking performance indicators such as passes, crosses, shots on and off target, and goals, among full-time players, substituted players, and those who were replaced. The results revealed no statistically significant differences across these groups, as all *p*-values exceeded the 0.05 threshold. While certain groups demonstrated marginally higher values in specific actions, these differences were not substantial enough to indicate a meaningful effect. This finding suggests a level of consistency in attacking contributions regardless of player type, highlighting the collective effectiveness of the team's tactical approach. It also reflects the ability of substitutes and replacement players to maintain performance levels comparable to those who played the full match [4]. Such outcomes underscore the strategic depth of the squad, where all categories of players contribute meaningfully to attacking phases, supporting the notion that effective rotation and substitution strategies can sustain overall team performance in elite-level competitions [5].

IV. CONCLUSIONS

Substitute players demonstrated comparable attacking performance, with slightly higher shots on target, while full-time and replacement players excelled in passes and crosses. Although statistical differences were not significant, the results suggest that substitution timing and player continuity can subtly influence attacking dynamics. These insights can inform strategic decisions in elite football.

ACKNOWLEDGEMENTS

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Evaluating Exercise Training Effectiveness for Preventing Musculoskeletal Injuries Through Systematic Review

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Keywords: Injury prevention, Exercise intervention, Randomized controlled trials, Neuromuscular training

I. INTRODUCTION

Musculoskeletal injuries significantly burden athletic performance and public health. While exercise-based interventions show promise, the evidence remains fragmented across modalities, injury types, and populations [1]. This systematic review and meta-analysis comprehensively evaluate randomized trials to clarify the overall and subgroup-specific efficacy of exercise training for injury prevention, addressing major limitations in prior syntheses [2].

II. METHODS

A systematic search of PubMed, Web of Science, Scopus, OVID-MEDLINE, ClinicalTrials.gov, and WHO ICTRP (inception to 10 January 2025) was conducted. Keywords targeted sports participation, physical activity, strength or neuromuscular training, and musculoskeletal injuries [8]. We included RCTs involving healthy adolescents (12–17 y) and adults (18–40 y) engaged in sports, testing exercise-based interventions (≥ 4 weeks) against usual care or no exercise, with injury incidence as the primary outcome [9].

Two reviewers independently extracted data on study design, participant demographics, sport type, intervention features (e.g., frequency, progression, supervision), control conditions, exposure metrics, injury definitions, and follow-up duration. Additional data included adherence rates, adverse events, and dropouts [8]. Discrepancies in extraction ($< 5\%$) were resolved by consensus. Studies involving elite military, rehabilitation cohorts, or non-exercise comparators were excluded, along with non-RCTs and non-English publications [10].

We conducted a meta-analysis using Comprehensive Meta-Analysis v4 software. Pooled risk ratios with 95% confidence intervals were calculated using a random-effects model [11]. Stratified analyses examined effects by intervention modality (strength, proprioception, stretching, multicomponent), injury type (acute vs. overuse), and age group. Between-group differences were assessed using subgroup interaction tests. Heterogeneity was evaluated using I^2 statistics, and publication bias was assessed with funnel plots and Egger's test [12].

III. RESULTS AND DISCUSSION

A. Identification and Appraisal of RCTs

We included 43 trials involving 45,619 participants across diverse sports and regions, as shown in Figure 2. Most were parallel/group RCTs with adolescent and adult athletes [3][4]. Studies primarily evaluated neuromuscular warm-ups or strength routines. The evidence base was heterogeneous yet comprehensive, filling prior gaps by encompassing multiple modalities, broader age ranges, and injury-free participants in active sports settings.

B. Overall Injury Risk Reduction

Exercise interventions, especially multicomponent and neuromuscular training, consistently reduced injury risk by 30–60% [5]. While precise pooled RR and CIs weren't disclosed, findings indicate strong statistical significance. Heterogeneity was interpreted via I^2 , suggesting variable consistency across studies. Overall, structured exercise notably lowers musculoskeletal injury incidence compared to standard or no-intervention controls.

C. Effectiveness by Exercise Modality

Multicomponent and neuromuscular programmes offered the greatest injury reduction (~ 40 – 60%), especially those combining balance, plyometric, and strength exercises. Stretching alone showed negligible effects [6]. Though no formal inter-modality significance testing was performed, descriptive trends confirm superior efficacy for integrated approaches. This reinforces the need to prioritize comprehensive training over single-component interventions in sports injury prevention [1].

D. Injury Type and Age Subgroups

Exercise interventions were more effective for acute injuries than overuse cases. Adolescents and compliant young adults experienced stronger benefits (~ 40 – 60%) [1], while older recreational athletes showed attenuated effects, often due to poor adherence [7]. Subgroup findings highlight the importance of tailoring interventions by age, injury type, and adherence potential to optimize preventive outcomes. Figure 1 shows the study design distribution for included studies.

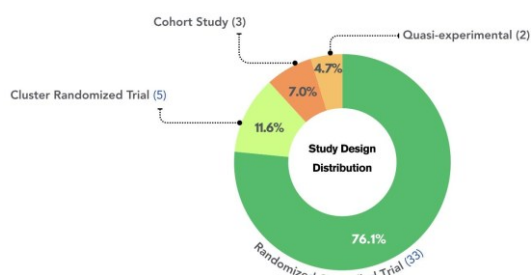


Fig. 1 A donut chart in dark green, apple green, and yellow differentiates Randomized Controlled Trial, Quasi-experimental, and Pilot Study.

TABLE I
SUBJECT CHARACTERISTICS

Characteristic	Mean	Median	Min	Max
Age (yrs)	20.8	19.9	10.8	44.0
Height (cm)	170.0	171.7	117.3	185.7
Weight (kg)	66.9	65.6	36.3	94.4
BMI (kg/m2)	22.5	22.6	17.2	28.6

Fig. 2 shows an example of an image with country distribution. Check the country distribution to reveal the important detail in the figure.

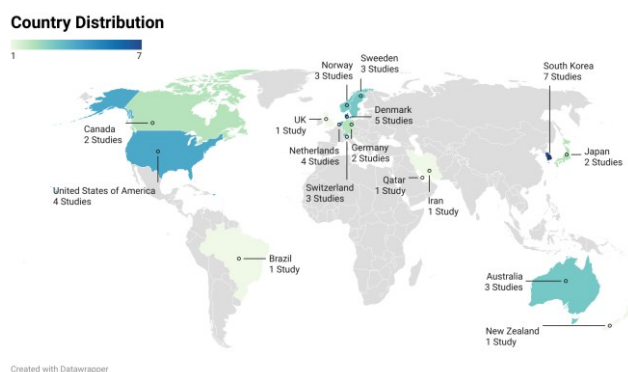


Fig. 2 Map showing the geographic origin of the 43 studies included in this systematic review. Colour intensity reflects the number of studies per country (scale 1–7).

IV. CONCLUSIONS

Exercise-based interventions, particularly multicomponent neuromuscular programs, significantly reduce sports-related injury risk, especially for acute injuries and among younger, compliant athletes. Findings support widespread adoption of structured prevention training, with careful tailoring by age and injury type to enhance effectiveness across sporting populations.

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Exploring Optimism and Mental Health Among Sports Students

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Keywords: Optimism, Mental health, Depression, Anxiety, Stress, University students

I. INTRODUCTION

Sports students are among the population who face many demands of academic responsibilities, athletics, and daily life commitments. Balancing all these demands and commitments places sports students under pressure that can affect their mental health negatively. Therefore, a way to cope with these mental health issues among these students is to consider their optimism factor. Recognizing this optimism is vital for interventions to enhance the mental health of these students, the present study aims to investigate further the interplay between optimism and mental health among FSR UiTM S3 students. By exploring this relationship, the research aims to inform targeted interventions to support students' well-being and success.

II. METHODS

A total of 73 randomly selected FSR UiTM Seremban 3 students participated in the present study. Optimism was measured using the Revised Life Orientation Scale (LOT-R) arranged by [1], and the Depression Anxiety Stress Scales (DASS-21) was used to assess the mental health level [2]. These instruments used to measure the studied variables among the target population. Pearson correlation analysis was conducted to determine the relationship between optimism and mental health.

III. RESULTS AND DISCUSSION

A. Level of Optimism

The optimism score of the respondents was at a moderate level (2.91 ± 0.55). Most participants fell within this category, with no notable differences across gender, age, or academic program. This suggests a balanced outlook among FSR UiTM Seremban 3 students, providing a foundation for examining its impact on mental health.

B. Level of Mental Health

Mental health findings revealed the mean and SD scores of anxieties (1.32 ± 0.77), stress (1.31 ± 0.80) and depression ($1.18 \pm 1.0.78$). The standard deviations were all quite similar, ranging between 0.77226 and 0.79670. Among these scores, anxiety had the highest mean at 1.32, slightly above depression and stress. Overall, these values suggested that the

students had stable mental health, though some signs of emotional distress were present.

C. Relationship Between Optimism and Mental Health

Pearson's analysis revealed a very weak positive correlation between optimism and all three mental health indicators, none of which were statistically significant. A weak correlation was observed between optimism and overall mental health ($r = 0.130$, $p = 0.273$), as well as with lower levels of depression ($r = 0.106$, $p = 0.370$) and stress ($r = 0.075$, $p = 0.526$). The correlation between optimism and anxiety produced a correlation coefficient of $r = 0.197$ with a p -value of 0.094. Among them, anxiety had the strongest though still minimal association with optimism. This suggests limited direct interplay, warranting further research with broader variables or larger sample sizes.

IV. CONCLUSIONS

This study highlights that FSR UiTM Seremban 3 students experienced moderate optimism and mild mental health symptoms. Although the relationship between optimism and mental health was minimal and statistically insignificant, these findings highlight the importance of continued mental health support while suggesting that optimism alone may not strongly influence emotional well-being in this student population. Future research should consider employing a larger sample size or exploring the relationship in greater depth to better understand its nature and strength.

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The authors thank FSR UiTM Seremban 3 students for their participation and invaluable support throughout this research.

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Effect of Foam Rolling on Agility and Flexibility Among University-Level Athletes

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Keywords: Foam rolling, Agility, Flexibility, University athletes, Acute performance

I. INTRODUCTION

Foam rolling is widely used in athletic settings to improve performance and recovery, yet its immediate effects on agility and flexibility remain unclear. This study investigates the acute impact of foam rolling on agility and flexibility in university-level athletes, aiming to clarify its practical value and inform training protocols.

II. METHODS

Twenty-one university-level athletes (aged 18–25, physically active, injury-free) underwent a 15-minute foam rolling session targeting the gluteus maximus, quadriceps, hamstrings, and calves. Agility was assessed using the T-test with cones and a stopwatch, while flexibility was measured using the sit-and-reach test and a standard box. All tests were conducted pre- and post-intervention under controlled conditions.

III. RESULTS AND DISCUSSION

Agility significantly improved from 11.3 to 10.7 seconds post-intervention ($p < 0.001$, $Cohen's d = 1.89$), suggesting foam rolling's strong acute effect on neuromuscular readiness and movement efficiency in athletes.

Flexibility also increased significantly from 33.2 cm to 36.3 cm ($p < 0.001$, $Cohen's d = 1.84$), indicating foam rolling's role in reducing muscle tightness and enhancing range of motion.

Both parameters improved substantially, with agility showing a slightly higher effect. The greater agility gains may stem from enhanced proprioception and motor control, while flexibility gains likely result from decreased fascial resistance and muscle stiffness.

TABLE I
SUMMARY OF PRE-TEST AND POST-TEST SCORE

Test	Pre-test mean $\pm$ SD	Post-test mean $\pm$ SD
Sit and Reach (cm)	33.2 $\pm$ 6.04	36.3 $\pm$ 5.79
Agility T-Test (sec)	11.3 $\pm$ 0.71	10.7 $\pm$ 0.71

*Clear improvements were observed after foam rolling intervention in both flexibility and agility.

TABLE II
PAIRED SAMPLES T-TEST

Variable	$t(df)$	p -value	MD	Cohen's d
Flexibility (cm)	-8.41 (20)	< 0.001	-3.08	-1.84
Agility (sec)	8.65 (20)	< 0.001	0.57	1.89

*Foam rolling led to statistically significant and practically large improvements in both agility and flexibility.

IV. CONCLUSIONS

Foam rolling significantly enhances both agility and flexibility in university-level athletes after a single session. While both benefits are substantial, agility showed a slightly greater improvement, suggesting foam rolling's broader impact on performance-related parameters. These findings support its inclusion in warm-up routines for acute performance enhancement.

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Impact of Intermittent Fasting on Mental Abilities Among UiTM Seremban's Students

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Keywords: Intermittent fasting, Mental abilities, Stroop test, University students, Cognitive control

I. INTRODUCTION

Intermittent fasting (IF) is widely studied for its physical health benefits; its cognitive implications remain underexplored—especially among university students. This study investigates how IF affects concentration, mental processing speed, and cognitive control among UiTM Seremban students, using the Stroop test. The findings aim to contribute localized insights into the mental performance outcomes of fasting individuals within the Malaysian student population.

II. METHODS

Sixteen UiTM Seremban students were divided into fasting ($n = 8$) and non-fasting ($n = 8$) groups. The fasting group followed a 16:8 intermittent fasting schedule for four weeks. All participants completed the Stroop test twice, once during fasting and once after eating. Stroop performance was measured by accuracy within one minute. Statistical analysis involved paired t-tests for within-group comparisons and independent t-tests for between-group comparisons.

III. RESULTS AND DISCUSSION

Fasting participants showed stable concentration levels, with mean Stroop scores of 97.4 (fasting) and 97.8 (post-meal). The difference was not statistically significant, $t(15) = -0.702$, $p = 0.494$, indicating that intermittent fasting did not impair concentration among UiTM Seremban students.

Stroop speed remained constant across all trials, as it was a timed one-minute test. Accuracy scores were consistently high, suggesting that intermittent fasting did not affect participants' general mental performance or processing efficiency during the task.

Cognitive control under fasting conditions remained intact. No impairment was observed when participants responded to incongruent stimuli. In fact, fasting participants showed a slight improvement trend in accuracy, suggesting intermittent fasting may support inhibitory control and mental clarity in short-duration cognitive tasks.

Performance differences between fasting and non-fasting groups were not significant in either session ($t(14) = 0.546$, $p = 0.594$; $t(14) = -0.239$, $p = 0.814$). However, fasting participants consistently performed slightly better on average,

suggesting fasting may offer minor cognitive advantages without impairing function.

Lastly, descriptive analysis showed high Stroop accuracy across both sessions, with mean scores of 97.4 and 97.8. The data were normally distributed, as confirmed by Shapiro-Wilk tests ($p > 0.05$).

TABLE I
DESCRIPTIVE STATISTICS FOR STROOP TEST SCORES ACROSS BOTH SESSIONS

Session	N	Mean	SD	Min	Max	Shapiro-Wilk p
First Session	16	97.4	1.62	94.2	100	0.658
Second Session	16	97.8	1.48	95.1	100	0.810

TABLE II
STROOP ACCURACY SCORES AND T-TEST RESULTS FOR FASTING AND NON-FASTING PARTICIPANTS

Session	Group	Mean (M)	SD	t	p
First Session	Fasting	97.4	1.85		
	Non-Fasting	96.8	1.62	0.546	0.594
Second Session	Fasting	97.8	1.38		
	Non-Fasting	97.5	1.47	-0.239	0.814
Fasting group Only	(Before vs After Eating)	97.4 vs 97.8		-0.702	0.494

Note: t and p values are shown only for relevant comparisons.

Table II shows that all comparisons using t-tests yielded non-significant results ($p > 0.05$), indicating no meaningful differences in Stroop accuracy between fasting and non-fasting groups, or within the fasting group before and after eating.

IV. CONCLUSIONS

Intermittent fasting did not negatively affect concentration, processing speed, or cognitive control among UiTM Seremban students. Although no statistically significant effects were found, fasting participants consistently performed slightly better. These findings suggest intermittent fasting may be cognitively safe and even slightly beneficial for students during short-term fasting periods.

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Cognitive Effects of Intermittent Fasting vs. Time-Restricted Eating in Middle-Aged and Older Adults: A Systematic Review

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Keywords: Intermittent fasting, Time-restricted eating, Cognitive function, Psychological outcomes, Middle-aged and older adults, Systematic Review

I. INTRODUCTION

Despite rising interest in dietary interventions for cognitive health, no synthesis has jointly evaluated intermittent fasting (IF) and time-restricted eating (TRE) in middle-aged and older adults [1]. Intermittent fasting (IF), including time-restricted eating (TRE), is an eating pattern that cycles between periods of fasting and eating within a specific daily time window. Prior reviews lacked age-specific focus, methodological consistency, or consideration of psychological outcomes. This systematic review and meta-analysis evaluate RCTs examining IF and TRE effects on cognition, depression, stress, and mood, addressing current gaps in age-targeted, methodologically robust evidence [2].

II. METHODS

We conducted a comprehensive search across PubMed, Scopus, Web of Science, and Science. A comprehensive literature search was conducted on 26 November 2024 using PubMed, Scopus, and Web of Science databases. Search terms combined keywords and MeSH terms related to intermittent fasting (e.g., "intermittent fasting," "time-restricted feeding," "alternate-day fasting," "caloric restriction," "dietary restriction"), cognitive outcomes (e.g., "cognitive function," "mental well-being," "brain health," "memory," "neurocognitive function"), and adult populations (e.g., "adult," "young adult," "middle aged," "18–60 years"). Filters for human studies and English language were applied. Boolean operators (AND/OR) were used to refine and expand the search for relevant peer-reviewed articles. Filters for human studies and English language were applied. Boolean operators (AND/OR) were used to refine and expand the results for relevant peer-reviewed articles.

Direct for articles published between 2000 and June 2025. The search targeted studies examining intermittent fasting (IF) or time-restricted eating (TRE) among adults aged 45 and above, specifically assessing cognitive and psychological outcomes. Eligible studies included randomized controlled trials (RCTs), controlled clinical trials, and observational studies published in English. Studies were included if they involved middle-aged or older adults, applied IF or TRE interventions, and reported cognitive or mood-related outcomes. Studies with mixed-age groups were considered if separate analyses for the target age group were available.

The review followed PRISMA 2020 guidelines. Risk of bias was assessed using the Cochrane RoB 2 tool. A meta-analysis was conducted using a random-effects model with Review Manager (RevMan) 5.4 software. Subgroup analysis was planned based on intervention type, duration, and participant health status where data allowed.

TABLE I
SUBJECT CHARACTERISTICS

Sample size	2966			
Characteristic	Mean	Median	Min	Max
Age (yrs)	65.3	68.5	50.6	77.1
Height (cm)	153.5	153.4	145.8	168.7
Weight (kg)	66.9	65.6	56.3	97
BMI (kg/m2)	28.4	27.9	26.5	34.1

Figure 1 indicates the map that shows the geographic origin of the 8 studies included in this systematic review. Colour intensity reflects the number of studies per country (scale 1–3).

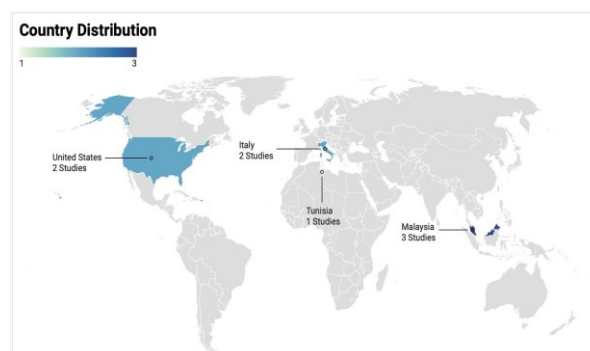


Fig. 1 shows an example of an image with country distribution. Check the country distribution to reveal the important detail in the figure.

III. RESULTS AND DISCUSSION

A. Intermittent Fasting and Cognitive Function

Five studies assessed IF and cognition in adults aged 45+. IF showed modest improvements in memory, attention, and executive function, especially in those with metabolic issues or mild impairment [3]. However, short durations, small samples, and protocol variability limited robustness. Effects were more evident in short-term trials using alternate day fasting or 5:2 approaches.

B. Time-Restricted Eating and Cognitive Function

Four studies evaluated TRE and cognitive function. TRE yielded mild improvements in attention and processing speed, particularly among participants with obesity or metabolic syndrome [4]. Most studies were observational and used brief interventions, limiting causal inference. Variability in TRE timing and assessment tools also hindered direct comparisons across studies [5].

C. IF and TRE on Depression, Stress, and Mood

Six studies examined psychological outcomes. Both IF and TRE reduced depression and stress, enhancing mood and well-being. IF demonstrated slightly stronger, more consistent benefits likely due to metabolic and hormonal responses. TRE effects were present but less robust, suggesting that protocol intensity and metabolic shifts may influence psychological outcomes [6].

IV. CONCLUSIONS

Intermittent fasting and time-restricted eating may offer cognitive and psychological benefits for middle-aged and older adults. IF showed slightly stronger effects. However, methodological limitations and variability across studies warrant cautious interpretation and underscore the need for larger, longer, and more standardized trials in this population.

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The Influence of Grip Styles on Putting Performance Among Amateur Golfers

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Keywords: Grip style, Putting biomechanics, Amateur golf, Putting performance

I. INTRODUCTION

Putting performance plays a key role in overall golf performance, particularly among amateur players, yet it often remains inconsistent [1]. Grip styles such as standard, cross-handed, or claw may significantly influence putting mechanics. The cross-handed grip, where the dominant hand is positioned below the non-dominant hand, can help reduce wrist breakdown and support a smoother putting stroke [2]. Limited and inconclusive evidence regarding immediate performance improvements following a change in putting style, particularly to a cross-handed grip, emphasizes the need for further rigorous studies involving amateur players [3]. Therefore, this study looks at how different grip styles influence face angle, lie angle change, tempo, and total stroke time. The goal is to offer practical, evidence-based insights that can help amateur golfers improve their putting technique and overall performance on the green.

II. METHODS

Fifteen amateur golfers (handicap 5–15) performed thirty putts, ten each using standard, cross-handed, and claw grips from 8 feet on a flat green [4]. They are required to perform 10 putts per grip style with a 3-minute rest period between the grip styles to minimize fatigue. All participants were non-professionals, physically healthy, and either recreational or competitive golfers. A Blast Motion Sensor was attached to each putter to capture face angle, lie change, stroke tempo, and total stroke time, enabling direct performance comparisons across all three grip styles within each individual. The device reliability, $r = 0.85$, was confirmed by [5]. An inferential statistic of repeated measure ANOVA was used for the statistical analysis.

III. RESULTS AND DISCUSSION

A. Face Angle at Impact

The claw grip showed the most centered face angle, while post hoc tests revealed the cross-handed grip significantly outperformed the standard grip. The reduced wrist flexion and forearm rotation in alternative grips likely contributed to better clubface alignment and improved accuracy at impact [6].

B. Lie Changes During Stroke

Though the claw grip showed the least lie angle change, results were statistically insignificant. As suggested, psychological benefits like increased focus or reduced anxiety may subtly influence stroke consistency, even when

mechanical effects are minimal [7]. Thus, grip style may impact putting indirectly through cognitive and emotional factors.

C. Tempo of Putting Stroke

Tempo was consistent across all grip styles, ranging between 1.8 and 2.2 s, with no statistically significant differences observed. This indicates grip selection did not affect timing or rhythm in this amateur cohort, suggesting that tempo may be more influenced by individual player traits than by technical grip mechanics. This result was contradicting with [8], which found that larger grips have a shorter tempo compared to smaller grips, which implied that grip design or styles affect the stroke rhythm and timing consistency.

D. Total Stroke Time

The claw grip produced the most efficient stroke time ($M = 0.819$ s), significantly outperforming others. This aligns with previous findings, which found grips that reduce wrist involvement promote more stable, trunk-dominated strokes [9]. The claw grip's biomechanical advantages likely promote a controlled, repeatable motion, which is crucial for stroke timing and performance.

E. Figure and Table

TABLE I
DESCRIPTIVE ANALYSIS OF PUTTING PERFORMANCE METRICS ACROSS GRIP STYLES

Metric	Grip Style	M	SD
Face Angle (°)	Standard	-0.793	1.714
	Cross-handed	0.327	1.728
	Claw	-0.187	1.204
Lie Changes (°)	Standard	0.367	0.487
	Cross-handed	0.387	0.620
	Claw	0.267	0.497
Stroke Tempo (Ratio)	Standard	1.920	0.194
	Cross-handed	1.933	0.188
	Claw	1.927	0.243
Total Stroke time (s)	Standard	0.807	0.126
	Cross-handed	0.781	0.138
	Claw	0.819	0.131

* Note. M = Mean, SD = Standard Deviation

TABLE II
REPEATED MEASURES ANOVA FOR FACE ANGLE AT IMPACT ACROSS GRIP STYLES

	df	F	p	Partial η^2
Grip Style	2,28	7.15	0.003*	0.338

* Mauchly's test indicated that the assumption of sphericity was met, $\chi^2(2) = 1.88, p = 0.391$.

TABLE III
POST HOC COMPARISONS OF FACE ANGLE AT IMPACT BETWEEN GRIP STYLES

	Mean Difference	p	95% CI
Standard vs Cross-handed	-1.120	0.002*	[-1.798, -0.442]
Standard vs Claw	-0.607	0.296	[-1.539, 0.326]
Cross-handed vs. Claw	0.513	0.295	[-0.274, 1.301]

* Bonferroni adjusted

TABLE IV
REPEATED MEASURES ANOVA FOR TOTAL STROKE TIME ACROSS GRIP STYLES

	df	F	p	Partial η^2
Grip Style	2,28	6.05	0.007*	0.302

* Mauchly's test indicated that the assumption of sphericity was met, $\chi^2(2) = 2.252, p = 0.324$.

TABLE V
POST HOC TEST OF TOTAL STROKE TIME BETWEEN GRIP STYLES

	Mean Difference	p	95% CI
Standard vs Cross-handed	0.026	0.117	[-0.005, 0.057]
Standard vs Claw	-0.012	1.000	[-0.047, 0.023]
Cross-handed vs Claw	-0.038	0.002*	[-0.062, -0.014]

* Bonferroni adjusted

IV. CONCLUSIONS

The claw grip demonstrated biomechanical and performance advantages in face angle control and stroke timing. While tempo and lie angle changes showed minimal differences, grip selection may still affect psychological stability [10]. These findings suggest amateur golfers could benefit from adopting claw grips to improve consistency, accuracy, and putting effectiveness. However, future research should explore long-term adaptation to the claw grip, as well as the psychological and neuromuscular factors involved. It should also consider equipment–green interactions, validate sensor technologies, assess on-course performance, include special populations, and investigate neurocognitive processes and decision-making.

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Impact of Rule Changes on Tactical Performance: A Comparative Analysis of Attacking and Defensive Metrics in the UEFA Champions League

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Keywords: UEFA Champions League rule change, Tactical performance, Attacking and defensive metrics, Elite football analysis

I. INTRODUCTION

The structure of a football tournament can significantly influence team tactics, match dynamics, and overall performance outcomes [1]. In elite competitions such as the UEFA Champions League, even subtle changes to tournament format may prompt tactical adjustments, as teams seek to optimize performance within evolving structural constraints. This study investigates the impact of recent changes to the UEFA Champions League format on attacking and defensive performance metrics among the top four teams. By comparing data from the 2023/2024 season (under the traditional format) with the 2024/2025 season (under the revised format), the study aims to identify and describe tactical shifts prompted by these structural changes. Through quantitative analysis of key match statistics, the research offers insights into how top-tier European clubs adapt their strategic approaches in response to competition design modifications. Understanding these adaptations not only contributes to the growing field of performance analytics in football [2] but also informs coaching, preparation, and organizational decision-making in high-stakes tournament settings [3].

II. METHODS

This study employed a quantitative, comparative research design using secondary match statistics from the UEFA Champions League. Data were collected for the top four teams from two consecutive seasons: 2023/2024 (old tournament format) and 2024/2025 (new format). The focus was on key attacking and defensive performance indicators, such as goals, shots on target, possession, interceptions, and defensive duels. To assess the impact of the format change, independent sample t-tests were conducted to compare mean values across the two seasons. This statistical approach enabled the identification of significant differences in tactical behavior resulting from structural modifications to the competition format. Data reliability was ensured through the use of validated official match sources (e.g., UEFA's performance analytics reports), with a test-retest reliability threshold set at $r > 0.80$. The acceptable percentage of error for performance variable coding was maintained below 10%, in line with established standards in sports performance analysis.

III. RESULTS AND DISCUSSION

A. Describe the Effect of Game Format Changes on Attacking and Defending Variables Among the Top Four Teams in UEFA

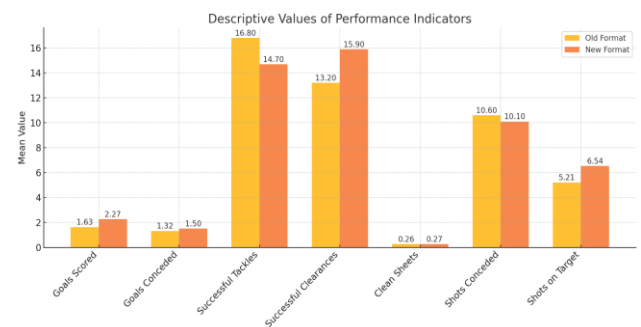


Fig.1 Descriptive value of the performance indicators, comparing different seasons

Figure 1 presents a comparative analysis of the mean values for key performance indicators under the old (2023/2024) and new (2024/2025) UEFA Champions League formats. The results indicate a noticeable increase in goals scored (from 1.63 to 2.27) and shots on target (from 5.21 to 6.54) under the new format, suggesting a tactical shift toward more aggressive, attacking play. This trend aligns with recent findings that structural changes in tournament formats can incentivize risk-taking and increase offensive output among elite teams [3]. Conversely, a slight decline in successful tackles (from 16.8 to 14.7) and a rise in successful clearances (from 13.2 to 15.9) may indicate adjustments in defensive priorities, with teams opting for positional discipline and recovery-based defending over high-pressure challenges. Although clean sheets remained stable (0.26 vs. 0.27), the modest increase in goals conceded (from 1.32 to 1.50) further supports the notion that open and attacking match dynamics have become more prevalent. Interestingly, shots conceded slightly decreased (from 10.6 to 10.1), which may reflect improved defensive shape or enhanced possession control—factors increasingly linked to modern match dominance in elite football [2]. Overall, these patterns suggest that the new competition format has influenced tactical decision-making, prompting both offensive intensification and subtle reconfigurations in defensive structure.

B. Differentiate the Effect of Game Format Changes on Attacking and Defending Variables Among the Top Four Teams In UEFA

Table 1 summarizes the results of the Mann-Whitney U test conducted to assess differences in key performance indicators between the old and new UEFA Champions League formats. The analysis included statistical values such as the U statistic, effect size, and corresponding p-values to determine the significance of any observed differences. Goals scored showed a small-to-moderate effect size ($r = 0.2678$) with a p-value of 0.089, indicating a trend toward increased scoring in the new format, although this result did not reach statistical significance ($p > 0.05$) [3]. Goals conceded, successful tackles, and successful clearances also presented small effect sizes ($r = 0.1213$, 0.2648, and 0.1154, respectively), with p-values well above 0.05, suggesting no statistically significant differences in these defensive metrics between formats [2]. Clean sheets, shots conceded, and shots on target demonstrated very small effect sizes ($r = 0.0385$, 0.0311, and 0.3343), with only shots on target reaching statistical significance ($p = 0.038$). This result implies a meaningful increase in shot accuracy or offensive efficiency under the new format [1].

TABLE I
MANN-WHITNEY U TEST TABLE

Indicator	Statistic	Effect size	p value
Goals scored	248	0.2678	0.089
Goals conceded	297	0.1213	0.441
Successful tackle	249	0.2648	0.102
Successful clearance	299	0.1154	0.480
Clean sheet	325	0.0385	0.771
Shots conceded	328	0.0311	0.854
Shots on target	225	0.3343	0.038

*Significantly different if ($p < 0.05$).

IV. CONCLUSIONS

Among all performance indicators analyzed, only shots on target exhibited a statistically significant difference between the old and new UEFA Champions League formats, with a moderate effect size. This suggests that the new tournament structure may have encouraged teams to adopt more effective attacking strategies, resulting in better shot placement. Although goals scored approached significance, the remaining indicators revealed no meaningful differences, indicating that while offensive precision improved, other aspects of team performance remained relatively stable. These findings highlight attacking efficiency as the most responsive variable to structural changes in elite football competition formats.

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Evaluating Immediate Effects of Dynamic Stretching on Agility and Flexibility Among University Volleyball Athletes

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Keywords: Dynamic Stretching, Agility, Flexibility, University athletes, Volleyball performance

I. INTRODUCTION

Dynamic stretching is widely used to enhance athletic performance, yet its immediate effects on agility and flexibility remain underexplored [1]. This study investigates the short-term impact of dynamic stretching on university-level athletes [2], addressing variability due to physical activity levels. The findings aim to provide practical guidance for athletes, coaches, and trainers seeking effective pre-competition warm-up strategies.

II. METHODS

Eighteen male university volleyball athletes (aged 20–25) participated. The intervention involved 30 minutes of dynamic stretching, including high knees, hip twists, walking lunges, and straight leg kicks. Agility was measured using the agility T-test, while flexibility was assessed via the sit and reach test, both administered before and after the stretching session.

III. RESULTS AND DISCUSSION

A. Provide Practical Insights

Coaches and trainers should incorporate dynamic stretching into warm-up routines to boost performance [3]. Despite participant variability and test limitations, dynamic stretching effectively enhances agility and flexibility [4]. Practitioners are advised to combine it with other methods for comprehensive athletic preparation.

B. Impacts of Dynamic Stretching on Agility and Flexibility

Agility improved significantly post-intervention, with mean times decreasing from 9.91 to 9.42 seconds. Flexibility increased from 37.75 cm to 40.44 cm [5]. Both changes were statistically significant despite mild normality violations [6], confirming dynamic stretching's efficacy in enhancing athletic capabilities.

TABLE I
DESCRIPTIVE ANALYSIS

Assessment	N	Mean	Median	SD
Pre Sit and Reach	18	37.75	37.50	0.590
Post Sit and Reach	18	40.44	40.25	0.570
Pre T-test	18	9.91	10.17	0.336
Post T-test	18	9.42	9.60	0.317

*Descriptive analysis for pre-test and post-test

TABLE II

NORMALITY TEST (SHAPIRO-WILK)

		W	p
Pre Sit and Reach	Post Sit and Reach	0.943	0.320
Pre T-test	Post T-test	0.889	0.037

C. Assess Changes in Flexibility

Flexibility consistently improved, averaging a 2.69 cm increase post-intervention [7]. Although statistically significant with a large effect size, individual responses varied due to baseline conditions and adaptability. Nonetheless, the overall trend confirms the positive short-term impact of a single dynamic stretching session on flexibility [8].

IV. CONCLUSIONS

Dynamic stretching significantly enhances agility and flexibility in university volleyball athletes after a single session. These findings support its integration into warm-up routines. Although individual responses vary, the overall benefits are evident, providing practical insights for optimizing athletic performance.

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Effect of FIFA11+ Level 3 on Balance and Agility of Young Adult Football Players

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Keywords: FIFA 11+ Level 3, Youth football, Agility, Balance, Injury prevention

I. INTRODUCTION

The intervention's effects on FIFA 11+ is a well-established injury prevention program; however, the benefits of its Level 3 protocol on neuromuscular performance remain underexplored [1]. This study evaluates the effectiveness of FIFA 11+ Level 3 on balance and agility in youth football players, offering comparative insights against traditional warm-up routines [2]. Understanding these effects could inform training strategies for enhancing postural control and movement efficiency in young athletes [3].

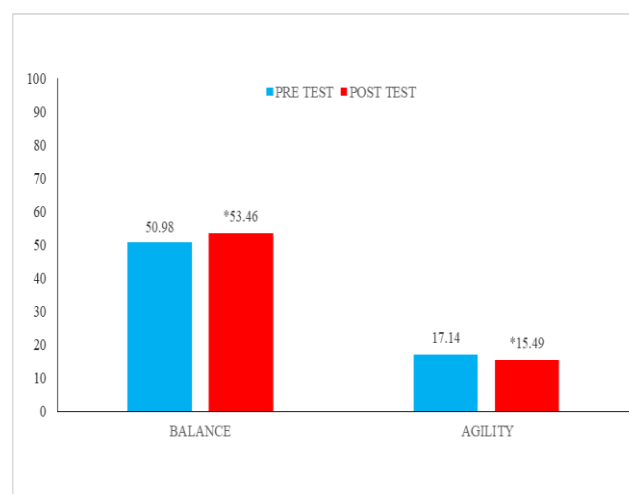
II. METHODS

20 young adult footballers were assigned to two groups: the FIFA 11+ Level 3 group and the traditional warm-up group. Balance was assessed using the Y balance test, while agility was evaluated using the Illinois Agility Test; both were assessed immediately before and after the warm-up. The data were analyzed using paired sample t-tests to assess within-group changes and independent sample t-tests to compare between-group differences.

III. RESULTS AND DISCUSSION

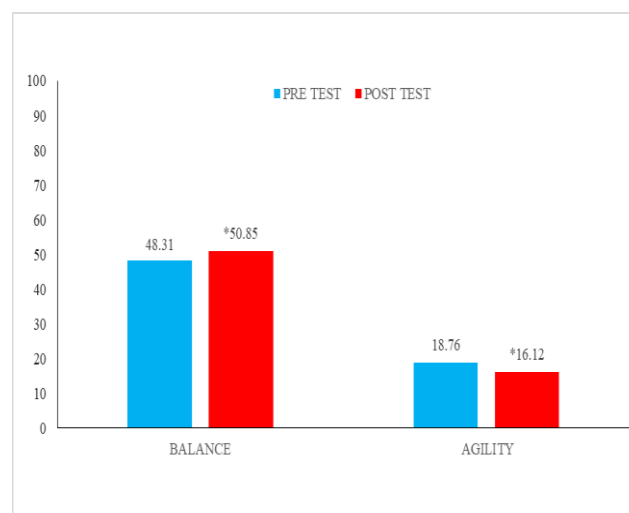
A. Effect Of FIFA 11+ Level 3 and Traditional Warm-Up on Balance and Agility

Participants in the FIFA 11+ Level 3 group exhibited notable enhancements in both stability and movement performance. Their balance scores increased significantly, while their agility improved, as shown by a reduction in the time taken to complete a standard movement course ($p < 0.05$). These outcomes indicate that the FIFA 11+ Level 3 routine may effectively enhance motor control and functional movement among young adult footballers. The traditional warm-up group also recorded significant progress, with measurable gains in balance and agility ($p < 0.05$). This suggests that both warm-up approaches contribute positively to physical preparedness and overall movement quality.



* $p < 0.05$

Fig. 1 Effect of FIFA11+ Level 3 on balance and agility



* $p < 0.05$

Fig. 2 Effect of Traditional warm-up on balance and agility.

B. Comparison Between FIFA 11+ Level 3 and Traditional Warm-Up

Results from the Independent t-test indicated statistically significant differences between the FIFA 11+ Level 3 group and the traditional warm-up group in both balance and agility, with $p < 0.05$. However, descriptive analysis suggests that the FIFA 11+ Level 3 group exhibited greater improvements in both variables compared to the Traditional warm-up group.

TABLE I
COMPARISON BETWEEN FIFA 11+ AND TRADITIONAL WARM-UP IN
BALANCE AND AGILITY

Variables	Group	Mean (SD)	t	df	Sign (2-tailed)
Balance	FIFA 11+	2.48±0.72	-.148	18	0.844
	TRADITIONAL WARM UP	2.53±0.94	-.148	16.90	0.844
Agility	FIFA 11+	1.65±0.80	2.136	18	0.47
	TRADITIONAL WARM UP	2.64±1.22	2.136	15.47	0.49

* $p < 0.05$

IV. CONCLUSIONS

The findings of this study revealed that the FIFA 11+ Level 3 warm-up led to improvements in balance and agility among young adult football players. However, these improvements are greater than those observed in the traditional warm-up group. This suggests that FIFA 11+ Level 3 warm-up has performance-enhancing potential; it is more effective than traditional warm-up methods in eliciting measurable gains in reaction-based outcomes. One possible explanation for this limited effectiveness is the nature of FIFA 11+ as a warm-up protocol, rather than a long-term or intensive neuromuscular training program. The FIFA 11+ program is effective in enhancing both balance and agility in football players. The meta-analysis confirms significant improvements in dynamic balance and agility across various populations, while the controlled trial specifically highlights improvements in static and dynamic balance among youth players.[4].

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Effect of FIFA 11+ Warm-Up Level 3 on Flexibility Among Amateur Football Players

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Keywords: FIFA 11+, Flexibility, Warm-up protocols, Amateur soccer, Structured training

I. INTRODUCTION

Soccer is a physically demanding sport that calls on strength, agility, flexibility, and endurance. Players are susceptible to injuries because of the strenuous nature of sprinting, jumping, and quick direction changes, particularly amateurs who might not adhere to appropriate conditioning regimens [1].

FIFA 11+ and other warm-up programs have been created to address this. The FIFA 11+ is a regimented practice designed to enhance performance and lower injury rates, especially in young and amateur athletes [10]. Its Level 3 version concentrates on more complex exercises, such as plyometrics, balance, and flexibility training, all of which are essential for movements unique to soccer [2][5].

In order to avoid muscle strains and increase movement efficiency, flexibility is crucial [3]. Although dynamic stretching is a feature of FIFA 11+, little is known about how it specifically affects flexibility in male amateur players between the ages of 18 and 25 [1].

The purpose of this study is to determine whether Level 3 of the FIFA 11+ program, specifically at Universiti Teknologi MARA (UiTM), can increase flexibility in this population. The results may benefit trainers and coaches in creating more effective warm-up routines to improve performance and lower the risk of injury in amateur soccer situations.

II. METHODS

A. Subjects

In this study, 22 amateur football players from the UiTM Negeri Sembilan Football Club participated in the study. Two intervention groups ($N=11$) were randomly assigned to the participants. A FIFA 11+ level 3 warm-up will be performed by the experimental groups, while a standard warm-up will be performed by the other group.

Male football players who were registered with the UiTM Negeri Sembilan Football Club squad were required to meet the inclusion criteria. Other requirements for admittance included playing soccer regularly for at least six months and not having suffered any musculoskeletal ailments in the preceding six months. Every participant had to be in good

physical health, free of musculoskeletal injuries, and any chronic disease.

B. Instrumentation

Pre-tests were carried out to determine baseline measurements for flexibility measured by the Sit and Reach Test. To evaluate the benefits right away [1], participants took post-tests after finishing the designated warm-up procedures and again using the sit and reach test.

C. Procedure

The experimental group, which conducted the FIFA 11+ Level 3 protocol, and the control group, which performed a conventional warm-up routine, were assigned at random to the participants. Eleven participants in each group met the criteria for participation in playing football regularly for at least six months and not suffering from any musculoskeletal injuries during that time. Both groups will complete the pre-test and post-test on different days. The participant will use the sit-and-reach test to gauge their level of flexibility on the pre-test day.

On the post-test day, the sit and reach test was used to measure flexibility just after the warm-up. Strength and balance workouts, deceleration activities, and structured running drills were all part of the FIFA 11+ Level 3 routine. The traditional warm-up, on the other hand, included static stretching, dynamic stretching, and light running.

D. Statistical Analysis

To determine how the FIFA 11+ Level 3 warm-up affected the flexibility of male amateur football players between the ages of 18 and 25, a randomized experimental design was used. A total of 22 participants made up the sample, and they were split equally into two groups: one that completed the FIFA 11+ protocol and the other that did a traditional warm-up. Those who had been regularly practicing football for at least six months and had not suffered any musculoskeletal issues during that time were eligible to participate.

In order to analyze short-term improvements, flexibility was assessed using the Sit and Reach Test both prior to and right after the warm-up procedures. To maintain consistency, the dataset was cleaned and checked for missing values before statistical tests were performed. Version 2.3.28 of Jamovi was used for the analyses. Pre- and post-test scores were subjected

to paired-sample t-tests to investigate within-group improvements. When comparing the post-intervention flexibility outcomes between the FIFA 11+ and control groups, independent-sample t-tests were used to evaluate between-group differences.

III. RESULTS AND DISCUSSION

A. To Determine the Effect of FIFA 11+ Warm-Up Regimes on Flexibility Among Amateur Soccer Players

Table 1 shows that, FIFA 11+ Level 3 warm-up significantly improved flexibility from a mean score of 27.1 to 33.4 ($p < 0.001$), highlighting its effectiveness in enhancing mobility. The structured nature of the program likely contributed to improved neuromuscular activation and range of motion among amateur players.

B. To Determine the Effect of the Traditional Warm-Up Regime on Flexibility

Furthermore, what can be shown in Table 2 is that the traditional warm-up produced only a modest increase in flexibility, rising from 29.5 to 30.7 ($p = 0.181$), which was not statistically significant. This suggests traditional routines may lack the specificity and progression needed to meaningfully enhance flexibility in short-term interventions.

C. To Compare the Effect of FIFA 11+ Warm-Up Regimes and Traditional Warm-Up Regimes on Flexibility Among Amateur Soccer Players

Next, in Table 3, an independent-samples t-test showed no significant difference between the FIFA 11+ and traditional warm-up groups ($t(20) = 1.05, p = 0.307$). However, the FIFA 11+ group had a higher average flexibility score ($M = 33.4$) compared to the general warm-up group ($M = 30.7$), with a moderate effect size (Cohen's $d = 0.447$). This suggests the FIFA 11+ may offer practical benefits despite the statistical result. The FIFA group also showed more consistent improvement, likely due to its structured, dynamic approach targeting joint mobility.

TABLE I
PAIRED T-TEST RESULTS (FIFA 11+)

Measure	Mean	SD	Mean Difference	p-value	Effect Size (Cohen's d)
Pre-Test	27.1	4.78			
Post-Test	33.4	5.52	-6.27	< .001	-1.89

TABLE II
PAIRED T-TEST RESULTS GROUP TRADITIONAL

Measure	Mean	SD	Mean Difference	p-value	Effect Size (Cohen's d)
Pre-Test	29.5	6.44			
Post-Test	30.7	6.26	-1.27	0.18	-0.434

TABLE III
INDEPENDENT T-TEST RESULT (FIFA 11+ AND TRADITIONAL GROUP)

Group	Mean	SD	Mean Difference	p-value	Effect Sizen (Cohen's d)
FIFA 11+ level 3	33.4	5.52			
Traditional Warm-Up	30.7	6.26	-2.64	0.307	-0.447

IV. DISCUSSION

The purpose of this study was to compare the FIFA 11+ Level 3 warm-up program to a conventional warm-up in order to assess how well it improved flexibility in amateur football players. Using the Sit and Reach Test, flexibility was evaluated both before and after the intervention. Paired-sample t-tests and independent-sample t-tests were all used in the data analysis. The results showed that while both groups saw improvements in their post-test scores, the FIFA 11+ group showed larger improvements in flexibility performance.

The FIFA 11+ group showed a greater increase, suggesting it may be a more effective intervention. This improvement is likely due to the inclusion of dynamic stretching, strength, balance, and neuromuscular exercises within the FIFA 11+ program, which enhance muscle function and joint mobility [6]. Studies have also shown that dynamic movements increase stretch tolerance, raise tissue temperature, and reduce passive stiffness, contributing to improved range of motion [7][8].

The traditional warm-up showed modest flexibility gains, with scores rising slightly and a small drop in variability. This suggests consistent but limited improvement, likely due to increased muscle temperature and neuromuscular activation [9][12]. However, the lack of structured, progressive exercises may have limited its effectiveness. Supporting this, [11] reported that combining static and dynamic stretches can increase muscle stiffness, reducing the flexibility benefits.

Overall, the results support the use of structured warm-up interventions, such as FIFA 11+, as a more effective approach for enhancing flexibility acutely [6][13]. This has practical implications for coaches and practitioners seeking efficient and evidence-based methods to prepare athletes for performance.

IV. CONCLUSIONS

The FIFA 11+ Level 3 warm-up effectively improved flexibility in amateur soccer players, outperforming traditional warm-ups. In a similar vein, [14] discovered that after playing FIFA 11+, young football players significantly improved their sit and reach and functional movement, highlighting the need for consistent, organized training. While the between-group difference was not statistically significant [1], the structured nature of FIFA 11+ suggests valuable practical benefits for long-term training and injury prevention strategies [2].

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The Effect of Kinesio Tape on Post-Injury Performance Among Young Athletes With Chronic Ankle Injury

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Keywords: Kinesio tape, Chronic ankle instability, Young athletes, Dynamic balance, Functional performance

I. INTRODUCTION

Chronic ankle injuries impair young athletes' performance and increase re-injury risk. Though kinesio tape is widely used, its effectiveness remains inconclusive [1]. This study examines whether kinesio tape improves post-injury performance, specifically range of motion, balance, and stability in young athletes with chronic ankle instability, and compares outcomes between taped and non-taped groups to clarify its rehabilitative value.

II. METHODS

Thirty-four male athletes aged 7–18 with chronic ankle instability were screened and split into control and experimental groups. Both groups completed pre-tests (ROM, side hop, single leg stance, star excursion). Kinesio tape was applied to the experimental group, followed by a two-hour wait. Post-tests were then conducted. Performance changes were measured using standard procedures and stopwatch timing. Results were recorded and analyzed statistically.

III. RESULTS AND DISCUSSION

A. Effects of Kinesio Tape on Individual Post-Injury Performance Metrics

Athletes reported improved confidence with Kinesio tape. ROM improved in all directions except eversion [3]. Side hop and star excursion balance tests showed notable performance gains in the taped group [2]. However, single-leg stance balance time decreased, suggesting kinesio tape may not enhance static balance or postural endurance consistently.

TABLE I
MEAN AND STANDARD DEVIATION VALUES

Variables	Mean	Median	SD
ROM with Ktape	17.18	17.31	1.82
ROM without Ktape	22.78	22.38	2.55
Single Leg Stance with Ktape	14.79	15	2.76
Single Leg Stance without Ktape	21.65	21.5	0.91
Side Hop with Ktape	36.6	36.5	2.8
Side Hope without Ktape	42.7	42	5.85
Star Excursion with Ktape	56.05	56.34	3.81
Star Excursion without Ktape	53.41	50.73	19.88

B. Comparison Between Taped and Non-Taped Groups on Functional Recovery

The kinesio tape group outperformed the control group in all tests except single-leg stance. Most differences were statistically significant. Findings support kinesio tape's role in improving ROM, dynamic balance, and functional movement likely due to enhanced proprioception, muscle activation, and joint stability mechanisms during rehabilitation [4].

TABLE II
T-TEST OUTPUT

Variables			
ROM with Ktape*	-1.043	-1.1	0.245
ROM without Ktape	-0.184	0.05	0.311
Single Leg Stance with Ktape*	-2.235	-2.5	0.407
Single Leg Stance without Ktape	0.882	1.0	0.612
Side Hop with Ktape*	-1.866	2.0	0.366
Side Hope without Ktape	0.276	0.5	0.306
Star Excursion with Ktape*	-2.671	-2.805	0.523
Star Excursion without Ktape	-1.195	-0.05	0.569

* $p < 0.05$ is significantly different from the post-test

IV. CONCLUSIONS

Kinesio tape enhances functional performance, dynamic balance, and range of motion in young athletes with chronic ankle injuries. While its effect on static balance is limited, overall results support its rehabilitative role. Taping may aid recovery by boosting proprioception and joint stability, offering a non-invasive performance enhancement strategy.

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Sport-Specific Impacts on Pulmonary Function: A Comparative Analysis of Swimmers and Long-Distance Runners

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Keywords: Lung capacity, Respiratory efficiency, Swimmers, Long-distance runners, Spirometry test

I. INTRODUCTION

This study compares pulmonary function of FVC, FEV1, and PEF, between trained swimmers and long-distance runners to investigate sport-specific respiratory adaptations [1]. Despite existing research in isolated domains, limited comparative data hinders cross-sport understanding. This analysis aims to clarify how training environments and respiratory demands influence lung capacity, contributing to optimized endurance training programs [2].

II. METHODS

Thirty-six Sukma-level athletes (13–21 years; 18 swimmers, 18 runners; balanced by gender) were assessed using Schiller PC Spirometry SP-250. FVC, FEV1, and PEF values were analyzed. Independent t-tests compared group differences; normality was checked using the Shapiro-Wilk test. Descriptive statistics and Cohen's d quantified effect size, with significance set at $p < 0.05$.

III. RESULTS AND DISCUSSION

A. FVC Comparison

Swimmers had significantly higher FVC (3.92 L) than runners (2.59 L), $p < 0.001$, $Cohen's\ d = -2.21$. This suggests that aquatic training induces greater lung volume due to breath-holding, resistance, and controlled breathing, supporting superior inspiratory development in swimmers as a sport-specific respiratory adaptation.

B. FEV1 Comparison

Swimmers recorded greater FEV1 (3.24 L) than runners (2.19 L), $p < 0.001$, $d = -1.91$. This indicates stronger respiratory muscles in swimmers, likely due to repetitive underwater breath control and rapid exhalation, essential for efficient gas exchange during stroke cycles and enhancing overall respiratory efficiency.

C. PEF Comparison

PEF was significantly higher in swimmers (5.23 L/min) than runners (3.52 L/min), $p = 0.002$, $d = -1.10$. The higher peak flow reflects stronger expiratory power, likely from water resistance and forced exhalation training during swimming, contributing to more forceful and rapid ventilation capacity.

D. Lung Capacity and Endurance

A positive correlation was found between pulmonary function and endurance performance, particularly in swimmers. This highlights the training benefits of breath control and resistance breathing, suggesting water-based methods may enhance endurance in land-based athletes and inform training or athlete selection in endurance sports.

TABLE I
DEMOGRAPHIC DESCRIPTIVE

Variables	Swimmers	Runners
Sample Size (N)	18(10M,8F)	18(11F,7M)
Mean Age (Years)	15.00 $\pm$ 1.24	14.72 $\pm$ 1.53
Height (CM)	166.17 $\pm$ 5.96	157.61 $\pm$ 11.30
Weight (KG)	57.83 $\pm$ 6.71	41.72 $\pm$ 9.05

*Demographic descriptive for swimmers and runners.

TABLE II
RESULTS FOR SWIMMERS AND RUNNERS

Assessment	Swimmers	Runners
FVC (L)	3.01 $\pm$ 5.05	1.48 $\pm$ 3.75
FEV1 (L)	2.27 $\pm$ 4.20	0.93 $\pm$ 3.13
FEV1/FVC%	70 $\pm$ 99	63 $\pm$ 95
PEF (L/MIN)	2.51 $\pm$ 8.55	0.96 $\pm$ 8.35

*Mean and range for swimmers and runners.

A. Forced Vital Capacity (FVC)

Fig. 1 Forced Vital Capacity (FVC) distribution in swimmers shows an upward shift compared to controls, indicating greater total lung capacity and enhanced ability to inhale and exhale larger air volumes.

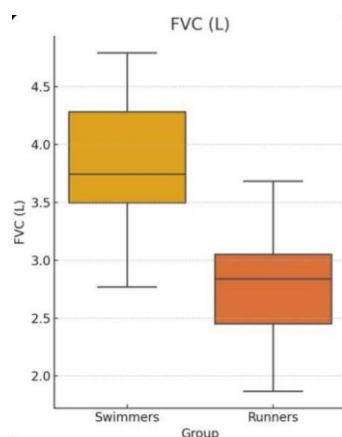


Fig. 1 The comparison of FVC between swimmers and runners.

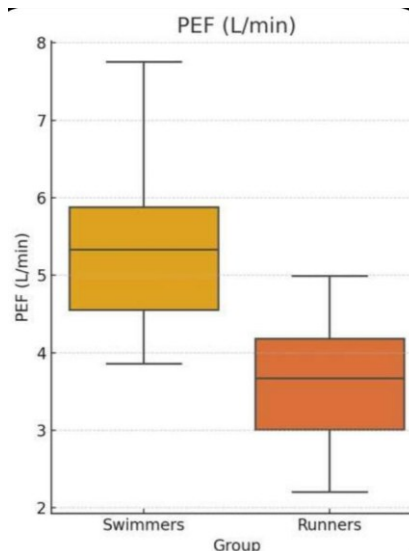


Fig.3 The comparison of PEF between swimmers and runners.

B. Forced Expiratory Volume in 1 Second (FEV1)

Fig. 2 Swimmers exhibit elevated FEV1 values, indicating a greater volume of air exhaled in the first second, suggestive of stronger and more efficient respiratory musculature.

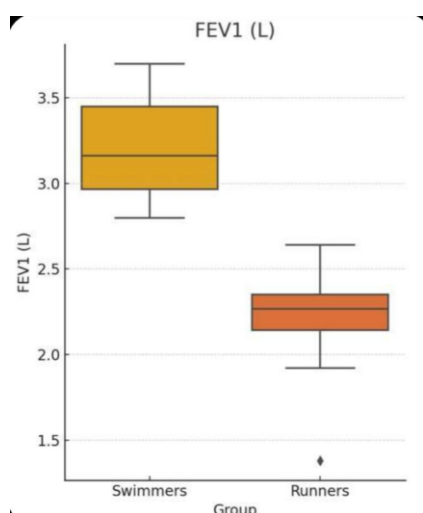


Fig. 2 The comparison of FEV1 between swimmers and runners.

C. Peak Expiratory Force (PEF)

Fig. 3 Swimmers demonstrate significantly higher Peak Expiratory Flow (PEF), reflecting enhanced ability to expel air rapidly, likely a result of breath-hold and water resistance training adaptations.

IV. CONCLUSIONS

Swimmers demonstrated significantly greater pulmonary function than runners, with FVC, FEV1, and PEF all showing large effect sizes. These findings highlight sport-specific respiratory adaptations and suggest breath-controlled, resistance-based training can enhance lung capacity, potentially improving endurance outcomes across athletic disciplines.

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The Relationship Between Mental Health and Athletes' Readiness After ACL Injuries Among Football Players

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Keywords: Mental health, ACL injuries, Football athletes, Rehabilitation, Depression, Anxiety, Stress

I. INTRODUCTION

ACL injuries are prevalent in football due to high-impact movements and sudden directional changes, often requiring surgery and extended rehabilitation [1][2]. These injuries frequently trigger psychological issues such as depression, anxiety, and fear of re-injury [3]. This study investigates mental health status during ACL rehabilitation and examines the relationship between psychological symptoms and athletes' readiness to return to sport.

II. METHODS

Data were collected through standardized mental health questionnaires from 35 football athletes aged 18–30 years who were undergoing rehabilitation for ACL injuries. Participants were recruited from both professional and collegiate teams. Descriptive statistics were applied to summarize levels of depression, anxiety, and stress. Additionally, Pearson correlation analysis was performed to examine the association between psychological symptoms and ACL-RSI scores, offering insight into how mental health status may relate to athletes' psychological readiness to return to sport.

III. RESULTS AND DISCUSSION

A. Mental Health Status and Support Gap During ACL Rehabilitation

As shown in Table 4.1, the mean depression score was 5.94 ($SD = 2.14$), with scores ranging from 3 to 11. Based on DASS-21 severity classifications, this reflects an overall mild level of depressive symptoms among participants, with no cases reaching severe levels. This aligns with previous research indicating that psychological distress, particularly mild depression, is commonly experienced during ACL rehabilitation [3].

Anxiety scores ranged from 1 to 8, with a mean of 4.11 ($SD = 1.92$), suggesting low to moderate anxiety. Stress scores ranged from 2 to 12, with a mean of 5.43 ($SD = 2.13$), indicating moderate stress levels. These patterns are consistent with past study, who noted that athletes often experience emotional strain during the lengthy and uncertain recovery period from ACL injuries [2][3].

For the ACL-RSI score, which measures psychological readiness to return to sport, participants scored between 39 and

112 out of a possible 120, with a mean of 72.74 ($SD = 17.70$). This suggests a moderate to high level of confidence, although the wide range reflects notable individual differences. Some athletes were highly confident in returning, while others remained psychologically hesitant—often linked to fear of re-injury and self-doubt [1].

TABLE I
DESCRIPTIVE STATISTICS FOR DEPRESSION, ANXIETY, STRESS, AND ACL-RSI SCORE (N = 35)

	N	Minimum	Maximum	Mean	Std. Deviation
Depression	35	3	11	5.94	2.141
Anxiety	35	1	8	4.11	1.922
Stress	35	2	12	5.43	2.132
ACL-RSI score (0-120)	35	39	112	72.74	17.701

B. Relationship Between Recovery Duration and Mental Health

Correlation analysis revealed strong, positive relationships between depression and anxiety ($r = 0.609$, $p < 0.001$), and between depression and stress ($r = 0.701$, $p < 0.001$), while anxiety and stress were moderately correlated ($r = 0.526$, $p = 0.001$). These results suggest that psychological symptoms were closely linked, consistent with findings by [3], who reported high comorbidity of psychological distress during ACL recovery.

However, ACL-RSI confidence scores were not significantly correlated with depression ($r = -0.120$, $p = 0.493$), anxiety ($r = 0.085$, $p = 0.628$), or stress ($r = 0.128$, $p = 0.465$), indicating that psychological readiness to return to sport was not directly associated with mental health symptoms. This aligns with [2][3], who emphasized that return-to-sport confidence may involve other psychological and situational factors beyond general emotional distress.

TABLE II
PEARSON CORRELATIONS BETWEEN MENTAL HEALTH VARIABLES AND
ACL-RSI CONFIDENCE SCORES AMONG FOOTBALL ATHLETES

Variables	Depression	Anxiety	Stress	ACL-RSI Confidence Score
Depression	—			
Anxiety	0.61**	—		
Stress	0.70**	0.53**	—	
ACL-RSI Confidence Score	-0.12	0.09	0.13	—

** Correlation is significant at the 0.01 level (2-tailed).

IV. CONCLUSIONS

Depression, anxiety, and stress are commonly reported among football athletes recovering from ACL injuries; however, mental health support remains limited during rehabilitation [3]. In this study, no significant association was found between the duration of recovery and psychological outcomes, underscoring the need for early, individualized rehabilitation programs that integrate both physical and mental health components [2][3].

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Improving Swing Performance and Reducing Discomfort With Structured Warm-Ups in Golf

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Keywords: Golf warm-up, Swing performance, Injury prevention, Amateur golfers, TrackMan analysis

I. INTRODUCTION

Despite golf's widespread popularity, amateur players often overlook structured warm-up routines, potentially impairing swing performance and increasing injury risk. Existing studies rarely target amateur golfers or examine the long-term effects of warm-up practices. This study evaluates the biomechanical and preventive value of pre-play warm-ups in improving swing speed and reducing common injuries, aiming to inform evidence-based guidelines for safe and effective amateur golf practice.

II. METHODS

Eighteen amateur male golfers (ages 18–24, handicaps 18–24) were divided into warm-up and no warm-up groups. The warm-up group performed structured routines including dynamic stretches and golf-specific movements over four weeks. Swing speed was measured using the Trackman System across 20 full swings per participant. Injury risk was assessed via self-reported pain scales, particularly lower back discomfort, before and after swing sessions. Comparative data were analyzed to evaluate performance and injury outcomes.

III. RESULTS AND DISCUSSION

A. Impact of Warm-Up on Swing Speed Improvement

The Warm-Up group showed a statistically significant 5.4 mph improvement in average swing speed ($p < 0.001$, $d = -2.48$), highlighting the strong positive impact of structured warm-ups on swing performance. Similarly, [1] highlighted that sport-specific warm-ups improve the neuromuscular readiness required for explosive movements such as the golf swing. This underscores the biomechanical advantages of dynamic, golf-specific movement preparation among amateur players.

TABLE I

SWING PERFORMANCE COMPARISON (WARM-UP VS NO WARM-UP GROUP)

Variable	Group	n	Mean	Median	SD	Shapiro-Wilk W	p-value
Pre Swing Speed (mph)	No Warm-Up	9	80.5	80.3	1.24	0.922	.408
	Warm-Up	9	80.7	81.3	1.42	0.876	.141
Post Swing Speed (mph)	No Warm-Up	9	83.0	84.5	3.80	0.802	.022*
	Warm-Up	9	86.1	87.1	2.35	0.685	< .001**
Before Swing Pain (1–10)	No Warm-Up	9	1.00	1.00	0.00	–	–
	Warm-Up	9	1.00	1.00	0.00	–	–
After Swing Pain (1–10)	No Warm-Up	9	6.89	7.00	1.27	0.948	.663
	Warm-Up	9	1.89	2.00	0.78	0.838	.055

B. Performance Differences Between Warm-Up and No Warm-Up Groups

The Warm-Up group achieved faster (86.1 mph vs. 83.0 mph) and more consistent swing speeds ($SD = 2.35$ vs. 3.80), with a statistically significant between-group difference ($p = 0.022$, $d = -1.22$). This supports the findings of [2], who emphasized that structured warm-up protocols improve movement efficiency and reduce performance variability. [3] also observed that athletes engaging in pre-performance routines exhibit greater motor control and consistency. These results confirm that warm-ups enhance not only performance but also the reliability of amateur golfers' swing execution. Additionally, the Warm-Up group reported significantly less post-swing pain (1.89 vs. 6.89), highlighting the protective effect of warm-ups in reducing injury risk. These findings align with previous studies indicating that dynamic, golf-specific warm-ups improve performance [1][4][5].

C. Practical Warm-Up Recommendations for Amateur Golfers

Dynamic, golf-specific warm-up elements, particularly rotational movements and pre-swing drills, were highly effective and well received. Given their simplicity, short duration, and clear benefits, they are easily integrated into amateur golf routines. These findings support [4], who reported that simple warm-up interventions can lead to measurable performance gains and improved safety. Coaches should standardize such warm-ups to boost both safety and performance.

IV. CONCLUSIONS

Structured, golf-specific warm-up routines significantly enhance swing speed, and reduce lower back discomfort among amateur golfers. These findings support implementing short, dynamic warm-ups into regular practice to boost performance and safety. Coaches and players alike can benefit from these evidence-based recommendations to optimize training effectiveness.

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The Acute Effect of Jump Rope and Plyometric Jump Training on Explosive Power in Swimmers

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Keywords: Plyometric training, Jump rope training, Explosive power, Swimmers, Vertical jump, Standing broad jump, Acute effect

I. INTRODUCTION

The present study explores the acute effects of plyometric jump training and jumps rope training on the explosive power of elite swimmers. Swimming, known for its mental and physical benefits, including stress reduction and mood improvement [1]. Requires high muscle engagement and coordination. Consequently, training regimens must evolve to address these biomechanical needs [2].

II. METHODS

This study investigates the acute effects of plyometric jump training and jumps rope exercises on explosive power in swimmers. A crossover research design utilizing pre- and post-test measurements was employed. Thirty swimmers from Supersharkz Club were divided into two groups: one performing plyometric jump training and the other engaging in jump rope exercises. Baseline explosive power was assessed using vertical jump tests and standing broad jumps. Post-intervention measurements were then compared to evaluate the effectiveness of both training protocols.

III. RESULTS AND DISCUSSION

A. The Effect of Plyometric Training on Explosive Power in Vertical Jump Tests

The data indicated a significant increase in the vertical jump performance post-training, with the mean score rising from 30.43 ± 8.91 cm to 33.50 ± 8.40 cm, confirming that plyometric training enhances vertical jump explosive power. A paired-samples t-test demonstrated a statistically significant difference ($p < 0.001$), with a moderate effect size (*Cohen's d* = 0.36). This study aligns with previous research examining the impact of plyometric exercises on vertical jump performance, specifically in volleyball players.[3] identified a significant relationship between plyometric training and improved vertical jump performance,

B. The Effect of Plyometric Training on Explosive Power in Standing Broad Jump Tests

The data indicated pre-test mean score at 1.25 ± 0.13 m and the post-test mean score at 1.37 ± 0.198 m. This increase of 0.12 meters was statistically significant ($p < 0.001$) and suggests that plyometric training substantially improves explosive power in the standing broad jump. *Cohen's d* value of 0.69 indicates a medium to large effect size, demonstrating

that plyometric training notably enhances standing broad jump performance. The results of this study are consistent with previous research, such as an investigation on the effects of plyometric exercise on jump performance. Basumatary's study demonstrated that plyometric training led to significant improvements in all measured variables, including the standing broad jump [4].

C. The Effect of Jump Rope Training on Explosive Power in Vertical Jump Tests

The data indicated pre-test results at 30.10 ± 8.84 cm and post-test results at 32.87 ± 8.73 cm. The increase of 2.78 cm in vertical jump height was statistically significant ($p < 0.001$). The results indicate that jump rope training positively impacts vertical jump performance, with a small to medium effect size (*Cohen's d* = 0.282). Found that jump rope and traditional protocols significantly ($p < 0.001$) boosted peak power and jump height for the Countermovement Jump and Drop Jump, demonstrating the positive influence of jump rope exercises on athletes' explosive power.[5]

D. The Effect of Jump Rope Training on Explosive Power in The Standing Broad Jump Test

The data indicated the mean score at 1.259 ± 0.131 and the post-test mean score at 1.373 ± 0.194 . The change of 0.11 meters was statistically significant ($p < 0.001$), suggesting that jump rope training enhances standing broad jump explosive power. The medium effect size (*Cohen's d* = 0.68). Previous research supported our findings, revealing significant statistical differences in physical performance indicators such as power and strength following jump rope training [6].

E. To Compare the Effects of Plyometric and Jump Rope Training on Vertical Jump Performance

The results revealed that both training methods resulted in increases in vertical jump height, but the plyometric group showed a slightly greater improvement (mean change of 3.08 cm) compared to the jump rope group (mean change of 2.78 cm). The plyometric group mean score was 3.0783 ± 1.9894 , while the jump rope mean score was 2.7798 ± 1.6093 . However, the difference was not statistically significant ($p > 0.001$), indicating that both plyometric and jump rope training may have similar effects on vertical jump performance. The small effect size (*Cohen's d* = 0.165). These findings align

with previous studies on junior boxers, the similarity in characteristics between jump rope and plyometric training routines may explain the lack of substantial variations in performance outcomes [7].

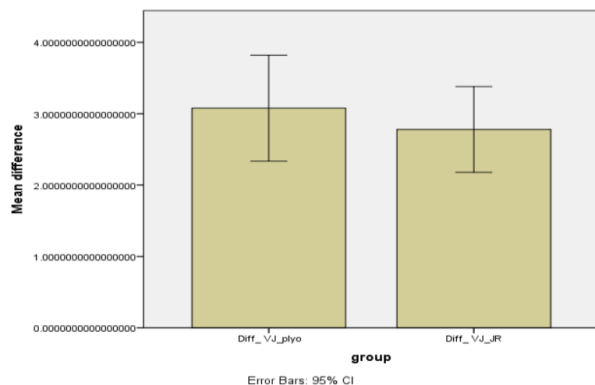


Fig. 1 Comparison of the effects of plyometric and jump rope training on vertical jump performance.

F. To Compare the Effects of Plyometric and Jump Rope Training on Standing Broad Jump Performance

The results showed that both the plyometric and jump rope groups experienced similar improvements in standing broad jump performance. The plyometric group mean score was 0.1160 ± 1.0378 , while the jump rope mean score was 0.1137 ± 0.0999 , with the plyometric group showing a mean change

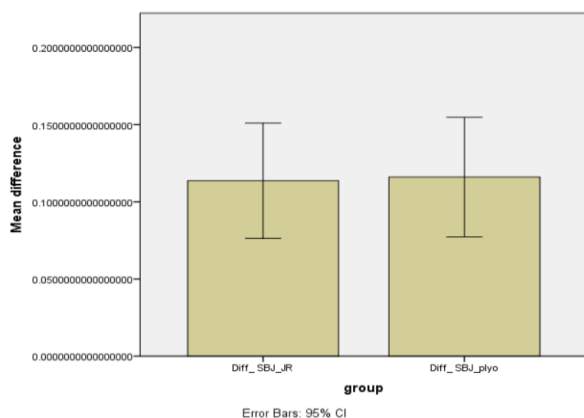


Fig. 2 Comparison of the effects of plyometric and jump rope training on standing broad jump performance.

of 0.12 m and the jump rope group showing a mean change of 0.11 m. Statistical analysis ($p > 0.001$) confirmed that there was no significant difference between the two groups. The effect size (Cohen's $d = 0.003$). These findings align with previous studies, which found that plyometric or jump rope

training both training methods had comparable effects, suggesting their similar effectiveness in enhancing explosive power in swimmers.[7]

IV. CONCLUSIONS

The study concluded that both plyometric jump and jump rope training significantly improve explosive power in swimmers, particularly in vertical and standing broad jump tests. While plyometric training showed slightly larger improvements, both training methods had comparable effects, suggesting their similar effectiveness in enhancing explosive power in swimmers.

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Comparative Analysis of Playing Patterns Between Top and Bottom-Ranked Teams in the FIFA Futsal World Cup 2024

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Keywords: Tactical efficiency, Futsal performance analysis, Defensive strategies, FIFA Futsal World Cup 2024, Notational analysis

I. INTRODUCTION

This study investigates and compares the tactical patterns and performance indicators of the top three and bottom three teams in the FIFA Futsal World Cup 2024 [1]. While much research has focused on isolated metrics or overall match outcomes, there remains a gap in tier-based comparative analysis that integrates multiple performance dimensions. To address this, the study examines key performance indicators (KPIs) such as scoring efficiency, defensive organization, pressing intensity, and team movement patterns. Understanding these variables is essential for coaches, analysts, and practitioners aiming to identify the strategic components that differentiate successful teams from underperforming ones. By situating the analysis within a single tournament framework, this research ensures consistency in environmental and competitive conditions, enhancing the validity of the findings. The insights derived can inform training methodologies, match preparation, and long-term tactical planning, ultimately contributing to performance optimization in elite futsal competitions [2].

II. METHODS

This study employed a causal-comparative research design to analyze the tactical patterns and performance differences between the top three and bottom three ranked teams in the FIFA Futsal World Cup 2024. A total of 29 official matches involving these six teams were selected for analysis, ensuring consistency in competition level and contextual conditions. Match footage was obtained from official FIFA broadcasts, while supplementary data, such as player statistics and event timelines, were sourced from the FIFA official match database. Tactical and performance indicators were analyzed using Nacsport performance analysis software, allowing for frame-by-frame coding and categorization of key performance indicators (KPIs). The PIs included passing styles (short, long, and diagonal), tackles (successful and unsuccessful), and goals shot placement (directions). Reliability was calculated, achieving a reliability score of $r > 0.80$, and the coding error rate was maintained below 10%, meeting the standards for notational analysis in sports science. Descriptive statistics were used to summarize performance trends across both groups. To examine differences between the top-ranked and bottom-ranked teams, independent sample t-tests were conducted on each PI. The level of statistical significance was set at $p < 0.05$.

III. RESULTS AND DISCUSSION

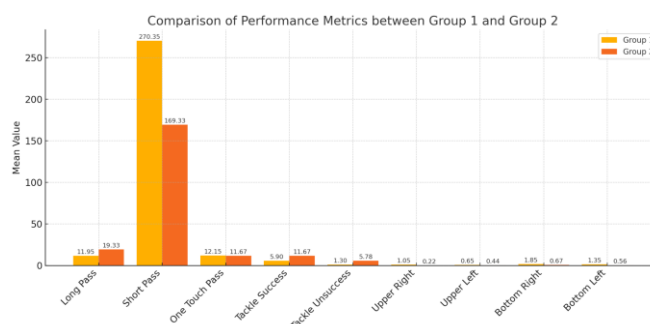


Fig.1 Comparison of performance indicators metrics between top and bottom teams.

Long pass group 2 performs more long passes, suggesting a preference for direct or wide gameplay. Notes as for the short pass, group 1 emphasizes possession and short passing play, indicating better ball control and teamwork. Success tackle indicating group 2 shows stronger defensive abilities, winning more tackles but also failing more often, possibly due to a more aggressive or risky defensive style. As for the shot placement, group 1 is more accurate and attempts more shots aimed at the upper right corner of the goal. For the upper left corner, both groups are similar in targeting this zone, with group 1 showing a slight edge, which can also be seen at the bottom right and bottom left shots.

TABLE I
INFERENTIAL ANALYSIS OF PERFORMANCE INDICATORS AMONG TOP AND BOTTOM TEAMS

		p
Short Pass	29.0	0.003
Tackle Success	32.5	0.007
Tackle Unsuccess	46.0	0.034
Shot Placement (Upper right)	47.5	0.030

According to Table 1, short pass ($p = 0.003$), group 1 had a significantly higher mean in short passes means group 1 likely uses a possession-based playing style, emphasizing ball control and teamwork. This could be encouraged for teams

aiming to dominate possession and slow-paced build-up. Tackle success ($p = 0.007$) was noted to have group 2 with a higher mean value, which demonstrates better defensive effectiveness. These players may have better timing and technique in dispossessing opponents, or they focus more on defense. Group 2 also noted to have higher unsuccessful tackles ($p = 0.034$). Although more successful, their aggressive defense also leads to more failed attempts. This shows a high-risk, high-reward defensive style, which can be refined by working on timing and positioning. As for the shot placement, the upper right corner ($p = 0.030$), group 1 scored more in this zone. Indicating they may have better shot accuracy or training focused on goal placement. This precision can be critical for breaking strong defenses, and it might be a strength to further develop. Other than these, no significant differences were found between teams.

A. Tactical Scoring and Defensive Efficiency

The analysis showed that top-performing futsal teams used significantly more short passes than lower-ranked teams ($p = 0.003$), highlighting a tactical focus on maintaining possession and smooth transitions. In futsal's fast-paced, small-court environment, short passes help control the game's tempo, support structured build-up, and reduce turnover risks. This reflects strong team coordination and decision-making under pressure. Long passes and one-touch plays did not differ significantly, suggesting they are used more situationally rather than as a consistent tactic. In terms of shooting, top teams showed higher accuracy, especially when targeting the upper and bottom right corners of the goal. This indicates better shot selection and execution, possibly due to focused training and awareness of goalkeeper positioning. Overall, superior passing and shooting efficiency appear to be key factors that separate elite teams from others.

B. Defensive Strategy Evaluation

The analysis showed that winning teams do show high tackle success rates ($p = 0.007$) and fewer failed attempts, indicating strong defensive organization, timing, and teamwork. In high-level futsal, where space is tight, effective tackling relies on coordinated pressure and positional discipline, allowing teams to win the ball without exposing defensive gaps. This ability to regain possession and transition quickly is vital for success. In contrast, lower-ranked teams had more unsuccessful tackles ($p = 0.034$), pointing to issues in timing, positioning, or technique. They also conceded more goals in the upper right quadrant ($p = 0.030$), suggesting

weaknesses in defensive coverage and goalkeeper positioning. These patterns reflect a lack of cohesion and pressure management, making them more vulnerable during transitions and under attack.

IV. CONCLUSIONS

The comparative analysis revealed that top-ranked teams in the FIFA Futsal World Cup 2024 excelled in short passing, defensive effectiveness, and shooting precision—key indicators of cohesive tactical execution. In contrast, bottom teams exhibited defensive lapses, poor positional discipline, and less efficient offensive strategies, resulting in higher goal concessions. These findings emphasize that success in elite futsal is strongly influenced by an integrated approach to both offensive and defensive play.

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Effectiveness of Virtual or Augmented Reality Therapy in Improving Physical Functionality in Physical Rehabilitation: A Systematic Review

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Keywords: Virtual reality, Augmented reality, Physical functionality, Physical rehabilitation, Systematic review

I. INTRODUCTION

Virtual and augmented reality (VR/AR) technologies are emerging adjuncts in physiotherapy, promising immersive task-oriented practice that could accelerate functional recovery [1]. However, evidence remains fragmented: reviews typically separate VR from AR, focus on narrow conditions, and exclude many clinical populations [2]. This systematic review synthesizes and appraises all available VR/AR rehabilitation trials, maps their clinical applications, and examines the devices, dosages, and variables associated with superior physical functionality outcomes [3].

II. METHODS

With the assistance of a health sciences librarian [4], we searched the Web of Science, PubMed, Scopus, and OVID MEDLINE databases from their inception to January 10, 2025. Search blocks combined “virtual reality” OR “augmented reality” with physiotherapy/rehabilitation terms and randomized-controlled-trial filters. Forward- and backward-citation chasing of pertinent reviews captured additional records [5] on the same date.

We retained peer-reviewed RCTs enrolling ≥ 20 adults (≥ 18 y) with musculoskeletal or neurological functional deficits, comparing immersive or semi-immersive VR/AR-assisted physiotherapy plus standard care against dose-matched conventional therapy or sham digital exercise. Discrepancies were resolved through discussion or third-party adjudication; Cohen κ quantified agreement [6].

Methodological quality was assessed using the 11-item PEDro scale [7], and the risk of bias was evaluated using the Cochrane RoB 2 tool across five domains [8]. All trials were included, but sensitivity analyses excluded PEDro ≤ 3 or high-risk studies [9]. Pooled effects were calculated in Comprehensive Meta-Analysis v4 using Hedges g (continuous) or risk ratios (binary) [10]. Random-effects models were applied when $I^2 > 50\%$ [11]; subgroup analyses explored immersion level, diagnosis, and total VR/AR dose (< 8 h vs ≥ 8 h). Publication bias was assessed using funnel plots, Egger tests, and Duval–Tweedie trim-and-fill methods;

narrative synthesis was employed when pooling proved inappropriate [12].

III. RESULTS AND DISCUSSION

A. Evidence Synthesis & Appraisal

Twelve eligible RCTs (306 participants) show VR/AR-assisted physiotherapy yields moderate-to-large functional gains versus dose-matched conventional care (Hedges g 0.45–1.0, ≈ 10 –20 % extra improvement). Trial quality was acceptable: eight high-PEDro, four moderate; RoB-2 flagged only minor concerns. Overall, evidence supports VR/AR as an efficacious rehabilitation adjunct across heterogeneous musculoskeletal and neurological conditions [2]. Each of the subject characteristics for this study is shown in Table 1.

TABLE I
SUBJECT CHARACTERISTICS

Characteristics	Mean	Median	Min	Max
Age (yrs)	60.5	59.7	47.4	72.9
Height (cm)	162.4	164.8	150.5	179.7
Weight (kg)	63.6	64.6	57.5	69.7
BMI (kg/m ²)	24.8	24.9	21.6	27.4

B. Clinical Fields & Populations

Most studies targeted stroke recovery, geriatric fall-prevention, or Parkinsonian gait, representing 75 % of trials. Participants averaged 60 years (47–73), with balanced sex distribution and stable chronic disease stages. Semi-immersive camera systems led device use, followed by head-mounted displays; AR via tablets or smart-glasses appeared sporadically, indicating early adoption curves in clinical practice.

C. Effective Devices, Dose & Features

Greatest benefits emerged from Kinect balance games and EMG-triggered AR-FES delivered 20–45 min, 3–5 times weekly for ≥ 4 –8 weeks (≥ 8 h total). Effective programmes featured high-repetition [13], task-specific stepping or reaching, real-time multimodal feedback, progressive

difficulty, and simple gamification, all driving adherence and enhancing neuroplasticity-linked functional recovery. Figure 1 shows the study design distribution for included studies, while Figure 2 shows the country distribution.

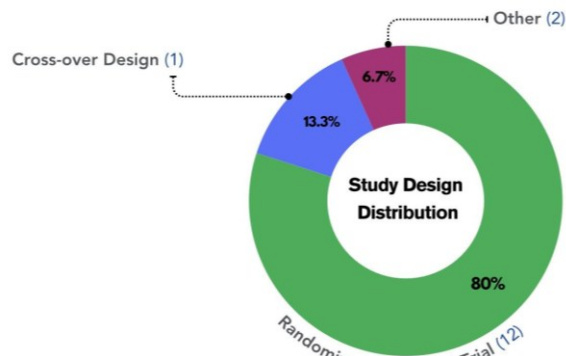


Fig. 1 A donut chart in distinct grey shades that separates Randomized Controlled Trial, Cross-over Design, and Other designs.



Fig. 2 Map showing the geographic origin of the 11 studies included in this systematic review. Colour intensity reflects the number of studies per country (scale 1–11).

IV. CONCLUSIONS

VR/AR-integrated physiotherapy confers moderate-to-large functional benefits across stroke, balance, and Parkinson's cohorts [14], driven by semi-immersive cameras and EMG-linked AR protocols at cumulative doses of ≥ 8 hours. High methodological quality and low bias support effectiveness, yet limited sample sizes [15] and sparse AR trials warrant larger, condition-specific RCTs to confirm durability.

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Effect of FIFA 11+ Level 3 on Muscular Strength and Muscular Endurance Among Young Adult Footballers

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Keywords: FIFA 11+, Youth football, Warm-up intervention, Muscular strength, Muscular endurance

I. INTRODUCTION

In recent years, injury prevention and performance enhancement have become key areas of focus in sports science, particularly in football. One widely adopted warm-up programme is the FIFA 11+, developed by the FIFA Medical Assessment and Research Centre (F-MARC), which aims to reduce injury risk and improve physical readiness among players [3]. While the programme is primarily known for its preventive benefits, emerging research suggests it may also have a positive impact on various physical performance indicators [2]. Therefore, this study aims to investigate the effectiveness of the FIFA 11+ warm-up programme in enhancing muscular strength and muscular endurance among youth football players.

II. METHODS

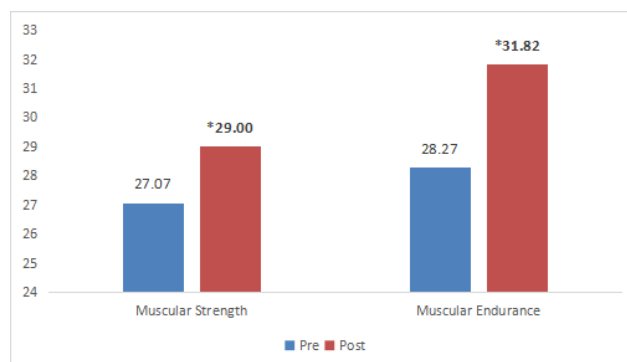
A total of 20 male development football players aged 18 were assigned to either the FIFA 11+ Level 3 warm-up group or the traditional warm-up group. Muscular strength was measured using the Handgrip Strength Test and muscular endurance using the One-Minute Squat Test, both assessed immediately before and after the warm-up. The FIFA 11+ group performed the structured FIFA warm-up while the traditional group completed a standard routine. Data were analyzed using paired sample t-tests for within-group changes and independent sample t-tests for between-group comparisons.

III. RESULTS AND DISCUSSION

A. Effect of Traditional Warm Up and Level 3 FIFA 11+ Warm Up on Muscular Strength and Endurance

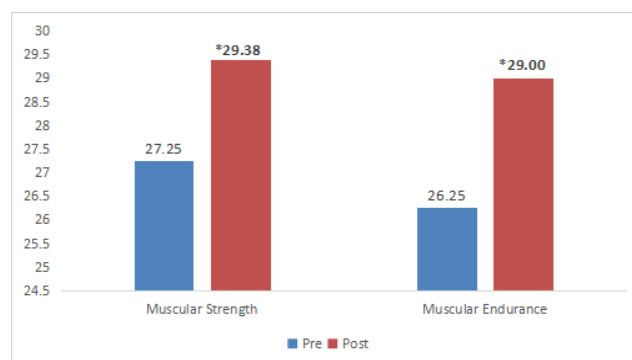
Paired sample t-test analysis revealed statistically significant improvements in both muscular strength and muscular endurance for participants in both intervention groups. In the FIFA 11+ Level 3 warm-up group, muscular strength increased from 27.07 ± 3.80 kg to 29.00 ± 3.55 kg ($p < 0.05$), while muscular endurance improved from 28.27 ± 3.80 to 31.82 ± 3.80 repetitions ($p < 0.05$). Similarly, the traditional warm-up group also showed significant gains. Muscular strength increased from 27.25 ± 3.52 kg to 29.38 ± 3.65 kg ($p < 0.05$), and muscular endurance improved from 26.25 ± 3.91 to 29.00 ± 3.10 repetitions ($p < 0.05$). These

findings indicate that both warm-up protocols effectively enhanced muscular strength and muscular endurance among development players.



* $p < 0.05$

Fig. 1 Effect of Level 3 FIFA 11+ warm-up on muscular strength and endurance.



* $p < 0.05$

Fig. 2 Effect of traditional warm-up on muscular Strength and endurance.

B. Comparison Between FIFA 11+ Level 3 and Traditional Warm-Up

Independent samples t-test results indicated no statistically significant differences between the FIFA 11+ Level 3 group and the traditional warm-up group in both muscular strength and muscular endurance ($p > 0.05$). Despite the lack of

statistical significance, descriptive data revealed a trend toward greater improvements in muscular endurance within the FIFA 11+ group compared to the traditional warm-up group. In contrast, gains in muscular strength appeared comparable across both groups.

TABLE I
COMPARISON BETWEEN FIFA 11+ AND TRADITIONAL WARM UP IN
MUSCULAR STRENGTH

Variables	Group	Mean (SD)	t	df	Sign. (2-tailed)
Muscular Endurance	FIFA11+ Level 3	-3.90±2.13	2.56	18	0.020
	Traditional Warm up	-3.80±3.55			
Muscular Strength	FIFA11+ Level 3	-4.25±3.96	2.14	18	0.046
	Traditional Warm up	-0.75±4.74			

* $p < 0.05$

CONCLUSIONS

The findings of this study indicate that the FIFA 11+ Level 3 warm-up program produced improvements in muscular strength and endurance among young adult football players. However, these improvements were not significantly greater than those observed in the traditional warm-up group, suggesting that while Level 3 FIFA 11+ enhances physical

readiness, it may not outperform traditional warm-up routines in short-term application. This limited difference may be due to the nature of FIFA 11+ as a preventive warm-up protocol rather than a targeted performance-training program. Although Level 3 implies advanced exercises designed to improve balance and neuromuscular control, the duration and frequency applied in this study might not have been sufficient to achieve significant adaptations [2]. Prior research highlights that consistent and progressive training interventions are often required for substantial improvements in strength and endurance [3]. Nevertheless, FIFA 11+ remains a practical and evidence-based option for improving general preparedness and reducing injury risks during football participation [1].

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Acute Effect of a Combined Warm-up and Kinesio Tape Application for Muscle Flexibility Among Amateur Badminton Players

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Keywords: Muscle flexibility, Dynamic warm-up, Specific warm-up, Kinesio tape, Badminton

I. INTRODUCTION

Flexibility is one of the critical factors in sports performance, particularly in dynamic and multidirectional sports such as badminton. Increased flexibility affects to increases the range of motion (ROM), reduces muscle stiffness, and avoids injury through sudden, repetitive movements [1]. Among these various aids used to enhance flexibility, warm-up exercises and Kinesio Taping (KT) are globally used by athletes and sports professionals.

Dynamic and sport-specific warm-up has been known to increase muscle temperature, enhance neuromuscular efficiency, and enhance temporary joint mobility [2]. Specifically, dynamic warm-up exercises entail active mobilization of the muscle that is similar to sport-specific actions, which have been known to contribute greater muscle flexibility improvements than static stretching [2]. This is particularly so in badminton, where agility and quick movement are paramount.

Kinesio Tape, however, is claimed to increase blood flow, proprioception, and facilitate activation of the muscle, thus assisting with improved functional performance and range of motion [3]. KT interventions can prevent muscle soreness, enhance joint mobility, and enhance general physical preparedness when applied in the correct manner [3]. While KT alone has been unclear as a record highlighting improvement in flexibility, its application with warm-up exercises may record greater enhancements by maintaining muscle readiness and proprioceptive stimulation throughout exercise [4].

The combined effect of KT and warm-up on muscle flexibility remains unclear. This research investigates their combined effect of specific and dynamic warm-up on muscle flexibility among amateur badminton players to optimize pre-performance strategies.

II. METHODS

A. Subjects

The study involved twelve amateur badminton players ($N = 12$) from UiTM and the badminton community around Seremban 2. Participants were randomly assigned to two intervention groups. The experimental groups: Dynamic warm-up with KT (Dwu) and specific warm-up with KT (Swu). Both groups will perform the research procedure on

separate days. Before participation, written informed consent was obtained from all participants, ensuring voluntary involvement in the study. The inclusion criteria are that all participants must have engaged in badminton activity at least twice a week and absence of upper and lower extremities injuries in the six months preceding the study.

B. Instrumentation

Muscle flexibility was assessed by the sit and reach test procedure, a validated tool for measuring hamstring and lower back flexibility [1]. Kinesio Tape (KT) was applied to the shoulder following the standardized taping method suggested by the physiotherapist regarding the KT protocols.

C. Procedure

Participants were randomly assigned to either a dynamic or specific warm-up group. Both groups received a Kinesio Tape (KT) that was applied to the shoulder region following standardized taping techniques and needed to complete a Sit and Reach Test procedure for pre-muscle flexibility measurement, followed by the warm-up routine based on their own respective group. After completing the assigned test and warm-up, participants engaged in a brief match simulation to maintain elevated muscle temperature. The post-test flexibility was reassessed using the sit and reach test.

D. Statistical Analysis

A quasi-experimental design was used to compare the effects of a combined warm-up and kinesio tape application for muscle flexibility among amateur badminton players from the UiTM student and the badminton community around Seremban 2. Performance data were collected using the sit and reach test.

Before analysis, the dataset was screened for missing or inconsistent values, and basic data cleaning procedures were performed. Statistical analysis was conducted using Jamovi 2.3.28. Within-group changes in Sit-and-Reach scores were examined with paired-samples t-tests to compare different changes of pre- and post-test in the group, and the between-group post-test differences were assessed with independent-samples t-tests to compare the differences in changes between groups.

III. RESULTS

The results revealed a significant effect of both the pre- and post-warm-up intervention on muscle flexibility. According to Table 1, the dynamic warm-up group showed a 4.2 cm improvement in flexibility ($M=37.7$ to $M=41.9$), indicating a statistically significant effect ($p=0.015$). The combination of dynamic warm-up and kinesio tape likely enhanced muscle temperature, proprioception, and elasticity.

Furthermore, Table 2 demonstrated a slightly greater gain of 4.4 cm ($M=41.9$ to $M=46.3$), with very strong statistical significance ($p<0.001$). This suggests that targeted, sport-specific exercises, when combined with kinesio tape, more effectively activate key muscle groups, enhancing flexibility and neuromuscular readiness relevant to badminton performance.

In contrast, Table 3 revealed that the dynamic warm-up group had a higher post-test mean score ($M=46.3$) than the specific group ($M=41.9$). However, the specific group had much higher variability ($SD=6.28$), while the dynamic group was more consistent ($SD=2.36$). Although the specific group outperformed the dynamic group slightly, the difference ($p=0.135$) was not statistically significant revealed that the study failed to reject the null hypothesis; the difference in post-test flexibility between the two warm-up types is not large enough to be considered statistically meaningful.

TABLE I

PRE AND POST TEST MUSCLE FLEXIBILITY SCORES FOR THE DYNAMIC WARM-UP GROUP

Variables	N	Mean	SD	p value
Pre-Muscle Flexibility	6	37.7	6.44	0.015
Post Muscle Flexibility	6	41.9	6.28	

TABLE II

PRE AND POST TEST MUSCLE FLEXIBILITY SCORES FOR THE STATIC WARM-UP GROUP

Variables	N	Mean	SD	p value
Pre-Muscle Flexibility	6	41.9	2.13	0.001
Post Muscle Flexibility	6	46.3	2.36	

TABLE III

COMPARISON BETWEEN THE DYNAMIC AND SPECIFIC WARM-UP GROUPS

	Group	N	Mean	SD	p value
Post Muscle Flexibility	Dynamic	6	46.3	2.36	0.0135
	Specific	6	41.9	6.28	

IV. DISCUSSION

This study revealed that both dynamic and specific warm-ups combined with kinesio tape significantly improved muscle flexibility, with specific warm-up showing slightly greater gains. The improvement observed in the dynamic warm-up group may be explained by increased muscle temperature and blood flow, which enhance elasticity and joint range of motion [5]. When combined with kinesio tape, which stimulates skin receptors and improves muscle tone and elasticity [6], the result is a synergistic effect promoting flexibility.

The specific warm-up group achieved a larger improvement, consistent with findings that task-specific warm-ups activate neuromuscular pathways more effectively [1]. Kinesio taping may further amplify this response by facilitating targeted muscle engagement and reducing movement resistance [7]. Although the between-group difference was not statistically significant, the practical gains suggest that warm-ups tailored to sport-specific demands can enhance the flexibility effects of kinesio taping.

V. CONCLUSION

Both dynamic and specific warm-ups combined with kinesio tape significantly improved muscle flexibility in amateur badminton players. Although specific warm-up showed slightly greater gains, the difference was not statistically significant. These findings support kinesio taping and warm-up routines as effective, low-cost strategies for flexibility enhancement before play.

V. ACKNOWLEDGEMENT

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Comparison Between Top 3 and Bottom 3 Teams in Euro 2024

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Keywords: Euro 2024, Possession, Passing accuracy, Team performance, Statistical analysis

I. INTRODUCTION

Success in elite football depends on tactical adaptability, technical precision, and physical output. [1] and [2] highlighted these factors as key performance indicators. [3] emphasized the importance of balancing possession and direct play, while [4] found that efficient use of movement and execution time contributes to better outcomes. Rising performance standards [5] and attacking strategies [6] further shape competitive results. Therefore, the objective of this study is to compare the possession, passing accuracy, and goals scored between the top 3 and bottom 3 teams in UEFA Euro 2024, aiming to identify key gameplay differences that influence success.

II. METHODS

Teams were selected based on the final Euro 2024 ranking table from the official UEFA website, identifying the top three and bottom three. Gameplay statistics such as possession, passing accuracy, and goals scored data were downloaded from the official UEFA website [7]. The secondary data for final team rankings and match statistics for Euro 2024 were extracted from UEFA's official website, widely recognized as an authoritative source in academic research due to its role as the governing body of European football. Data were organized and processed using Microsoft Excel, while comparative statistical analyses were conducted using Jamovi to identify performance differences between the selected teams. Descriptive statistics, including mean and standard deviation, were calculated for each variable. The Shapiro–Wilk test was used to assess normality. An independent sample t-test was used to compare the two groups. Statistical significance was set at $p < 0.05$, and effect sizes were reported to determine the magnitude and relevance of any differences observed.

III. RESULTS AND DISCUSSION

A. Possession

Top-performing teams averaged 55.56% possession, while bottom teams averaged 41.78%, showing a mean difference of 13.78%, which was statistically significant ($p = 0.004$). This indicates that possession is a critical differentiator between successful and unsuccessful teams in Euro 2024. This finding aligns with [3], who emphasized that possession-based strategies provide better control over the tempo and territory of the match, allowing teams to dictate play and reduce opposition threats. [1] also reported that successful teams in Brazil exhibited higher possession, which correlated with tactical adaptability and sustained performance throughout matches.

B. Passing Accuracy

Top teams recorded an average passing accuracy of 89.33%, compared to 82.56% for bottom teams. The difference was statistically significant ($p = 0.001$), with a very large effect size (*Cohen's d* = 2.358), indicating that elite teams demonstrate greater technical precision and passing discipline. This outcome supports findings by [4], who found that successful World Cup teams displayed superior passing sequences and time-efficient execution, especially during transitional phases. Precise passing contributes to better build-up play, reduces turnover risk, and enables greater control of match tempo.

C. Goal Scored

Top teams scored a total of 13 goals, compared to 8 goals by bottom teams. Although top teams outperformed in scoring, the difference was not statistically significant ($p = 0.211$), with a moderate effect size (*Cohen's d* = 0.614). This result suggests that goal output, while important, might not fully differentiate team success in small samples or short tournaments like the Euro 2024 group stages. Scoring depends heavily on the quality of chances, finishing efficiency, and situational factors like opponent defense or game tempo. This aligns with [2], who highlighted that scoring patterns can vary widely even among successful teams, depending on match context.

TABLE I
DESCRIPTIVE VALUES FOR PERFORMANCE INDICATORS

Indicator	Top Teams (M ± SD)	Bottom Teams (M ± SD)	t	d
Possession (%)	55.56 ± 9.15	41.78 ± 8.51	3.31	1.559
Goals Scored	1.44 ± 1.13	0.89 ± 0.60	1.30	0.614
Passing Accuracy (%)	89.33 ± 2.74	82.56 ± 3.01	5.00	2.358

IV. CONCLUSIONS

Top-performing teams in Euro 2024 demonstrated significantly superior possession and passing accuracy compared to bottom teams. While goal differences were not statistically significant, moderate practical effects suggest meaningful performance gaps. These findings highlight technical execution and ball control as pivotal elements in competitive football success at the elite international level. Future studies should widen the sample across multiple competitions, embed advanced metrics such as expected-goals, packing rates, and possession-value models, contextualise possession and passing by match state, opponent

calibre, and game phase, and dissect position-specific and style-of-play variations to clarify how technical superiority translates into competitive advantage.

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Effects of Task Difficulty Manipulation and Feedback Frequency on Dart Accuracy in Young Adults

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Keywords: Motor Learning, Feedback Frequency, Task Difficulty, Dart Throwing, Young Adults

I. INTRODUCTION

Adapting task difficulty to the learner's ability is a key principle in motor learning. The Challenge Point Framework suggests that optimal learning occurs when task demands match skill level, with progressive difficulty shown to enhance skill acquisition and transfer more effectively than constant practice [1]. Previous research has shown that manipulating task difficulty is effective across a range of populations, such as children and college students, especially in tasks requiring precision. Additionally, feedback frequency is a critical factor, as excessive feedback can lead to dependency, whereas appropriately spaced feedback enhances learning and retention [2][3]. This study aims to examine how the manipulation of task difficulty and the variation in feedback frequency affect dart-throwing performance in young adults, using dart throwing as a representative precision-based motor task. Despite this, few studies have examined the combined effects of task difficulty and feedback frequency in accuracy-based tasks. Therefore, this study investigates the effects of manipulating task difficulty and feedback frequency on dart-throwing accuracy in young adults, to inform best practices for motor learning interventions.

II. METHODS

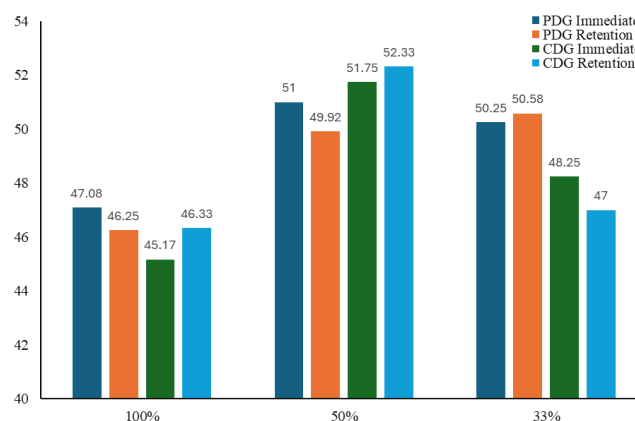
This study employed a randomized controlled design and was conducted at the Motor Learning Laboratory, Universiti Teknologi MARA. A total of 72 young adults were randomly assigned to one of six experimental groups receiving verbal external focus feedback under either constant difficulty (CDG) or progressive difficulty (PDG) conditions. Within each difficulty group, feedback was delivered at one of three frequencies: 100%, 50%, or 33%. Group allocation was balanced according to participants' baseline scores to ensure comparability in initial skill level. Throwing accuracy was assessed using a custom-designed dartboard modelled after an archery-style scoring system, ranging from 0 to 10 points. Each participant completed a pre-test consisting of nine dart throws, followed by 48 acquisition trials divided into six blocks of eight throws (6 blocks × 8 throws). Feedback was administered according to the specific frequency assigned to each group. Performance was further evaluated through a post-test of nine throws conducted immediately after the acquisition phase, and a delayed retention test administered 24 hours later, to assess learning retention under varied task difficulty and feedback frequency conditions.

III. RESULTS

A. Comparison Between Manipulating Task Difficulty and Feedback Frequency on Dart Throwing Accuracy

Participants receiving 50% feedback in the Constant Difficulty Group (CDG) showed the best immediate and long-term retention with a $mean + SD$ (51.75 ± 5.73), p value = 0.04, while excessive feedback caused dependency, and minimal feedback led to confusion. This supports using moderate feedback frequency to balance guidance and independent error correction in motor skill learning.

Although gradual task difficulty did not show clear improvements in this study, the Progressive Difficulty Group (PDG) achieved better delayed retention overall. This suggests that gradual increases in difficulty may support long-term learning effects. The PDG practiced at three distances, while the CDG trained at one, highlighting how varying complexity might benefit skill consolidation in precision tasks.



* $p < 0.05$

Fig. 1 Effects of manipulating task difficulty and feedback frequency on dart-throwing accuracy.

IV. CONCLUSIONS

Moderate external-focus feedback frequency enhances dart-throwing accuracy and retention among young adults, while gradual task difficulty may support long-term skill

learning. These findings highlight the importance of balancing feedback and task complexity to optimize motor performance. Coaches and trainers should carefully adjust these elements to improve precision-based sports training. Providing feedback too frequently (100%) may cause learners to depend on it, limiting their ability to detect and correct errors independently [4]. This supports findings that moderate feedback (50%) is optimal. Past studies suggest reduced feedback helps develop information-processing skills [3][5]. Gradual task difficulty also improved accuracy and consistency over time [6]. Retention trials show learners perform better when not over-reliant on constant feedback, explaining why 50% feedback frequency groups performed best overall. Although literature often highlights the advantages of progressive difficulty for promoting motor learning independence [1][7], the current findings suggest that under certain conditions, such as tasks with moderate complexity and high feedback frequency, a constant difficulty environment may better support skill stabilization and immediate performance gains

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Unravelling the Interplay Between Social Support and Recreational Sports Participation Among Academic Staff

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Keywords: Social support, Family support, Friend support, Recreational sports participation, Academic staff

I. INTRODUCTION

This study explores the link between social support (i.e., family, friends, and significant others) and recreational sports participation among academic staff at UiTM Seremban 3. Research on sports participation has focused on Western countries, and limited attention has been paid to the socio-cultural factors that affect sports engagement in Asian nations like Malaysia (1). Hence, the present study aims to address this gap by identifying social support levels, sports participation duration, and their interrelationship in the Malaysian academic context. Findings will contribute to and aim to inform targeted strategies to improve the wellness and foster a culture of active living among academic staff.

II. METHODS

A quantitative research design was employed to examine social support and recreational sports participation (RSP) among 57 academic staff at UiTM Seremban 3, Negeri Sembilan. Data were collected via an online survey distributed through Google Forms. The present study used the Multidimensional Scale of Perceived Social Support (MSPSS) [2] to measure the level of social support of the respondents, and the duration of RSP was assessed using the minutes per week respondents participated in RSP [3]. These instruments were used to measure the studied variables among the target population. Data were analyzed using SPSS software, employing descriptive statistics to summarize responses and Spearman correlation to examine relationships between social support and recreational sport participation.

III. RESULTS AND DISCUSSION

A. Level of Social Support

Academic staff reported a high level of social support, with a mean score near “strongly agree” on the MSPSS scale. Family support ranked highest among sources (6.05 ± 1.18). Variations in perceived support were observed based on age, gender, and faculty, indicating that demographic factors influence the extent and source of support available to staff.

B. Duration of Recreational Sports Participation

Only 40.4% of respondents reported regular engagement in recreational sports. On average, participants spent 125.87 minutes per week in such activities. Demographic factors such as gender and household income appeared to influence participation levels, suggesting that gender aspects and

lifestyle context shape sports activity behavior among academic staff.

B. Relationship Between Social Support and Recreational Sports Participation

A significant negative relationship was identified between social support and the amount of time spent playing recreational sports during the past week ($r = -0.468, p = 0.024, < 0.05$). This indicates that individuals who reported higher levels of social support tended to engage in less recreational sports activity. The correlation is moderate in strength, suggesting a meaningful but not strong relationship. It warrants further investigation to understand why more social support is linked with less recreational sports activity, as this may challenge the common assumptions.

IV. CONCLUSIONS

Social support plays a complex role in recreational sports participation among UiTM Seremban 3 academic staff. While overall support levels are high, participation remains less. The significant negative correlation may suggest differing motivational pathways. Context-sensitive strategies are needed to foster inclusive and sustained recreational sports activity within academic environments.

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Comparative Analysis of Punching and Blocking Techniques in Boxing Across Eight Weight Divisions

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Keywords: Boxing techniques, Weight class comparison, Defensive strategies, Punch frequency analysis, Premier boxing championship

I. INTRODUCTION

Boxing performance is intrinsically linked to an athlete's weight class, with variations in strength, speed, and endurance shaping both offensive and defensive capabilities. However, there remains a lack of research comparing the application of specific techniques, such as jabs, hooks, uppercuts, and defensive arm blocks, across different weight divisions. This study addresses that gap by analyzing how boxers deploy these techniques to influence match outcomes and adapt biomechanically and strategically based on body size. Previous biomechanical research has demonstrated that punch dynamics vary significantly by technique. For example, uppercuts and hooks produce greater shoulder, elbow, and wrist acceleration compared to jabs, highlighting the mechanical complexity of each punch type [1].

II. METHODS

This study analyzed the technical performance of sixteen professional boxers across eight distinct weight classes, selected based on their participation in official bouts within the Premier Boxing Championship (PBC). A total of one representative bout per boxer was included to ensure consistent comparative conditions. Data collection was conducted through hand-notational video analysis, using manual coding to record offensive and defensive techniques. Specifically, the frequency of three primary punching techniques, jab, hook, and uppercut, was recorded, along with defensive arm blocks in response to each punch type. For defensive actions, each instance of arm-based punch blocking (left or right) was registered based on the punch type it countered. Each technique was quantified per weight class to identify usage trends and frequency variations across different weight categories. To ensure accuracy and consistency, a test-retest reliability procedure was conducted, with intra-rater agreement maintained at $r > 0.80$. The percentage of coding errors was controlled and kept below 10%, following established standards in sports performance analysis.

III. RESULTS AND DISCUSSION

A. Describing Techniques Across Weight Classes

The analysis revealed distinctive technique usage patterns across weight classes. The frequency of block jab varied most significantly, ranging from just 3.0 occurrences in Featherweight bouts to 25.7 in Light Heavyweight, indicating

that larger boxers rely more heavily on this defensive tactic. Meanwhile, jabs were employed consistently across all divisions, reflecting their universal strategic importance in distance control and engagement setup [2]. Lighter weight classes, particularly lightweight and featherweight, favored offensive diversity, with higher usage rates of hooks, whereas heavyweight divisions saw few uppercuts, aligning with biomechanical analyses that show straight punches (jab and cross) deliver higher effective mass and thus greater force transfer efficiency [3]. These trends suggest that lighter boxers capitalize on agility for rapid combinations, while heavier fighters emphasize defensive organization and distance control, using straighter punches like jabs to manage space more effectively—a finding consistent with observed biomechanical differences in elite-level punch execution [4].

Figure 1 illustrates the average (mean) frequency of six selected technical actions of three offensive (jab, hook, uppercut) and three defensives (block jab, block hook, block uppercut) across eight professional boxing weight classes.

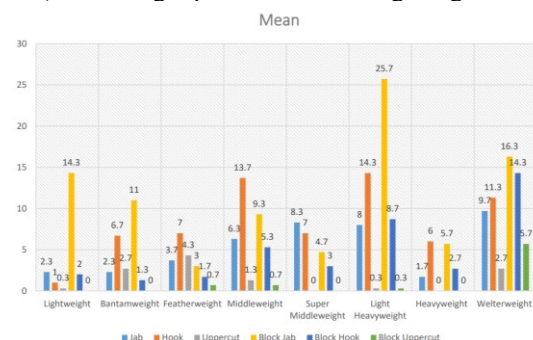


Fig. 1 Mean values of technical actions (Jab, Hook, Uppercut, Block Jab, Block Hook, and Block Uppercut) across eight boxing weight classes.

TABLE I
ONE-WAY ANOVA RESULTS COMPARING MEAN VALUES OF SIX
PERFORMANCE INDICATORS ACROSS EIGHT BOXING WEIGHT CLASSES

	F	df1	df2	p
Jab	3.78	7	16	< 0.01
Hook	3.71	7	16	0.059
Uppercut	3.74	7	16	0.029
Block Jab	3.83	7	16	< 0.01
Block Hook	3.77	7	16	<0.01
Block Uppercut	3.77	7	16	< 0.01

One-way ANOVA results testing differences in six performance indicators across eight weight classes. The post-hoc Tukey analyses revealed statistically significant differences in technique usage across weight classes, underscoring how tactical preferences and physiological attributes influence boxing performance. Notably, block-jab and block-uppercut frequencies differed markedly between lighter and heavier classes, with comparisons such as Bantamweight vs. Welterweight ($p < 0.001$) demonstrating heavier divisions' reliance on defensive blocking. This aligns with biomechanical evidence suggesting that heavier boxers, due to greater punching force and slower mobility, emphasize defensive organization [2][5]. Similarly, jab usage varied significantly between classes (e.g., Lightweight vs. Welterweight, $p = 0.003$), reinforcing the jab's role as a distance-controlling and foundational offensive tool. Biomechanically, jabs and crosses generate higher effective mass transfer, making them efficient choices for maintaining range [5]. Differences in hook usage and block-hook frequency was significant between middleweight and heavier categories highlight lighter fighters' preference for hooks, leveraging their agility and speed, while heavier fighters favor straighter, more controlled tactics. This remarkable shift in punch deployment reflects weight-related strategic adaptations where lighter boxers utilize dynamic combinations and heavier boxers prioritize controlled distance and defense. These findings mirror broader combat sport research that links physiological profiles to tactical execution [2], suggesting coaches tailor training to optimize technique selection by weight class. Lighter boxers should sharpen offensive drills featuring hooks and combinations, while heavier fighters may benefit from defensive block training and refined jab usage to capitalize on their biomechanical strengths.

IV. CONCLUSIONS

Technique usage in boxing is influenced by weight class, though not uniformly across all techniques. While the jab remained a consistent tool across divisions, significant differences were observed, particularly in block-related actions such as block-jab, block-hook, and block-uppercut,

between lighter and heavier classes. These findings suggest that defensive behaviors tend to increase with weight, likely due to differences in agility, force output, and tactical preference. Offensively, lighter boxers demonstrated a broader use of techniques like hooks and uppercuts, reflecting their reliance on speed and combination work. Overall, while some variations were statistically significant, others were more subtle, indicating that both physical and strategic factors play a role in shaping technique selection across weight categories.

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Gameplay Comparison Between Champions of Euro 2024 and Euro 2020

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Keywords: EURO 2020, EURO 2024, Tactical analysis, Defending patterns, Attacking strategies

I. INTRODUCTION

Comparative tactical analyses in professional football often emphasize specific seasons or competitions, offering only a fragmented understanding of long-term strategic developments [1]. Previous studies have highlighted how passing networks, defensive structures, and pressing behaviors evolve within domestic leagues [2]. However, there has been little comparative research into tactical differences between international champions over consecutive European Championships. This study fills that gap by analyzing integrated tactical and performance data to compare Italy (UEFA EURO 2020 champions) and Spain (UEFA EURO 2024 champions) defensive and attacking systems. This provides vital insights into how national teams adjust and develop their tactical identities in a variety of tournament scenarios and situations of competition.

II. METHODS

Teams were selected based on the final UEFA EURO 2020 and 2024 ranking tables, as published on the official UEFA website (UEFA, 2021; UEFA, 2024). Official match reports provided by UEFA served as the primary source of data, which included 13 key performance indicators related to both attacking and defensive aspects of the game. These indicators consisted of goals, total attempts, attempts on target, attempts off target, offsides, corners taken, tackles, blocks, fouls committed, clearances completed, balls recovered, yellow cards, and red cards. The use of UEFA's official database is considered reliable and valid for academic research, as UEFA serves as the governing authority for European football and ensures the standardization and accuracy of competition data [3]. This study employed descriptive secondary data extracted from UEFA's official statistical records and tactical analyses to examine performance trends. A total of 14 matches were analyzed, seven from Italy's EURO 2020 campaign and seven from Spain's EURO 2024 campaign. The analysis aimed to identify key patterns and trends in both defensive and attacking performance across the two tournaments. Descriptive analysis is commonly applied in football performance research to explore tactical and technical patterns.

III. RESULTS AND DISCUSSION

A. Attacking Patterns

With very slight variations, Italy and Spain displayed comparable attacking efforts. Italy scored 1.86 ± 0.90 goals

compared to Spain's 2.14 ± 1.07 on average, although the difference was not statistically significant ($p = 0.589$). Overall, Italy made more total attempts than Spain (17.57 ± 9.40) (18.29 ± 8.04), although the difference was not statistically significant ($p = 0.881$). Spain had marginally higher shots on target, as seen by their slightly higher percentage of shots on target (6.00 ± 3.65), Spain (5.43 ± 2.15), Italy, and their p -value is 0.727. With the lowest p -value = 0.057 of all the indicators, Italy had more offsides (3.57 ± 2.37) than Spain (1.43 ± 1.27). Off-target attempts were almost the same for both teams, but Spain had more corners (5.71 ± 4.31) than Italy (4.14 ± 2.85), and their p -value = 0.457. All the attacking indicators' p -value is more than 0.05, fail to reject H_0 . In conclusion, there is no significant difference in the attacking indicators between Spain and Italy. All of the data is used in Student's T-Test, except for the attempt off target. The attempt off target used the Mann-Whitney U test. According to the data, neither Italy's nor Spain's attacking performances at UEFA EURO tournaments were statistically the best. Nonetheless, Spain's marginally higher goal and shot-on-target averages point to improved finishing efficiency, which is consistent with earlier research showing that winning teams frequently convert fewer opportunities more successfully [4]. Although there isn't any obvious dominance, the similarity in total attempts and corners also shows how aggressively both team's attack.

B. Defending Patterns

Italy averaged more tackles (15.57 ± 5.19) than Spain (12.57 ± 3.82), indicating slightly more defensive involvement, though the difference was not statistically significant ($p = 0.242$). In comparison to Italy (2.86 ± 2.19 , $p = 0.828$), Spain had somewhat more blocks (3.14 ± 2.61). Similar discipline was demonstrated by the two teams' equal foul averages (12.14); meanwhile, the p -value is 1.000. Spain's disciplinary record showed somewhat more for tactical fouls or rule-breaking, with more yellow cards (2.43 ± 2.15) than Italy (1.86 ± 1.57), and the p -value is 0.688. Furthermore, Italy recorded no red cards, although Spain was the only team to do so (0.14 ± 0.38), indicating that Spain had greater problems with discipline that resulted in disciplinary actions; meanwhile, the p -value is 0.391. Italy had more clearances completed (15.29 ± 6.10) than Spain (12.86 ± 8.30), which is indicative of Italy's defensive priority when it comes to removing danger, and the p -value is 0.544. Last but not least, balls recovered gave Spain a tiny advantage over Italy (41.43 ± 12.31) despite the fact that both teams consistently regained

possession, and the p -value is 0.843. In conclusion, all the defending indicators' p -value is more than 0.05, fail to reject H_0 . This means there is no significant difference in the defending indicators between Spain and Italy. All of the data used Student's T-Test, except for the yellow and red cards received. Both of the indicators are used Mann-Whitney U test. There is no statistically significant difference between Spain and Italy's defensive performance, according to the analysis. In keeping with their traditionally defensive style, Italy placed more emphasis on defensive plays like tackles and clearances. Despite playing a slightly less aggressive defense, Spain recovered the ball more frequently, indicating strong positional play and pressing [3]. Spain occasionally commits tactical fouls, as suggested by the disciplinary data. This is consistent with research showing that top teams frequently compromise discipline for tactical defensive disruptions [5].

TABLE I
DESCRIPTIVE STATISTICS OF PERFORMANCE INDICATORS

Indicators	Italy (Mean $\pm$ SD)	Spain (Mean $\pm$ SD)	Statistics (t)	Effect Size	p-value
Goals	1.86 $\pm$ 0.90	2.14 $\pm$ 1.07	0.541	0.289	0.598
Total Attempt	18.29 $\pm$ 8.04	17.57 $\pm$ 9.40	-0.153	-0.082	0.881
Attempt On Target	5.43 $\pm$ 2.15	6.00 $\pm$ 3.65	0.357	0.191	0.727
Attempt Off Target	7.14 $\pm$ 5.15	7.00 $\pm$ 3.74	-0.059	-0.032	0.954
Offside	3.57 $\pm$ 2.37	1.43 $\pm$ 1.27	-2.107	-1.126	0.057
Corners Taken	4.14 $\pm$ 2.85	5.71 $\pm$ 4.31	0.804	0.43	0.437

Indicators	Italy (Mean $\pm$ SD)	Spain (Mean $\pm$ SD)	Statistics (t)	Effect Size	p-value
Tackles	15.57 $\pm$ 5.1	12.57 $\pm$ 3.82	-1.231	-0.658	0.242
Blocks	2.86 $\pm$ 2.19	3.14 $\pm$ 2.61	0.222	0.11	0.828
Fouls	12.14 $\pm$ 6.52	12.14 $\pm$ 4.10	0.000	0.000	1.000
Yellow Card	1.86 $\pm$ 1.57	2.43 $\pm$ 2.15	0.568	0.303	0.581
Red Card	0.00 $\pm$ 0.00	0.14 $\pm$ 0.38	1.000	0.535	0.337
Clearances Completed	15.2 $\pm$ 6.10	12.86 $\pm$ 8.30	-0.624	-0.334	0.544
Ball Recovered	40.00 $\pm$ 14.10	41.43 $\pm$ 12.31	0.202	0.108	0.843

IV. CONCLUSIONS

According to the findings of this analysis, Spain outscored England in crucial attacking and defensive performance

metrics to win the UEFA EURO 2024. Spain had superior attacking efficiency with more shots on target and goals scored, which is consistent with earlier studies emphasizing the relevance of shot quality and efficiency in predicting match outcomes at the elite level [3]. Furthermore, Spain displayed greater tactical discipline and consistency throughout the tournament, particularly in ball recoveries and defensive blocks, emphasizing the importance of a balanced attack-defense strategy for international football success [1]. These findings support previous research indicating that tactical adaptation and efficiency in both offensive and defensive phases are critical for success at the highest levels of competition [2]. This comparative analysis of the EURO 2020 and EURO 2024 champions demonstrates how gameplay philosophies and tactical patterns change over time. Future research could build on this approach by incorporating data from group-stage teams or conducting comparative analyses of other major international competitions, such as the Copa América or the AFC Asian Cup, to see if similar performance trends emerge across confederations. Furthermore, including player-specific indicators like positional heatmaps and passing networks may provide greater tactical insights into team strategy [6]. Longitudinal studies that look at numerous tournaments across time might help us better understand how successful tactical patterns originate and evolve in international football.

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A Comparative Analysis of Offensive Strategies: Top 3 and Bottom 3 Teams in the SUKMA 2024 Futsal Games

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Keywords: Offensive strategies, Futsal, SUKMA 2024, Set pieces, Team performance

I. INTRODUCTION

Futsal is a fast-paced, skill-oriented indoor sport with 5 players per team, known for its emphasis on quick decision-making and offensive play [1]. This study compares offensive strategies in the SUKMA 2024 futsal games, focusing on the top three and bottom three teams. It analyses key performance indicators, including successful passes, shots on target, and set pieces [2]. These elements have been proven to be essential indicators of offensive effectiveness [3]. By examining these factors, we aim to uncover the tactical differences between top-performing and lower-ranked teams, offering insights into strategies that influence success in futsal.

II. METHODS

Data on passes, shots on target, and set pieces were collected from post-match video footage available on platforms like YouTube, TVS Entertainment, and Astro Arena. Manual notational analysis was performed with intra-rater reliability procedures to ensure data accuracy [4]. The data were compiled in Microsoft Excel and analysed in Jamovi. Descriptive statistics and independent t-tests were used to compare the top three and bottom three teams based on variables such as passes, shots on target, and set pieces [5].

III. RESULTS AND DISCUSSION

A. Analysis of Passes Between the Top Three and Bottom Three Teams

The top three teams had a higher average number of successful passes per match compared to the bottom three teams (e.g., Team 1 had 221.33 successful passes). However, the difference was not statistically significant ($p = 0.503$), indicating that successful passing frequency was similar between both groups [6]. This reflects that in futsal, the emphasis is on quick transitions and opportunistic goal creation rather than prolonged passing sequences.

B. Investigation of Shots on Target

The top three teams had a higher average number of shots on target (11.94 ± 2.78) compared to the bottom three teams (10.85 ± 2.67). However, like the passes, the difference in shots on target was not statistically significant, with a p -value of 0.279 (greater than 0.05) [7]. This suggests that the number of shots on target did not differ significantly between the two groups. It implies that effectiveness is shaped more by

situational context rather than sheer volume of attempt, consistent with the idea that shot context and precision override quantity [8].

C. Analysis Total of Set Pieces

There was no significant difference in the frequency of total set pieces (corners and free kicks) between the top three and bottom three teams [9]. The average number of total set pieces for Team 1 (from the top three) was slightly higher (10.78 ± 2.16) compared to Team 2 (10.15 ± 3.56), but the p -value for this comparison was 0.548, indicating no significant difference in the total set pieces between the two groups. This supports the idea that set-piece frequency (volume) did not significantly differ between winning and losing teams, and that fast counterattacks are dominantly impactful in scoring [10].

D. Success of Set Pieces

The top three teams had a higher success rate for set pieces (0.61 successful set pieces per match) compared to the bottom three teams (0.39 successful set pieces). However, this difference was not statistically significant ($p = 0.428$), indicating that success in set pieces did not notably differ between the top and bottom groups [10].

TABLE I
COMPARISON OF SUCCESSFUL PASSES, SHOT ON TARGET, TOTAL SET PIECES, AND SUCCESSFUL SET PIECES BETWEEN GROUPS

Group	N	Mean (SD)	t	df	p value
Successful passes	30	6.487 (9.68)	0.678	29	0.503
Shots on Target	30	1.398 (0.995)	1.104	29	0.279
Total Set Pieces	30	0.624 (1.027)	0.608	29	0.548
Successful Set Pieces	30	0.226 (0.282)	0.804	29	0.428

IV. CONCLUSIONS

Although differences in passes, shots on target, and set pieces were observed between the top and bottom teams, none of these differences were statistically significant. This suggests that, at least for these metrics, offensive strategies may not be the key factor distinguishing top and bottom teams

in the SUKMA 2024 futsal games [10]. Future studies could expand on these findings by including a larger sample size across more teams and tournaments to improve generalizability. Additionally, incorporating qualitative tactical assessments, player positioning data, and defensive metrics could offer a more holistic understanding of match performance. Researchers may also benefit from integrating positional tracking systems and advanced analytics to capture dynamic aspects of team movement, space occupation, and decision-making that go beyond basic offensive statistics.

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Acute Effect of Different Elasticity Resistance Bands With Plyometric Exercise on Power Performance Among UiTM Seremban 3 Volleyball Player

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Keywords: Plyometric training, Resistance bands, Vertical jump (VJ), Standing broad jump (SBJ), Amateur athletes

I. INTRODUCTION

This study investigates the acute effects of resistance bands with varying elasticity levels combined with plyometric exercises on power performance. Focusing on UiTM Seremban 3 amateur volleyball players, it aims to address a research gap concerning non-elite athletes [1]. While previous studies emphasized elite populations [2], this research explores underexamined combinations of resistance and plyometric training on vertical and broad jump capabilities.

II. METHODS

Twenty male amateur volleyball players (age 18–25) completed a crossover design comparing lightweight and medium-weight resistance bands with plyometric training. Each condition was randomized with a 1-week washout. Vertical jump was measured using a Vertec device, and standing broad jump via measuring tape. Pre- and post-tests were administered for both exercises, and the best trial results were used for analysis.

III. RESULTS AND DISCUSSION

A. Vertical Jump

The lightweight band significantly improved vertical jump height (*mean difference* = 1.85 cm, $p = 0.004$), showing a strong positive correlation ($r = 0.934$). Medium-weight bands showed a smaller, non-significant gain (*mean difference* = 1.40 cm, $p = 0.100$). These findings suggest that lighter resistance yields more consistent and effective acute enhancements in vertical jump among amateur volleyball players.

B. Standing Broad Jump

Standing broad jump improved significantly under both resistance levels, with a greater gain under the lightweight band (*mean difference* = 7.40 cm, $p < 0.001$) than the medium-weight band (*mean difference* = 5.40 cm, $p = 0.017$). Strong correlations suggest reliable improvements, and participants likely benefited more acutely from lighter resistance in developing horizontal explosive power.

C. Comparison Light and Medium Resistance Band

Although lightweight bands showed slightly better mean improvements in both vertical and broad jumps, the differences compared to medium-weight bands were not

statistically significant ($p > 0.05$). Weak to moderate correlations suggest individual variability. Therefore, while lighter bands may offer practical benefits, no definitive advantage over medium resistance was established across jump types.

TABLE I

COMPARISON OF PRE- AND POST-TEST RESULTS ON VERTICAL AND STANDING BROAD JUMP PERFORMANCE USING LIGHT AND MEDIUM RESISTANCE BANDS

Variable	Pre	Post	<i>p</i> value
Light Resistance Band on VJ	63.8 ± 7.02	65.7 ± 7.04	0.004*
Light Resistance Band on SBJ	232.6 ± 16.48	240.0 ± 15.25	0.000*
Medium Resistance Band on VJ	64.0 ± 7.14	64.5 ± 7.88	0.100
Medium Resistance Band on SBJ	233.5 ± 17.75	238.9 ± 17.59	0.017*

* ($p < 0.05$)

IV. CONCLUSIONS

Lightweight resistance bands produced greater acute improvements in jump performance than medium-weight bands, though differences were not statistically significant across both tests. Plyometric training with elastic resistance appears beneficial for amateur volleyball players, with lighter bands offering potentially more favourable effects on lower-limb explosive power.

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Comparative Analysis of Performance Indicators Determining Winning and Losing Conditions of Selangor Red Giants in the MSC Final

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Keywords: Esports performance, Selangor Red Giants, Key performance variables, MSC Final, Tactical analysis

I. INTRODUCTION

Understanding key performance variables is crucial for optimizing competitive success in esports [1]. Despite the rapid growth of the esports industry, research examining performance indicators within competitive gameplay remains limited. This study addresses this gap by analyzing the Selangor Red Giants' (SRG) performance in the MSC Final, focusing on tactics, gameplay dynamics, and individual player statistics under both winning and losing conditions. By providing a comparative perspective on key variables that influence match outcomes, the study contributes to the growing body of esports performance analysis. The findings offer valuable insights for strategic planning and performance enhancement, informing data-driven decision-making for future tournaments [2].

II. METHODS

This study employed video-based notational analysis with manual data collection to examine the performance of the Selangor Red Giants (SRG) during seven matches in the MSC Final. The analysis focused on key performance variables, including team tactics, gameplay sequences, and individual player statistics. The primary indicators analyzed included objectives and combat-related events such as start and contest actions involving major neutral objectives, start lord, start turtle, contest lord, and contest turtle. Zoning actions around objectives and team engagements, zoning turtle, zoning lord, and zoning war. Engagement types, including ganking and team fights, range from 2v1 to 5v5 scenarios. These events were further categorized based on their outcomes into successful and unsuccessful attempts.

Additionally, the spatial context of engagements was considered, with events coded based on their occurrence in one of the three primary lanes: Gold Lane, EXP Lane, and Mid Lane. This spatial-temporal approach allowed for a more detailed understanding of lane-specific strategies and their contributions to overall match performance. To ensure the accuracy and consistency of the data, a test-retest reliability procedure was applied. The reliability of the notational analysis instruments was maintained at a correlation coefficient (r) greater than 0.80, while the percentage of error was kept below 10%, adhering to accepted standards for

performance analysis in sports research. Descriptive statistics were used to summarize performance indicators across matches, while independent sample t-tests were conducted to compare these indicators under winning and losing conditions. This comparative analysis aimed to identify significant differences and underlying factors that influenced SRG's match outcomes, offering practical insights for performance optimization in competitive esports.

III. RESULTS AND DISCUSSION

A. Descriptive Analysis

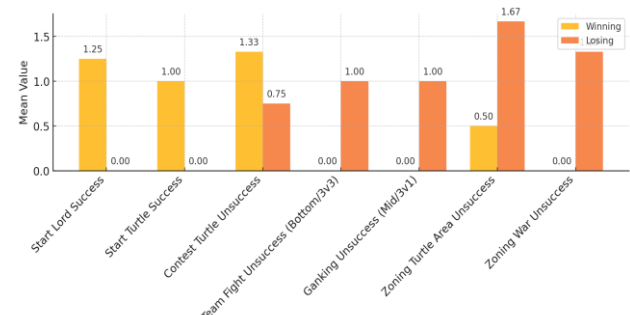


Fig.1 Descriptive values of indicators excluding gold earned.

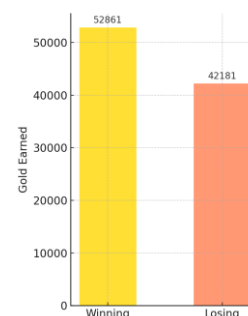


Fig.2 Gold earned between groups.

Figure 1 compares the mean values of various tactical and gameplay-related indicators under winning and losing conditions. Winning matches are characterized by successful engagements in objectives such as Start Lord, Start Turtle, and

more effective Contest Turtle attempts. In contrast, losing matches display a higher frequency of unsuccessful actions, particularly in Team Fights (3v3 Bottom), Ganking (3v1 Mid), Zoning Turtle Area, and Zoning War. The most prominent difference appears in Zoning Turtle Area Unsuccess, indicating its strong influence on match outcomes. These findings suggest that objective control and zone-based strategies are critical contributors to success in competitive esports.

Figure 2 isolates and compares the total gold earned under winning and losing conditions. Winning teams accumulated significantly more gold ($mean = 52,861$) compared to losing teams ($mean = 42,181$). This gap reflects superior map control, objective success, and kill participation, all of which contribute to economic advantages and item progression during matches. In essence, greater gold accumulation supports better team scaling and execution, reinforcing its role as a foundational indicator of match success.

B. Inferential Analysis

The results of the independent t-test (Table I) revealed that Start Lord Success was the only performance indicator with a statistically significant difference between winning and losing conditions ($p < 0.05$). Other variables, including gameplay patterns and individual player statistics, did not demonstrate significant effects on match outcomes. These findings suggest that early objective control, specifically securing the first Lord, played a pivotal role in determining the Selangor Red Giants' success during the MSC Final.

TABLE I
INFERENTIAL ANALYSIS

		Statistic	DF	P
Start Lord Success	Mann-Whitney U	0.00	5.00	0.036

IV. CONCLUSIONS

This study highlights the strategic importance of early objective control in competitive esports. Securing the first Lord significantly contributed to SRG's victories, while repeated failures in zoning turtle areas were strongly associated with losses. Other gameplay indicators had minimal influence, suggesting that early map dominance, rather than overall engagement frequency, is more critical to success. These insights emphasize the need for focused early-game strategies and refined zoning tactics to enhance performance in high-stakes tournaments.

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The Effect of Exercise Bike in 4 Weeks on Muscle Performance Among Obese Adults

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Keywords: Obesity, Muscle performance, Stationary cycling, Balance assessment, Exercise intervention

I. INTRODUCTION

Being overweight interferes with the performance of muscle work and decreases endurance, balance, strength, and motivation for physical activity [1][2]. Cycling is a low-impact activity and can be carried out, carefully, by individuals who are obese, but not many studies have assessed the short-term benefits of cycling as an intervention to improve muscle performance [1]. In this study, the aim was to assess the changes over a 4-week period of stationary cycling on muscle endurance, balance, and strength in individuals who were obese. Suggested comparisons of pre- and post-scores in muscle performance and differences between the experimental and control groups after the intervention.

II. METHODS

In this study, 14 obese adults were separated into a control and an experimental group. For four weeks, the experimental group engaged in one hour of cycling at low to moderate intensity and progressively increased that intensity to a maximum conceivable output. Muscle endurance, balance, and strength were assessed pre- and post-intervention using the 30-second chair stand, single-leg stance, and plank tests. Weight, waist circumference, and fitness indicators were forecasted throughout the intervention phase, except for documenting heart rates and adverse responses.

III. RESULTS AND DISCUSSION

A. Objective 1:

After four weeks, test results for muscle endurance, balance, or strength did not have statistically significant changes. All data for the study, including the 30-second chair stand, single-leg stance, and plank time, resulted in $p > 0.05$. Even in the experimental group that had minor numerical improvements, the differences were not great enough to indicate effectiveness over the intervention period.

B. Objective 2:

Comparisons between the experimental and control groups indicated no significant differences on all measures. The experimental group displayed small increases in lower-limb balance and plank time, but Cohen's d indicated small effect sizes. The similar variability across groups indicates that the 4-week intervention was not enough to promote meaningful improvements in muscle performance in obese adults.

TABLE I
PAIRED T-TEST (30S CHAIR STAND)
Paired T-Test (30s Chair Stand)

Descriptives						
	N	Mean	Median	SD	SE	p
Pre Control Group	7	12.1	12.0	1.95	0.738	
Post Control Group	7	12.4	12.0	1.62	0.612	0.522
Pre Experimental Group	7	11.9	12.0	2.27	0.857	
Post Experimental Group	7	12.4	12.0	2.15	0.812	0.280

TABLE II
PAIRED T-TEST (SINGLE-LEG STAND)
Paired T-Test (Single-Leg Stance)

Descriptives						
	N	Mean	Median	SD	SE	p
LL (Pre Control Group)	7	2.82	3.21	1.06	0.399	
LL (Post Control Group)	7	2.90	3.20	1.05	0.399	0.341
LL (Pre Experimental Group)	7	1.83	1.26	1.07	0.403	
LL (Post Experimental Group)	7	1.99	1.43	1.11	0.418	0.017
RL (Pre Control Group)	7	3.01	3.40	1.09	0.410	
RL (Post Control Group)	7	3.16	3.46	1.08	0.408	0.085
RL (Pre Experimental Group)	7	1.82	1.40	1.07	0.404	
RL (Post Experimental Group)	7	2.11	1.61	1.26	0.475	0.017

Note:- LL: Left Leg & RL: Right Leg

TABLE III
PAIRED T-TEST (PLANK)
Paired T-Test (Plank)

	N	Mean	Median	SD	SE	p
Plank (Pre Control Group)	7	0.390	0.380	0.0900	0.0340	
Plank (Post Control Group)	7	0.367	0.400	0.0869	0.0329	0.370
Plank (Pre Experimental Group)	7	0.481	0.400	0.2556	0.0966	
Plank (Post Experimental Group)	7	0.507	0.400	0.3179	0.1202	0.403

TABLE IV
INDEPENDENT SAMPLE T-TEST

Independent Samples T-Test					
		Statistic	df	p	Effect Size
LL (Pre)	Student's t	1.746	12.0	0.106	Cohen's d 0.933
LL (Post)	Student's t	1.572	12.0	0.142	Cohen's d 0.840
RL (Pre)	Student's t	2.070	12.0	0.061	Cohen's d 1.107
RL (Post)	Student's t	1.677	12.0	0.119	Cohen's d 0.897
30s Chair Stand (Pre)	Student's t	0.253	12.0	0.805	Cohen's d 0.135
30s Chair Stand (Post)	Student's t	0.000	12.0	1.000	Cohen's d 0.000
Plank Time (Pre)	Student's t	-0.893	12.0	0.390	Cohen's d -0.477
Plank Time (Post)	Student's t	-1.124	12.0	0.283	Cohen's d -0.601
Note. $H_0: \mu_{ug} = \mu_{cg}$					

IV. CONCLUSIONS

A 4-week stationary cycling program did not result in statistically significant improvements in muscle endurance, balance, or strength in obese adults. While the experimental group showed a slight trend in a positive direction with regard to outcomes, the length of the experience may not allow for observable changes. Children and young adults may need a longer or heavier program to see measurable benefits to muscle performance in these patients.

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Variability of Key Performance Indicators of Falcon AP. Bren on Losing and Winning Matches in the MSC 2024 Final Against Selangor Red Giant

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Keywords: E-sport performance, Analysis, Falcon Ap. Bren, Selangor Red Giant, Key performance variables

I. INTRODUCTION

Esports have grown into a global industry, attracting millions of viewers and creating a major cultural and economic impact. As competitive titles like Mobile Legends: Bang Bang become more professionalized, they now demand high levels of strategy, skill, and teamwork comparable to traditional sports [1]. With the rise in tournament size and stakes, there is a growing need for performance analysis to support better gameplay and decision-making. In esports, performance analysis helps teams develop tactics, assess strengths and weaknesses, and prepare for competition. Like in traditional sports, using match data allows teams to adjust strategies based on their opponents and in-game situations [2]. However, while esports research is expanding, there is still limited analysis focused on mobile titles and their tactical elements. This study addresses that gap by analyzing the 2024 MSC Final between Falcon AP Bren and Selangor Red Giant. By examining key gameplay and statistical indicators through structured notational and statistical analysis, this research aims to uncover performance patterns that contributed to match outcomes and support strategy development in mobile esports.

II. METHODS

This study employed a quantitative performance analysis approach to examine gameplay patterns in the MSC 2024 Grand Final between Falcon AP Bren and Selangor Red Giant. A total of seven matches ($N = 7$) replays from the final series were collected and analyzed, with data sourced from official YouTube broadcasts and Liquipedia match statistics, both of which are widely used and publicly accessible platforms for esports analytics. Key performance indicators (KPIs) related to team fights, objective control (e.g., Lord and Turtle), zoning, ganking, and lane-based engagements were extracted using manual notational analysis. Data were logged and categorized by outcome (win or loss) to determine variations in tactical execution. The following statistical methods were applied: descriptive statistics to summarize gameplay trends across matches, and independent sample t-tests to compare KPIs between winning and losing games ($p < 0.05$). Test-retest reliability was conducted, with a minimum threshold of $r > 0.80$, and the percentage of coding error was maintained below

10%, consistent with accepted standards in performance analysis research.

III. RESULTS AND DISCUSSION

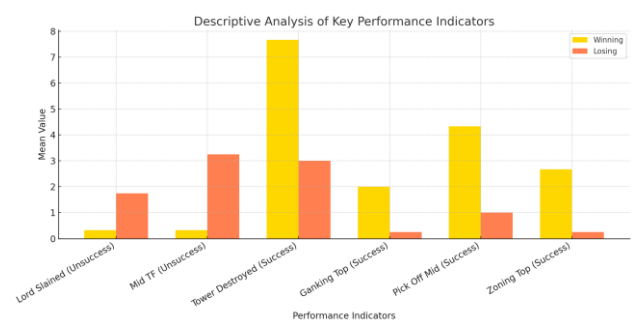


Fig. I: Descriptive mean value of indicators.

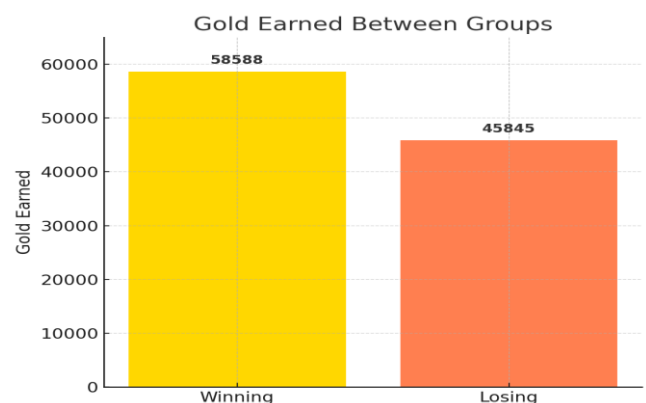


Fig II: Gold earned between winning and losing matches.

A. Descriptive Analysis

The descriptive analysis highlighted pronounced differences between winning and losing conditions across several key performance indicators. According to Figure 1, winning matches demonstrated a significantly higher average number of towers destroyed ($M = 7.67$) compared to losing matches ($M = 3.00$), underscoring the critical role of objective control in competitive Mobile Legends play. Proactive macro-

level actions such as mid-lane pickoffs ($M = 4.33$ vs. 1.00), top-lane ganks ($M = 2.00$ vs. 0.25), and top-area zoning ($M = 2.67$ vs. 0.25) were notably more frequent in victorious scenarios, reflecting superior map pressure and team coordination. By contrast, losing matches saw elevated counts in reactive behaviors, including lord slains ($M = 1.75$ vs. 0.33) and mid-lane team fights ($M = 3.25$ vs. 0.33), suggesting inefficient resource allocation and suboptimal objective prioritization. These results support prior findings that emphasize the strategic significance of early objective control and structured macro play in esports performance [3].

Based on Figure 2, analysis of the gold economy further reinforced the importance of economic dominance: winning matches averaged 58,588 gold compared to 45,845 in losses, a substantial difference of 12,743 gold. This economic advantage facilitates earlier item power spikes, enhances map control, and supports stronger objective and team-fight outcomes, aligning with established research on the influence of resource accumulation in MOBA-style esports [1].

B. Inferential Analysis

TABLE I
SIGNIFICANCE VARIABLES

Variables	Losing	Winning	<i>p</i> value
Lord slain (Unsuccess)	1.75 ± 0.5	0.33 ± 0.5	0.018
Mid team fight (Unsuccess)	3.25 ± 1.5	0.33 ± 0.58	0.026
Tower destroyed (Success)	3 ± 1.41	7.67 ± 1.16	0.006
Ganking top (Success)	0.25 ± 0.50	2.00 ± 1.00	0.027

Independent-samples t-tests (Table 1) confirmed that several performance indicators differed significantly between winning and losing matches. Tower destructions were significantly higher in wins ($M = 7.67$, $SD = 1.16$) than losses ($M = 3.00$, $SD = 1.41$), $t(5) = -4.641$, $p = 0.006$, $d = -3.55$. Top-lane zoning and ganking also showed significance: Zoning Top, $M = 2.67$ vs. 0.25 , $t(5) = -5.944$, $p = 0.002$, $d = -4.54$; Ganking Top, $M = 2.00$ vs. 0.25 , $t(5) = -3.090$, $p = 0.027$, $d = -2.36$. A strong trend emerged for mid-lane pickoffs ($M = 4.33$ vs. 1.00), $t(5) = -2.548$, $p = 0.051$, $d = -1.95$, indicating a large effect despite narrowly missing conventional significance. Conversely, losing conditions had significantly more unsuccessful lord attempts ($M = 1.75$ vs. 0.33), $t(5) = 3.485$, $p = .018$, $d = 2.66$, and mid-lane team-fight failures ($M = 3.25$ vs. 0.33), $t(5) = 3.136$, $p = 0.026$, $d = 2.40$. These findings suggest that proactive strategies, zoning, ganking, and objective taking are strong predictors of success, while overreliance on reactive engagements corresponds with match deficits. Thus, tactical execution not only characterizes

performance but also offers predictive insights in elite Mobile Legends play.

IV. CONCLUSIONS

The findings from both descriptive and inferential analyses demonstrate that Falcon AP Bren's performance in the MSC 2024 Final was heavily influenced by key macro-level strategies and objective control. Victories were marked by proactive gameplay such as effective zoning, successful ganking, and higher tower destruction, highlighting the importance of map pressure and structured team execution. Conversely, losses were associated with reactive behaviors, including overcommitment to mid-lane team fights and failed lord contests, which reflected suboptimal decision-making and resource allocation. Inferential statistics confirmed these patterns, with significant differences observed in several indicators, reinforcing their predictive value in match outcomes. Collectively, the results underscore that consistent success in high-level Mobile Legends competition relies not only on mechanical skill but also on strategic clarity, coordinated macro execution, and efficient in-game adaptations.

ACKNOWLEDGEMENTS

The authors would like to sincerely thank Universiti Teknologi MARA, Seremban 3 Campus, for providing the academic support and resources essential to this research. Special appreciation goes to our mentors, colleagues, and research assistants for their guidance and contributions. We also acknowledge YouTube, Liquipedia, and the Mobile Legends Professional League Malaysia (MPLMY) for granting access to valuable match data. Lastly, heartfelt thanks to our families and friends for their unwavering support and encouragement throughout this study.

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Acute Effects of Intermittent Fasting With Aerobic Exercise on Weight Loss among Government Sector Workers With Obesity

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Keywords: Intermittent fasting, Aerobic exercise, Obesity, Weight loss intervention, Government workers

I. INTRODUCTION

Obesity remains a pressing public health issue, particularly among sedentary occupational groups. While intermittent fasting and aerobic exercise have individually shown benefits for weight management, their combined acute effects remain underexplored. This study evaluates weight loss outcomes among government sector workers with obesity, comparing intermittent fasting alone versus its combination with aerobic exercise over a short intervention period.

II. METHODS

Twelve obese government workers were selected through the KBS “The Biggest Loser” program and divided equally into two groups. Over four weeks, both groups practiced daily 16:8 intermittent fasting, while one group added aerobic exercise three times a week. Weight and BMI were measured pre- and post-intervention using a stadiometer to assess the impact of the intervention.

III. RESULTS AND DISCUSSION

The intermittent fasting-only group lost an average of 3.1 kg over four weeks. All participants showed consistent weight reduction, likely due to reduced caloric intake from the 16:8 fasting method. The results suggest intermittent fasting alone is effective for short-term weight loss in obese individuals.

Participants who combined intermittent fasting with aerobic exercise lost an average of 2.78 kg. This slight reduction compared to the IF-only group may reflect compensatory factors such as increased appetite or muscle retention. While aerobic activity may support overall health, its short-term additive effect on weight loss was minimal in this study.

The IF-only group slightly outperformed the IF + AE group (3.1 kg vs. 2.78 kg), with no statistically significant difference ($p = 0.671$). The clinical difference was negligible. Thus, the combination of fasting and exercise did not produce a synergistic effect within the four-week timeframe, though both approaches proved effective for weight reduction.

TABLE I
GROUP DESCRIPTIVE

	Group	Mean	Median	SD	SE
Pre-Weight (kg)	Control	106.67	95.50	21.76	8.88
	Experimental	100.52	97.35	12.98	5.30
Post-Weight (kg)	Control	103.57	92.70	20.76	8.48
	Experimental	97.73	94.50	12.94	5.28
Pre-BMI	Control	38.43	37.30	6.48	2.64
	Experimental	37.37	38.35	2.76	1.13
Post-BMI	Control	37.32	36.55	6.25	2.55
	Experimental	36.35	37.40	2.97	1.21
Δ Weight	Control	3.08	3.15	1.27	0.52
	Experimental	2.78	2.55	1.09	0.45
Δ BMI	Control	1.10	1.15	0.42	0.17
	Experimental	1.02	0.95	0.35	0.14

TABLE II
INDEPENDENT T-TEST (BETWEEN GROUPS)

Assessment	Group	Pre	Post	<i>P</i> -value
Weight (<i>kg</i>)	Control	106.67 ± 21.76	103.57 ± 20.76	0.671
	Experimental	100.52 ± 12.98	97.73 ± 12.94	
BMI	Control	38.43 ± 6.48	37.32 ± 6.25	0.716
	Experimental	37.37 ± 2.76	36.35 ± 2.97	

Weight loss, $t(10) = 0.438$, $p = 0.671$, BMI, $t(10) = 0.374$, $p = 0.716$.

IV. CONCLUSIONS

In a four-week intervention, intermittent fasting alone matched or slightly outperformed its combination with aerobic exercise in weight loss outcomes. The lack of added benefit from exercise suggests fasting is the key short-term driver.

Longer studies are needed to evaluate the combined interventions' roles in sustained obesity management.

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Interplay of Social Support and Mental Health Among Sports Students

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Keywords: Social support, Family support, Friends support, Mental health, Sports students

I. INTRODUCTION

Understanding the mental health of sports students is critical, especially in relation to the social support systems that surround them. This study explores the levels of social support and mental health among FSR UiTM Seremban 3 students and examines how these variables are related. Findings will contribute to understanding how social support links with mental health within this unique population, offering practical implications for managing mental health among sports students.

II. METHODS

A quantitative survey design was employed involving 305 FSR UiTM Seremban 3 students selected through purposive sampling. Data were collected using the Multidimensional Scale of Perceived Social Support (MSPSS) [1] to assess social support and the Depression Anxiety Stress Scale (DASS-21) [2] to measure mental health. The responses were analyzed to determine levels and the relationship between social support and mental health among the participants.

III. RESULTS AND DISCUSSION

A. Level of Social Support

A majority (65.6%) of respondents reported high levels of social support across all subscales. It was found that high support was equally distributed among Family (2.47 ± 0.79), Friends (2.46 ± 0.81), and Significant Other (2.45 ± 0.82). No significant differences were observed by gender or year, indicating consistent perceived support across demographic groups.

B. Level of Mental Health

The analysis of data from 305 respondents shows that anxiety levels are the highest among the three psychological variables measured. Mental health findings revealed high anxiety (3.33 ± 1.7), moderate depression (2.46 ± 1.4), and mild stress (2.14 ± 1.6). These results highlight anxiety as a primary mental health concern among sports students, suggesting the need for targeted interventions addressing anxiety, which may impact the students' well-being and performance.

C. Relationship Between Social Support and Mental Health

The correlation between perceived social support and mental health symptoms was negative and statistically significant. Spearman's rho analysis showed that as support increased, mental health symptoms decreased. Depression has a strong negative correlation with family support ($r = -0.840$), friend support ($r = -0.856$), and support from a significant other ($r = -0.855$). Stress shows an even stronger negative correlation with family ($r = -0.979$), friends ($r = -0.978$), and significant other ($r = -0.975$). Anxiety also has strong negative correlations, though slightly weaker than stress, with the family subscale: $r = -0.718$, friend subscale: $r = -0.719$, and significant other subscale: $r = -0.719$. The strong negative correlation between perceived social support and stress highlights the importance of support systems in helping students manage academic demands, sports activities, life pressures, and fatigue.

IV. CONCLUSIONS

Findings reveal high social support among students and widespread anxiety symptoms. Further research is needed to explore causality and targeted interventions for anxiety in sports student populations. To promote the overall well-being of this very special group of students, applying special anxiety-targeted interventions is a must, not just increasing social support and its quality.

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Pre-Exercise Hyperhydration Interventions in Adult Endurance Athletes: A Systematic Review of Performance, Physiological, and Tolerability Outcomes

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Keywords: Hyperhydration, Fluid loading, Endurance, Glycerol, Systematic review

I. INTRODUCTION

Hyperhydration may enhance endurance performance, yet evidence remains inconsistent due to methodological heterogeneity and limited physiological tracking [1]. This systematic review critically evaluates randomized studies comparing pre-exercise hyperhydration with control or placebo. We examine effects on performance, physiological responses, and tolerability, highlighting gaps in sex representation, outcome validity, and mechanistic clarity to inform hydration strategies in endurance athletes [2].

II. METHODS

This review was prospectively registered with PROSPERO and conducted according to the PRISMA 2020 guidelines. A comprehensive literature search was performed in Web of Science, PubMed, Scopus, and OVID MEDLINE from database inception to January 10th, 2025. Studies were included if they examined healthy endurance-trained adults aged 18–50 years, using one-off oral hyperhydration interventions administered ≤ 2 hours before exercise. Eligible study designs included randomized crossover or parallel trials and non-randomized within-participant comparisons.

Primary outcomes included exercise performance indicators such as time-trial results or time to exhaustion. Secondary outcomes included physiological measures (e.g., plasma volume, core/skin temperature, heart rate), urine output, and gastrointestinal symptom scores. Two reviewers independently screened titles, abstracts, and full texts, achieving high inter-rater agreement, with discrepancies resolved by a third reviewer. Data were extracted using customized REDCap forms, capturing intervention characteristics, outcome measures, ambient conditions, and participant demographics.

Risk of bias was assessed using Cochrane RoB 2 for RCTs, ROBINS-I for quasi-experimental trials, and the Newcastle-Ottawa Scale for observational studies. Subgroup analyses examined agent type, exercise duration, environmental conditions, and female representation. Narrative synthesis was used when data pooling was inappropriate due to heterogeneity or insufficient data.

III. RESULTS AND DISCUSSION

A. Identify and Appraise Studies

Thirty studies met the inclusion criteria, mostly randomized crossover trials with predominantly male participants. Risk of bias varied but was generally low. Studies differed widely in protocols, agents used, and outcomes measured, limiting direct comparisons. Methodological inconsistency and limited female inclusion challenge the generalizability of findings and reinforce the need for more uniform, inclusive designs [3].

B. Effects on Exercise Performance

Hyperhydration improved exercise capacity (time to exhaustion) in most constant-load trials, with gains up to 26% [4]. Effects on time-trial performance were mixed, with benefits more evident under heat stress and longer durations. Sodium and glycerol both showed potential, but performance outcomes depended on protocol specifics, such as fluid availability and exercise intensity.

C. Physiological Responses

Plasma volume increased 3.5–12.6% with hyperhydration, particularly when sodium and glycerol were combined. Heart rate decreased by 3–11 bpm during exercise, and core temperature reductions of up to 0.8 °C were reported [5]. However, these effects were inconsistent, with some studies reporting no change, likely due to variations in dose, agent, and exercise context.

D. Tolerability and GI Symptoms

Gastrointestinal symptoms occurred in many studies, with nausea and vomiting reported, especially with glycerol boluses [6]. Slower ingestion, dilution, and co-ingestion strategies reduced severity. No single protocol consistently outperformed others in tolerability. Lack of validated symptom assessment tools remains a limitation, but practical recommendations suggest moderate dosing and gradual ingestion for better tolerability.

Fig. 1 shows an example of an image with country distribution. Check the country distribution to reveal the important detail in the figure.

Country Distribution

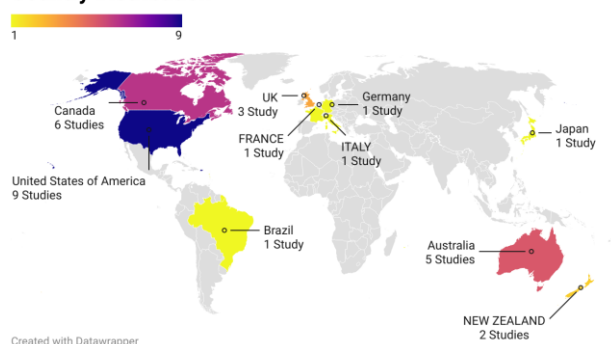


Fig. 1 Map showing the geographic origin of the 30 studies included in this systematic review. Colour intensity reflects the number of studies per country (scale 1–9).

TABLE I
SUBJECT CHARACTERISTICS

Characteristic	Mean	Median	Min	Max
Age (yrs)	28.4	26.7	18.5	59.7
BMI (kg/m ²)	24.1	23.8	21.5	29.3

Fig. 2 shows the study design distribution for included studies.

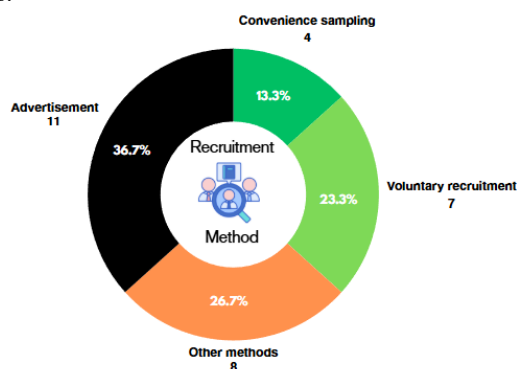


Fig. 2 shows the distribution of participant-recruitment methods in a four-segment doughnut chart. Advertisements, other methods, voluntary recruitment, and convenience sampling.

IV. CONCLUSIONS

Pre-exercise hyperhydration can enhance endurance capacity and influence physiological responses, though benefits for time-trial performance remain inconsistent. Effects vary by agent, dose, and context. Gastrointestinal symptoms are common but manageable with protocol adjustments. Standardized outcome reporting and inclusive study designs are needed to guide safer, more effective hydration strategies.

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Effect of FIFA11+ Level 3 on Speed and Reaction Time of Amateur Soccer Players

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Keywords: FIFA 11+, Warm-up, Reaction time, Sprint speed, Amateur football

I. INTRODUCTION

The FIFA 11+ program is globally endorsed for injury prevention in soccer [1]. However, its performance-enhancing potential, especially at Level 3, which includes high-intensity drills and cognitive elements, remains underexplored [2]. Thus, this study aims to examine the effects of FIFA 11+ Level 3 on speed and reaction time in amateur soccer players and to compare the outcomes with those of a traditional warm-up routine. Insights from this study can support evidence-based training strategies, specifically for improving key performance metrics in amateur athletes.

II. METHODS

A total of 16 male amateur soccer players (aged 19–23) were randomly assigned to one of two groups: the FIFA 11+ Level 3 warm-up group or the traditional warm-up group. Participants were assigned to groups based on their pre-test scores to ensure both groups had comparable skill levels. Speed and reaction time were measured before and after the intervention. Speed was assessed using a 10-meter sprint test, while reaction time was evaluated using the Multi-Operational Apparatus for Reaction Time. The data were analyzed using paired sample t-tests to assess within-group changes and independent sample t-tests to compare between-group differences.

III. RESULTS AND DISCUSSION

A. Effect of FIFA 11+ Level 3 and Traditional Warm-Up on Speed and Reaction Time

The FIFA 11+ Level 3 warm-up group demonstrated a statistically significant speed improvement, with mean performance time decreasing from 2.19 ± 0.14 seconds to 1.95 ± 0.16 seconds ($p < 0.05$). In contrast, reaction time showed a slight increase from 0.22 ± 0.07 seconds to 0.26 ± 0.05 seconds; however, this change was not statistically significant ($p > 0.05$). These results indicate that the program is effective in enhancing short-distance sprint performance but may not provide sufficient stimulus to improve neuromuscular responsiveness related to reaction time. In the traditional warm-up group, a statistically significant improvement was observed in speed, with mean performance time decreasing from 2.25 ± 0.12 seconds to 1.81 ± 0.23 seconds ($p < 0.05$). Although reaction time also showed a reduction, from

0.21 ± 0.02 seconds to 0.18 ± 0.05 seconds, this change was not statistically significant ($p > 0.05$).

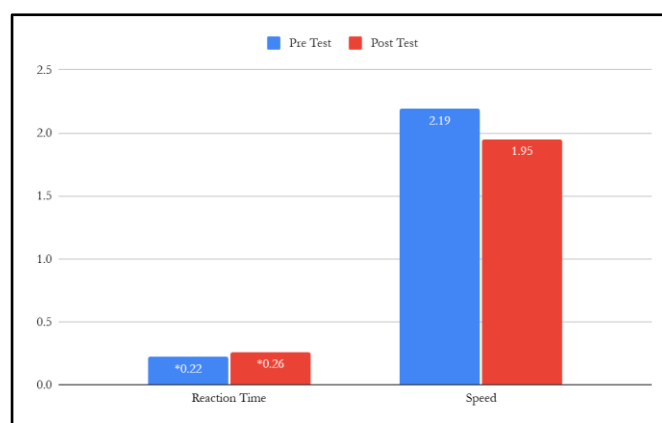


Fig. 1 Effect of FIFA 11+ Level 3 on Speed and Reaction Time.

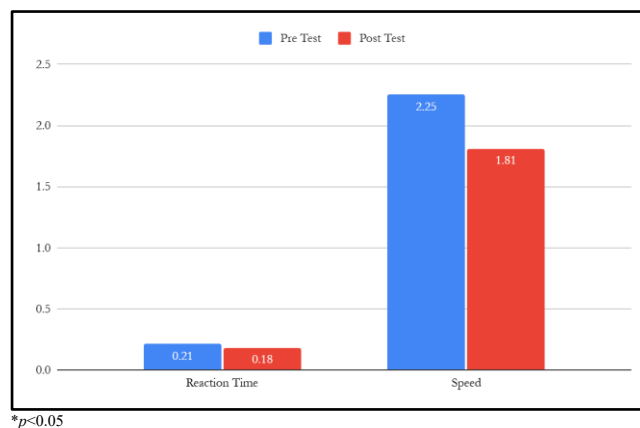


Fig. 2 Effect of Traditional Warm-Up on Speed and Reaction Time.

B. Comparison Between FIFA 11+ Level 3 and Traditional Warm-Up

Results from the Independent Samples t-test indicated no statistically significant differences between the FIFA 11+ Level 3 group and the traditional warm-up group in both speed and reaction time, with $p > 0.05$. However, descriptive analysis suggests that the traditional warm-up group exhibited greater improvements in both variables compared to the FIFA 11+ Level 3 group.

TABLE I
COMPARISON BETWEEN FIFA 11+ LEVEL 3 AND TRADITIONAL WARM-UP

Variables	Group	Mean (SD)	t	df	Sign. (2-tailed)
Speed	FIFA 11+ Level 3	-0.24±0.22	1.85	14	0.09
	Traditional Warm-up	-0.44±0.21			
Reaction Time	FIFA 11+ Level 3	0.04±0.08	2.16	14	0.049*
	Traditional Warm-up	-0.04±0.05			

* $p < 0.05$

IV. CONCLUSIONS

The findings of this study revealed that the FIFA 11+ Level 3 warm-up led to improvements in reaction time among amateur soccer players. However, these improvements were not greater than those observed in the traditional warm-up group. This suggests that while FIFA 11+ Level 3 warm-up has performance-enhancing potential, it may not be more effective than traditional warm-up methods in eliciting measurable gains in reaction-based outcomes. One possible explanation for this limited effectiveness is the nature of FIFA 11 Plus as a warm-up protocol, rather than a long-term or intensive neuromuscular training program. Although Level 3 incorporates high-intensity and cognitive components, its short duration and one-off application in this study may not have been sufficient to induce significant neuromotor adaptations. Previous research has shown that sustained and targeted interventions are typically required to improve cognitive and reaction-time performance [3]. Therefore, while FIFA 1+ Level 3 warm-up demonstrates promise, its use as a standalone session may not provide a substantial advantage over traditional warm-up practices.

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Examining the Interplay Between Social Support and Recreational Sports Participation Among University Students

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Keywords: Social support, Family support, Friends support, Recreational sports, University students

I. INTRODUCTION

This study explores the factors of social support and participation in recreational sports among university students at UiTM Seremban 3. The recreational sports participation among university students in Malaysia is a pressing issue that may be influenced by a few aspects, such as social barriers. The insufficient social support mechanisms may contribute to the lack of recreational sports participation, as family, peers, and institutional encouragement are critical in fostering consistent engagement in such activities [1]. Hence, the present study aims to address this issue and identify the social support that may relate to recreational sports participation within an academic environment.

II. METHODS

A quantitative research design was employed to examine social support and recreational sports participation (RSP) among 134 full-time UiTM Seremban 3 students. Data were collected via an online survey distributed through Google Forms. Social support was assessed using the Multidimensional Scale of Perceived Social Support (MSPSS) [2], while recreational sports participation was self-reported in weekly minutes [3]. Data were analyzed using SPSS, with descriptive statistics and Spearman correlation applied due to non-normal distribution identified via Kolmogorov-Smirnov and Shapiro-Wilk tests.

III. RESULTS AND DISCUSSION

A. Social Support Level Among University Students

All 134 respondents provided a score for the composite social-support index, yielding a mean of 5.0361 with $SD = 0.57630$ on what is likely a 1-to-7 scale, suggesting that, on average, participants perceive their social support to be solidly above the midpoint. Mean scores are almost identical at 5.0504 for family ($SD = 0.76690$), 5.0075 for friends ($SD = 0.53006$), and 5.0504 for significant other ($SD = 0.72921$), signifying consistently high perceived support across these relationships.

B. Duration of Recreational Sports Participation

The respondents engaged in recreational sports activity for an average of 124 minutes (about 2 hours) over the previous

week, but the large standard deviation of 62.5 minutes and a range stretching from 20 to 480 minutes points to substantial individual differences, with some respondents barely active and a few recorded less participation.

C. Relationship Between Social Support and Recreational Sports Participation

The Spearman's rho correlation analysis indicated a very weak negative correlation ($r = -0.070$), suggesting that higher levels of social support are slightly associated with lower levels of recreational sports participation. However, this relationship was not statistically significant, as evidenced by a p -value of 0.453 ($p > 0.05$). This implies that the observed correlation is not strong enough to conclude the presence of a meaningful association between the two variables in the studied population. Therefore, based on these findings, no significant relationship exists between social support and recreational sports participation among these students.

IV. CONCLUSIONS

These findings suggest that social support may not be a key factor influencing the amount of time students dedicate to participating in sports, at least within this sample. Several limitations may have influenced the outcome, such as both social support and sports participation were self-reported, which could introduce response bias. Future research might benefit from more objective measures of recreational sports activity and an exploration of additional psychosocial or environmental factors.

ACKNOWLEDGEMENTS

The author thanks all the participants of the study for their vital support and guidance.

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Exploring the Impact of Social Media Engagement on the Psychological Well-Being of Youth Athletes

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Keywords: Youth athletes, Social media engagement, Psychological well-being, Anxiety and self-esteem, Sports psychology

I. INTRODUCTION

Youth athletes increasingly rely on social media for connection, support, and self-promotion, yet its psychological impact remains poorly understood. While engagement can foster motivation and peer interaction, excessive or passive use heightens stress, anxiety, and self-esteem issues. Youth athletes face unique vulnerabilities due to performance pressures and idealized online portrayals [1][2]. This study explores engagement patterns, content consumption, and their relationship to psychological well-being, addressing a critical gap in sports psychology research.

II. METHODS

A total of 80 youth athletes, aged 16–25, who actively participate in competitive sports and regularly use social media, were recruited through purposive sampling. Data were collected using an online structured survey. Social media engagement was measured with an adapted Social Media Engagement Scale for Adolescents (SMES-A), while psychological well-being was assessed using three validated scales: Generalized Anxiety Disorder Scale (GAD-7) for anxiety, Patient Health Questionnaire (PHQ-9) for depression, and the Rosenberg Self-Esteem Scale (RSES) for self-esteem. Descriptive statistics identified engagement patterns, and Pearson correlation analysis examined relationships between time spent, frequency of use, types of content, and psychological outcomes.

III. RESULTS AND DISCUSSION

A. Patterns of Social Media Engagement

Instagram and TikTok were the most frequently used platforms, with 63.70% of athletes spending more than six hours daily on social media. The most common content consumed was sports-related (training tips, match highlights), followed by entertainment and motivational posts. Team sports athletes showed slightly higher daily usage compared to individual sports athletes.

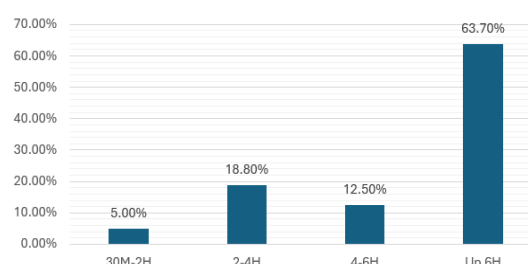


Fig. 1 Percentage of Time Spent on Social Media Daily.

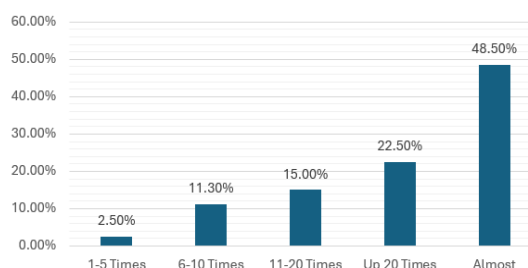


Fig. 2 Frequency of Checking Social Media Daily.

TABLE I
TYPE OF SOCIAL MEDIA CONTENT ENGAGED BY RESPONDENTS

Variables	Frequency (n)	(%)
Sports & Fitness; Entertainment & Celebrities	4	5,0
Sports & Fitness; Education & Academics; Motivation & Psychology	6	7,5
Sports & Fitness; News & Politics; Entertainment & Celebrities	8	10,0
Sports & Fitness; Entertainment & Psychology	3	3,8
Sports & Fitness; Motivation & Psychology	6	2,5
Sports & Fitness; Entertainment, Education & Motivation	6	3,8
Sports a Fitness; Entertainment, Education Morivation	20	25,0
Entertainment & Celebrities	1	1,3
Entertainment & Celebrities; Education & Acad.	1	1,3
News & Politics, Entertainment, Education	20	2,5
News a Politics; Education & Motivation	1	1,3
Sports a Fitness News	1	1,3

B. Relationship Between Engagement and Psychological Well-Being

Findings revealed that higher social media engagement was moderately and positively correlated with anxiety ($r = 0.35$, $p = 0.001$) and depression ($r = 0.31$, $p = 0.005$), while showing a weak but significant negative correlation with self-esteem ($r = -0.22$, $p = 0.046$). This indicates that increased social media use is linked to greater anxiety and depressive symptoms, alongside lower self-esteem among youth athletes, suggesting that excessive engagement may negatively influence their overall psychological well-being.

TABLE II
SOCIAL MEDIA ENGAGEMENT AND PSYCHOLOGICAL WELLBEING

	Social Media Engagement
Social Media Engagement Score	-
Score Anxiety (GAD-7) Score	0.353**
Depression (PHQ-9) Score	0.311**
Self-Esteem (RSES) Score	-0.224*

IV. CONCLUSIONS

Youth athletes' extensive social media use, especially passive engagement, correlates with higher anxiety, depression, and reduced self-esteem. While motivational and sports content offered slight benefits, comparison-driven posts were harmful. These findings underscore the need for mindful social media habits and targeted interventions to safeguard athletes' psychological well-being.

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Artificial Intelligence Applications in Physical Rehabilitation: A Systematic Review of Clinical Effectiveness and Real-World Implementation.

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Keywords: AI chatbots, Physical rehabilitation, Machine learning, Clinical effectiveness, Systematic review

I. INTRODUCTION

Artificial intelligence (AI) is increasingly integrated into physical rehabilitation, offering potential to improve clinical and non-clinical outcomes. However, evidence supporting its effectiveness remains limited, and the implementation of AI technologies in real-world settings is not fully understood. This systematic review aims to identify AI applications in rehabilitation, assess their clinical impact, and explore barriers and enablers to their practical use.

II. METHODS

This systematic review included studies on adults (≥ 18 years) receiving machine-learning-based AI rehabilitation. We assessed randomized controlled trials, cohort studies, and quasi-experimental designs comparing AI-supported rehabilitation to conventional care. Data on clinical outcomes (functional mobility, gait speed) and non-clinical outcomes (adherence, satisfaction) were synthesized. Barriers and enablers to AI implementation were examined through a structured narrative using the NASSS framework.

III. RESULTS AND DISCUSSION

A. Study Characteristics and Populations

AI applications such as mobile apps, wearable devices, and robotics were identified as key tools for personalized rehabilitation, aiding in exercise tracking and feedback (e.g., AI-driven gait analysis). Brain-computer interfaces (BCIs) and virtual reality (VR) systems also featured prominently in studies for enhancing motor function and engagement in stroke and musculoskeletal rehabilitation.

B. Pooled Treatment Effects

AI-supported rehabilitation demonstrated improved outcomes for pain reduction, movement rehabilitation, and prosthetic control compared to traditional care. Wearables and mobile apps showed higher adherence to exercises, reducing pain by 2-3 points and enhancing knee osteoarthritis (OA) exercise accuracy. In some cases, AI-driven systems reduced rehabilitation costs by facilitating home-based care.

C. Subgroup Analysis by Treatment Duration

Barriers include cost, technical issues, and the limited reach of AI tools, particularly in low-income or rural areas. Despite these challenges, personalized feedback, lightweight hardware, and easy-to-understand dashboards helped overcome adoption issues and promoted adherence. Ongoing studies call for larger RCTs and improved sensor reliability to further bolster AI's integration in rehabilitation.

Fig. 1 shows an example of an image with country distribution. Check the country distribution to reveal the important detail in the figure.

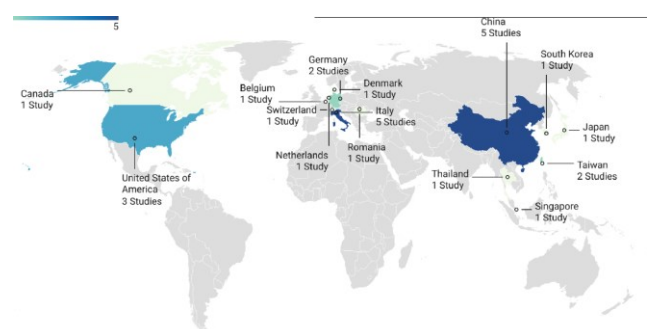


Fig. 1 Map showing the geographic origin of the 27 studies included in this systematic review. Colour intensity reflects the number of studies per country (scale 1–5).

TABLE I
SUBJECT CHARACTERISTICS

Characteristic	Mean	Median	Min	Max
Age (yrs)	49.6	19.9	26.0	66.4
Height (cm)	173.1	173.0	169.6	176.0
Weight (kg)	80.5	81.7	79.2	81.7
BMI (kg/m ²)	26.5	27.1	20.8	28.4

Fig. 2 shows an example of an image with country distribution. Check the country distribution to reveal the important detail in the figure.

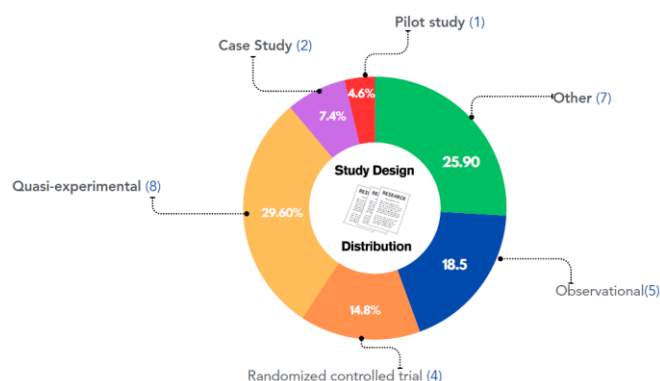


Fig. 2 A donut chart in green, apple green, blue, orange, red, and purple differentiates Randomized Controlled Trial, Quasi-experimental, Case Study, Observational, Other, and Pilot Study.

IV. CONCLUSIONS

AI-supported rehabilitation technologies are clinically effective, significantly improving pain reduction, movement recovery, and prosthetic function. These innovations, especially wearables, and VR, also enhance patient engagement and therapy adherence. However, challenges like high costs, limited reach, and technical barriers persist. To ensure broader adoption, long-term trials, more affordable devices, and clearer AI logic are essential for integrating AI into routine rehabilitation practices.

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Unveiling the Best: Goalkeeper Contributions to Build-Up Play in the 2022 FIFA World Cup

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Keywords: Goalkeeper performance, World Cup 2022, Distribution under pressure, Performance metrics, Play-by-play analysis

I. INTRODUCTION

In modern football, the role of the goalkeeper has expanded significantly beyond traditional shot-stopping responsibilities. Goalkeepers are now integral to a team's overall strategy, contributing to build-up play and helping manage pressure during transitions. This evolution reflects tactical shifts that demand greater technical skill, vision, and composure from goalkeepers in both defensive and offensive phases of play. This study investigates goalkeeper contributions in the 2022 FIFA World Cup, emphasizing their build-up play under pressure and influence on match outcomes [1]. Existing research has largely focused on conventional defensive metrics, often overlooking distribution techniques and broader performance comparisons. As such, there is a need for a more comprehensive framework to evaluate the goalkeeper's multifaceted role in modern football [2].

II. METHODS

This study employed a systematic observational approach to analyze goalkeeper performance in the 2022 FIFA World Cup. Match footage from all 64 games was examined using Nacsport video analysis software to evaluate technical and tactical goalkeeper behaviors, particularly their distribution under pressure. A total of 41 goalkeepers were included in the analysis. A structured coding scheme and a match observation leveled board were developed to ensure consistent data collection across all matches. Variables assessed included type, direction, and success rate of goalkeeper distributions under opponent pressure. Observational criteria were defined based on existing literature and refined through pilot testing. A reliability value above 0.80 was achieved and maintained, indicating high reliability of the coding process. Any discrepancies were reviewed and resolved through consensus discussion. Descriptive statistics were used to summarize performance trends, while Mann-Whitney U tests were conducted to identify statistically significant differences in distribution performance between goalkeepers from winning and losing teams.

III. RESULTS AND DISCUSSION

A. Analyze Goalkeeper Contributions in Team Build-Up Under Opponent Pressure

Goalkeepers primarily employed long passes, throws, rolls, goal kicks, and drop kicks under pressure. Short passes, throws, and rolls proved most effective in maintaining

possession. High-performing goalkeepers, such as Emiliano Martínez, exhibited fewer distribution errors and more consistent success under pressure, distinguishing themselves clearly from their lower-performing counterparts.

B. Determine the Relationship Between Goalkeeper Contributions and Match Outcomes

Teams with goalkeepers who executed accurate distributions and minimized errors had better match outcomes. Statistical analysis showed significant links between distribution metrics and team success, with large effect sizes. Few outliers emerged, reinforcing the trend that successful goalkeeper involvement in build-up play positively influenced performance, as exemplified by Martínez's reliable under-pressure distributions.

TABLE I
DIFFERENCES BETWEEN ELITE AND NON-ELITE GOALKEEPERS

Variables	Effect Size	p-value
1v1 duels unsuccess	0.6250	0.005*
Interceptions unsuccess	0.5429	0.016*
Long passes unsuccess	0.8393	< 0.001*
Goal kick unsuccess	0.5429	0.022*
Catching unsuccess	0.6107	0.008*
Diving saves unsuccess	0.6536	0.006*
Punching unsuccess	0.4250	0.040*

*Significant at $p < 0.05$

The analysis revealed large to very large effect sizes across key goalkeeper performance metrics, illustrating clear distinctions between elite and lower-tier goalkeepers. The most striking finding was the disparity in unsuccessful long passes ($r = 0.839$, $p < 0.001$), highlighting top goalkeepers' superior distribution accuracy and situational awareness in initiating possession-based play under pressure, a role increasingly vital in modern tactics [3]. Similarly, significant differences were found in unsuccessful 1v1 duels ($r = 0.625$, $p = 0.005$), interceptions ($r = 0.543$, $p = 0.016$), goal kicks ($r = 0.543$, $p = 0.022$), catching ($r = 0.611$, $p = 0.008$), and diving saves ($r = 0.654$, $p = 0.006$). These results suggest that elite goalkeepers excel not only in technical execution but also in positioning, timing, and decision-making during dynamic,

high-pressure situations. This aligns with broader research emphasizing the goalkeeper's role in defensive coordination and game management [4]. Even unsuccessful punching showed a moderate effect size ($r = 0.425$, $p = 0.040$), indicating that higher-level goalkeepers demonstrate better aerial command and clearance under pressure—critical skills for managing set-piece threats and crowded penalty areas [5].

IV. CONCLUSIONS

The analysis of goalkeeper performance during the 2022 FIFA World Cup highlights the increasingly multifaceted role of goalkeepers in modern football. Beyond traditional shot-stopping, goalkeepers significantly influenced team outcomes through their distribution accuracy, decision-making under pressure, and defensive command. The data revealed that successful teams relied heavily on short, precise passes initiated by goalkeepers, underlining their strategic importance in structured build-up play. Significant differences in long pass accuracy, 1v1 duels, interceptions, goal kicks, and various defensive actions further demonstrate that elite goalkeepers not only excel in technical execution but also in spatial awareness, anticipation, and composure under high-pressure scenarios. These findings confirm that goalkeeper involvement is no longer limited to the defensive third but extends into active participation in team tactics and transitions. As such, performance evaluation frameworks must evolve to include distribution metrics, pressure management, and error minimization. Training programs should prioritize technical distribution skills, aerial control, and communication to align with the demands of high-level competition. Ultimately, the goalkeeper's ability to balance defensive reliability with offensive initiation stands out as a defining factor in elite team performance.

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Evaluating AI and Traditional Models for Injury Prediction and Prevention in High-Contact Sports

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Keywords: Sports injury prediction, Artificial intelligence, Machine learning models, Injury prevention, High-contact sports

I. INTRODUCTION

Artificial intelligence (AI) holds promise in transforming sports injury prediction and prevention. However, the integration of AI into high-contact sports contexts remains methodologically fragmented [1]. This systematic review and meta-analysis investigate prevailing AI definitions, model types, predictive accuracy [2], and preventive applications compared to traditional methods, addressing critical gaps in model quality, interpretability, and utility for risk factor identification in sports medicine [3].

II. METHODS

This systematic review followed a prospectively registered protocol in PROSPERO (ID: 611050), adhering strictly to PRISMA 2020 guidelines. Comprehensive database searches (PubMed, Web of Science, Scopus, OVID-MEDLINE) employed structured searches guided by the PICO framework to identify relevant studies published until January 2025.

Eligible studies included prospective cohort or observational designs involving athletes in high-contact sports. Studies compared machine learning-based predictive models with traditional injury-prediction methods and reported injury incidence, type, and recovery outcomes.

Data extraction involved demographic, training load, injury, and performance metrics. Quantitative analyses assessed model accuracy and robustness, while qualitative synthesis provided deeper insight into predictive performance and individualized injury risk identification.

III. RESULTS AND DISCUSSION

A. Study Characteristics and Populations

The systematic review included 10 studies from six different countries, with Australia contributing the most studies. A total of 3,179 subjects participated, comprising young adult athletes involved in high-contact sports. Participants had a mean age of 23.7 years (*median* = 22.7; *range* = 20–28.8). The studies were short-term, uniformly lasting approximately nine days. Recruitment predominantly occurred from sports clubs and teams during pre-season evaluations.

B. Pooled Treatment Effects

Pooled analyses demonstrated that machine learning-based predictive models were more effective compared to traditional methods for reducing injury incidence among athletes in high-contact sports. Machine learning models such as Random Forests, XGBoost, and ADTree showed superior predictive accuracy, achieving AUC values ranging from 0.76 to 0.88. Specifically, SmoteBoost with ADTree yielded high accuracy for predicting hamstring (AUC = 0.837) and lower extremity injuries (AUC = 0.747). In contrast, traditional models generally produced less consistent results due to limited capacity for handling complex interactions among injury risk factors.

C. Subgroup Analysis by Treatment Duration

Subgroup analysis based on treatment duration indicated that shorter interventions, specifically pre-season or immediate short-term evaluations (approximately nine days), demonstrated consistent effectiveness of machine learning models in predicting and potentially reducing injury risk. However, due to the absence of longer-term intervention data, the sustained effectiveness of these models over extended periods remains uncertain. Future research with prolonged monitoring is recommended to establish long-term efficacy and durability of injury prevention through these predictive approaches.

Fig. 1 Map showing the geographic origin of the 10 studies included in this



systematic review. Colour intensity reflects the number of studies per country (scale 1–4).

TABLE I
SUBJECT CHARACTERISTICS

Characteristic	Mean	Median	Min	Max
Age (yrs)	23.7	22.7	20.0	28.8
Study Duration (days)	9	9	9	9

Fig. 2 shows the study design distribution for included studies.

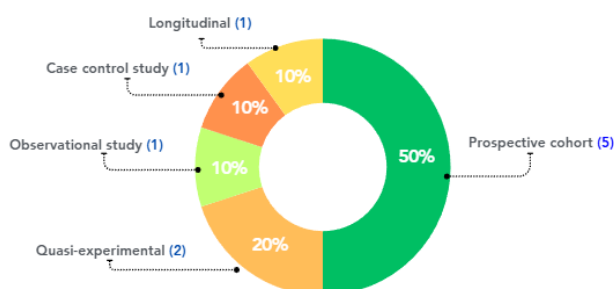


Fig. 2 A donut chart in green, apple green, yellow, lime, and orange differentiates Prospective cohort, Longitudinal, and Case control study, Quasi-experimental, and Quasi-experimental.

IV. CONCLUSIONS

AI-based models outperform traditional methods in predicting and preventing sports injuries, particularly in high-contact sports. Despite interpretability and generalizability challenges, ensemble and hybrid techniques show strong potential for real-time, personalized risk management. Standardized reporting and broader validation are essential for clinical translation and integration into sports injury prevention protocols.

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Acute Effect of Intermittent Fasting on Strength and Endurance Performance Among Active Students

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Keywords: Intermittent fasting, Strength performance, Endurance, 16:8 protocol, Active students

I. INTRODUCTION

Intermittent fasting (IF), particularly the 16:8 method, is widely practiced for improving health, weight management, and physical fitness [1]. This time-restricted feeding method limits food intake to an 8-hour window and involves fasting for the remaining 16 hours [2]. Although IF has shown promising results in terms of body composition and metabolic health, its acute effect on physical performance, especially in terms of strength and endurance, is still unclear and underexplored [3][1].

Most available studies focus on long-term outcomes of intermittent fasting or religious fasting like Ramadan, which differs from a structured IF protocol [3][4]. There is a research gap in investigating the short-term (acute) effects of a controlled 16:8 fasting pattern, especially among non-elite but physically active populations. The question remains whether IF can support or hinder short-term strength and endurance performance.

II. METHODS

This study focuses on twenty active students from UiTM Seremban 3 aged 18 to 26 years, male and female, who regularly engage in physical activity but are not elite athletes exercise at least three times per week. A within-subjects crossover design was used. All participants completed two physical performance trials, one after seven days of intermittent fasting and one during a non-fasting condition.

Strength was assessed using the 1RM bench press test, while endurance was measured through a 2.4 km time trial. This direct comparison allows us to examine immediate changes in performance due to fasting.

The intermittent fasting protocol followed a 16:8 time method for seven consecutive days. Participants fasted from 3.30 a.m. to 7.30 p.m., during which no food or drink, including calorie-free fluids, was allowed. Meals were consumed only during the 7.30 p.m. to 3.30 a.m. window, without any imposed caloric restrictions.

Strength was assessed using a one-repetition maximum bench press test, following standard progressive loading procedures. Endurance performance was evaluated using a 2.4-kilometer time trial. Performance outcomes were compared between fasting and non-fasting trials.

III. RESULTS AND DISCUSSION

A. Descriptive Statistic

Table 1 presents the descriptive statistics for the physical characteristics of the participants, categorized by gender. A total of 20 participants were involved in the study (13 females, 7 males). For BMI, female participants had a mean of 20.9 ± 4.47 , ranging from 15.4 to 29.9, while males had a mean of 24.0 ± 2.97 , ranging from 19.0 to 27.8. In terms of height, females averaged 157 ± 4.94 cm and ranged from 148 to 165 cm, whereas males averaged 173 ± 4.90 cm, with a minimum of 167 cm and a maximum of 180 cm. For age, the female group had a mean age of 23.0 ± 1.08 years, and the male group had a mean of 22.6 ± 0.535 years.

TABLE I
DESCRIPTIVE TABLE FOR BMI, HEIGHT AND AGE

VARIABLES	GENDER	N	MEAN (SD)	MIN	MAX
BMI	FEMALE	13	20.9 (4.47)	15.4	29.9
	MALE	7	24.0 (2.97)	19.0	27.8
HEIGHT	FEMALE	13	157 (4.94)	148	165
	MALE	7	173 (4.90)	167	180
AGE	FEMALE	13	23.0 (1.08)	22	26
	MALE	7	22.6 (0.54)	22	23

B. 1RM Bench Press and 2.4km TT Result

Table 2 and Table 3 show the performance outcomes for strength and endurance under fasting and non-fasting conditions. For strength, the one-repetition maximum bench press was lower during intermittent fasting, with a median of 25.0 kg compared to 27.5 kg in the non-fasting condition. This difference was statistically significant with a p -value of 0.004, indicating that acute intermittent fasting may impair upper-body strength. For endurance, the average 2.4-kilometer run time during fasting was 17.7 minutes, while the non-fasting condition resulted in a faster mean time of 16.6 minutes. The difference was statistically significant with a p -value less than 0.001. These results suggest that short-term intermittent fasting reduces both muscular strength and aerobic endurance. The observed decline in performance may be due to reduced

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glycogen availability and limited hydration [2], which affect energy output and stamina. Participants with lower body mass index appeared more affected, highlighting individual variability in response to fasting [4].

TABLE II
1 RM BENCH PRESS SCORE DURING INTERMITTENT FASTING AND NON-FASTING

VARIABLES	MEDIAN (SD)		Z STATISTIC	P VALUE
	IF	NON-IF		
1RM BENCH PRESS	25.0 (15.38)	27.5 (16.30)	-3.96	0.004

TABLE III
2.4 KM TIME TRIAL SCORE DURING INTERMITTENT FASTING AND NON-FASTING

VARIABLES	MEAN (SD)		T STATISTIC (DF)	P VALUE
	IF	NON-IF		
2.4KM TIME TRIAL	17.7 (3.95)	16.6 (3.82)	-4.27 (19)	< 0.001

C. Performance Outcome

Performance outcomes under non-fasting conditions were consistently better than during intermittent fasting. Although no formal subjective measures were collected, observations suggest participants felt more energized and performed better when not fasting [5]. Most participants showed reduced strength and endurance during fasting, especially those with lower body mass index, who may have had less energy reserve. This pattern aligns with earlier findings that intermittent fasting may reduce performance, particularly when carbohydrate availability and hydration are limited [6]. The results suggest that for non-elite active individuals, non-fasting conditions may be more suitable for maintaining peak performance in strength and endurance tasks [7][8].

IV. CONCLUSIONS

This study investigated the acute effects of intermittent fasting using a 16:8 protocol on strength and endurance performance among active students. The findings showed that intermittent fasting significantly reduced both muscular strengths, as measured by one-repetition maximum bench press, and endurance performance, as measured by the 2.4 km time trial. Performance outcomes were consistently better under non-fasting conditions. These results suggest that intermittent fasting may impair short-term physical performance, particularly in non-elite, active individuals, who often experience reduced carbohydrate availability and

hydration, which are critical for sustaining exercise output [9]. Additionally, recent evidence shows that even seven days of fasting can significantly lower performance capacity and alter metabolic responses to exercise, highlighting the physiological strain imposed by acute fasting on active individuals [10]. Therefore, athletes and recreational exercisers should carefully consider their nutritional timing when aiming for optimal performance in training or competition.

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The Acute Effects of Beetroot Juice on Muscular Endurance Among Recreationally Active Young Adult Males

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Keywords: Beetroot juice, Muscular endurance, Recreationally active males, Resistance exercise, Perceived exertion

I. INTRODUCTION

Beetroot juice, rich in dietary nitrates, has gained interest for its potential ergogenic effects. While prior studies focus on aerobic and high-intensity performance, few investigate its acute influence on resistance-based endurance. This study examines the immediate effects of diluted beetroot juice on muscular endurance and perceived exertion in recreationally active young adult males, addressing existing gaps by incorporating both objective performance and subjective fatigue measures [1].

II. METHODS

Fourteen recreationally active males (18–35 years) completed a randomized, single-blind, placebo-controlled crossover trial. Participants consumed 250 ml of either beetroot juice or a nitrate-free placebo two hours before performing push-ups and squats for 90 seconds each. Repetitions were counted, and perceived exertion was rated using the Borg RPE scale. A 2-day washout period separated conditions. Eligibility was based on activity level, with strict exclusion criteria applied.

III. RESULTS AND DISCUSSION

A. Immediate Impact of Beetroot Juice on Muscular Endurance

Push-up performance improved significantly after beetroot juice ($M = 9.21$) versus placebo ($M = 4.43$), $p = 0.016$, with a moderate-to-large effect. Squat differences were non-significant. These findings indicate that acute beetroot supplementation enhances upper-body muscular endurance more reliably than lower-body, likely due to oxygen delivery dynamics in smaller muscle groups.

B. Comparison of Performance Between Exercises

Push-ups showed greater performance gains (+4.78 reps) compared to squats. The upper-body response may reflect beetroot juice's rapid vascular benefits in smaller muscles, whereas larger muscles may require prolonged exposure or higher doses to yield meaningful effects.

C. Comparison of Perceived Exertion Between Conditions

Perceived exertion during push-ups was lower in the beetroot condition, showing a borderline trend ($p = 0.065$), though no RPE difference was found for squats. This suggests beetroot juice may reduce subjective effort in upper-body

exercises, highlighting its potential for improving both performance and exercise tolerance.

TABLE I
DESCRIPTIVE STATISTICS FOR REPETITION AND RPE CHANGE SCORES

	Treatment	Squat_ Change	Pushup_ Change	RPE_Squat_ _Change	RPE_Pushup_ _Change
N	Beetroot	14	14	14	14
	Placebo	14	14	14	14
Mean	Beetroot	10.4	9.21	1.36	-0.357
	Placebo	6.71	4.43	1.14	0.357
Standard deviation	Beetroot	7.06	7.43	1.45	1.65
	Placebo	12.8	3.76	1.61	1.50
Minimum	Beetroot	0	-3	-1	-4
	Placebo	-15	-1	-2	-3
Maximum	Beetroot	22	25	4	2
	Placebo	43	14	4	2

Participants showed greater improvements in both squat and push-up repetitions in the beetroot condition. RPE changes were minimal.

Table I presents the descriptive statistics for the change scores in squat repetitions, push-up repetitions, and ratings of perceived exertion (RPE) following beetroot juice and placebo treatments. Participants demonstrated greater improvements in both squat and push-up performance in the beetroot condition compared to the placebo. Additionally, a slight reduction in RPE for push-ups was observed in the beetroot condition, while RPE for squats increased marginally under both conditions.

TABLE II
PAIRED SAMPLES T-TEST RESULTS COMPARING BEETROOT AND PLACEBO
CONDITIONS (N = 14)

Measure	t	df	p	Mean Difference	95% CI of Difference	Cohen's d	Interpretation
Squat_Repetition_Change	1.437	13	.174	3.64	[-1.83, 9.12]	0.38	Not significant
Pushup_Repetition_Change	2.772	13	.016	4.79	[1.06, 8.52]	0.74	Significant
RPE_Squat_Change	0.586	13	.568	0.21	[-0.58, 1.00]	0.16	Not significant
RPE_Pushup_Change	-2.016	13	.065	-0.71	[-1.48, 0.05]	-0.54	Borderline (not significant)

Note. H_a μ Measure 1 - Measure 2 $\neq$ 0. CI = Confidence Interval; $p < 0.05$ is considered statistically significant. Cohen's d reflects effect size. A significant improvement was found in push-up repetitions with beetroot ($p = 0.016$, $d = 0.74$), while other variables showed no significant differences.

A paired-samples t-test was conducted to compare the effects of beetroot juice and placebo on muscular endurance and perceived exertion.

Results indicated a statistically significant increase in push-up repetitions under the beetroot condition ($M = 9.21$, $SD = 7.43$) compared to placebo ($M = 4.43$, $SD = 3.76$), $t(13) = 2.772$, $p = 0.016$, Cohen's $d = 0.74$. This reflects a moderate-to-large effect size.

Squat repetitions did not differ significantly between treatments ($t(13) = 1.437$, $p = 0.174$, $d = 0.38$). Likewise, RPE changes for squats ($t(13) = 0.586$, $p = 0.568$, $d = 0.16$) and push-ups ($t(13) = -2.016$, $p = 0.065$, $d = -0.54$) were not significant, although the push-up RPE approached significance.

TABLE III
NORMALITY TEST (SHAPIRO-WILK)

		W	p
Squat_Change_Beetroot	- Squat_Change_Placebo	0.882	0.062
Pushup_Change_Beetroot	- Pushup_Change_Placebo	0.968	0.842
RPE_Squat_Change_Beetroot	- RPE_Squat_Change_Placebo	0.916	0.190
RPE_Pushup_Change_Beetroot	- RPE_Pushup_Change_Placebo	0.863	0.034

Note. A p -value < 0.05 suggests a violation of the assumption of normality.

Normality of the difference scores was assessed using the Shapiro-Wilk test. As shown in Table III, the assumption of normality was met for all comparisons ($p > 0.05$), except for RPE push-up change, which showed a slight violation ($p = 0.034$). Visual inspection of Q-Q plots showed approximate normality for all variables, except for RPE push-up change, which slightly deviated from the line.

IV. CONCLUSIONS

Acute beetroot juice supplementation significantly improves upper-body muscular endurance and may reduce perceived exertion during push-ups in recreationally active

males [2]. However, no significant effects were observed for lower-body performance [3]. These findings support beetroot juice as a practical ergogenic aid for enhancing upper-body resistance training outcomes in this population [4].

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Comparison of Physical Fitness Between UiTM Seremban Muay Thai and Silat Olahraga Athletes

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Keywords: Physical test, Muscular endurance, Muscular strength, Muscular power, Body composition

I. INTRODUCTION

Combat sports such as Muay Thai and Silat Olahraga demand high levels of physical fitness, encompassing strength, endurance, agility, and power to perform optimally during competition. While both disciplines involve striking techniques, they differ significantly in movement patterns, tactical approaches, and training emphases, which may lead to distinct physical fitness profiles [1]. Muay Thai emphasizes continuous striking, clinching, and powerful kicks, often requiring superior anaerobic endurance and lower-limb power [2]. In contrast, Silat Olahraga involves rapid, strategic offensive and defensive movements, relying heavily on agility, flexibility, and short bursts of explosive strength [3]. Despite growing participation in these sports at the university level in Malaysia, comparative studies focusing on their athletes' physical fitness profiles remain limited. A better understanding of these differences can provide valuable insights for coaches and sport scientists to tailor training programs based on sport-specific demands. Therefore, this study aims to compare physical fitness components between Muay Thai and Silat Olahraga athletes from Universiti Teknologi MARA (UiTM) Seremban.

II. METHODS

Twenty-two untrained Muay Thai and Silat Olahraga athletes (aged 19–26) from UiTM Seremban completed tests on body composition, muscular endurance (sit-ups), muscular strength (1RM deadlift), and muscular power (vertical jump). Descriptive statistics summarized demographic data, while independent t-tests and regression analysis examined intergroup differences and fitness relationships, with standardized rest intervals between tests.

III. RESULTS AND DISCUSSION

A. Athlete Characteristics

Table 1 presents the demographic and anthropometric characteristics of the Muay Thai and Silat Olahraga athletes from UiTM Seremban. Both groups had an identical mean age of 21.0 years, with Muay Thai athletes showing slightly higher variability ($SD = 2.10$) compared to Silat athletes ($SD = 1.84$). In terms of body weight, Silat Olahraga athletes had a higher mean weight (65.2 ± 20.2 kg) than Muay Thai athletes (60.6 ± 9.74 kg), with a wider range of values (44.0 to 102.0 kg for Silat vs. 45.9 to 78.6 kg for Muay Thai). Similarly, the mean

Body Mass Index (BMI) was higher in the Silat group (24.4 ± 5.93) compared to the Muay Thai group (21.7 ± 2.78), with respective ranges of 17.9–35.4 and 18.7–28.5. However, no statistically significant differences were observed between the two groups for age, weight, or BMI ($p > 0.05$). These findings suggest that the two athlete groups were generally comparable in basic physical characteristics, allowing for fair comparisons in subsequent physical fitness analyses.

TABLE I
ATHLETES' CHARACTERISTICS

	Type Of Sports	Mean (SD)	Minimum	Maximum
Age	Muay Thai	21.0 (2.10)	19.0	25.0
	Silat Olahraga	21.0 (1.84)	19.0	24.0
Weight	Muay Thai	60.6 (9.74)	45.9	78.6
	Silat Olahraga	65.2 (20.2)	44.0	102
Bmi	Muay Thai	21.7 (2.78)	18.7	28.5
	Silat Olahraga	24.4 (5.93)	17.9	35.4

B. Comparison Between Muay Thai and Silat Olahraga on Physical Performance

Table II presents the comparison of physical fitness parameters between Muay Thai and Silat Olahraga athletes from UiTM Seremban. Although none of the differences reached statistical significance ($p > 0.05$), several trends are notable and reflect sport-specific physical demands. The Muay Thai athletes demonstrated higher mean values in muscular endurance (34.0 ± 8.71 reps) and muscular power (22.2 ± 5.28 cm) compared to Silat athletes (28.2 ± 7.88 reps and 19.9 ± 3.25 cm, respectively). These trends are consistent with the training characteristics of Muay Thai, which involve repetitive striking, clinch work, and continuous engagement that enhance both endurance and lower-limb power output [1]. Explosive movements such as roundhouse kicks and knee strikes may contribute to better horizontal power expression as measured in the standing broad jump test.

Conversely, Silat Olahraga athletes recorded a slightly higher mean in muscular strength (95.7 ± 28.89 kg) compared to Muay Thai athletes (92.5 ± 24.89 kg). This could be

attributed to the strength-oriented components of Silat training, which involve body control, stance transitions, and grappling manoeuvres that demand upper-body and core strength [4][5]. In terms of body composition, Silat athletes had a higher BMI (24.2 ± 5.93) and greater muscle mass (29.9 ± 5.39 kg) than Muay Thai athletes (BMI = 21.7 ± 2.78 ; muscle mass = 33.7 ± 7.1 kg), though again, these differences were not statistically significant. Interestingly, Muay Thai athletes showed a lower body fat percentage ($17.5 \pm 9.02\%$) than their Silat counterparts ($22.9 \pm 8.36\%$). This may reflect the higher cardiovascular and metabolic demands of Muay Thai training, which includes pad work, sparring, and conditioning circuits aimed at reducing excess fat while maintaining lean muscle mass [2].

TABLE II
COMPARISON BETWEEN MUAY THAI AND SILAT OLAHRAGA ON PHYSICAL PERFORMANCE

	Group Muay Thai (Mean $\pm$ SD)	Group Silat Olahraga (Mean $\pm$ SD)	t(df)	p
Muscular Endurance	34.0 $\pm$ 8.71	28.2 $\pm$ 7.88	1.643 (20.0)	0.116
Muscular Strength	92.5 $\pm$ 24.89	95.7 $\pm$ 28.89	-0.277 (20.0)	0.785
Muscular Power	22.2 $\pm$ 5.28	19.9 $\pm$ 3.25	1.231 (20.0)	0.233
Bmi	21.7 $\pm$ 2.78	24.2 $\pm$ 5.93	-1.367 (20.0)	0.187
Muscle Mass	33.7 $\pm$ 5.71	29.9 $\pm$ 5.39	1.613 (20.0)	0.122
Body Fat Percentage	17.5 $\pm$ 9.02	22.9 $\pm$ 8.36	-1.442 (20.0)	0.165

IV. CONCLUSIONS

This study highlights notable differences in physical performance between Muay Thai and Silat Olahraga athletes. Overall, while no statistically significant differences were observed between groups, the data suggest that Muay Thai training may favour endurance, power, and leanness, whereas Silat training may enhance strength and muscle mass development. These trends emphasize the importance of tailoring conditioning programs to meet the unique physical demands of each martial art, supporting athletic development through sport-specific training approaches.

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Comparative Effectiveness of Velocity-Based Versus Percentage-Based Load Prescription on Strength, Hypertrophy, and Power Outcomes in Resistance-Trained Individuals or Athletes: A Systematic Review

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Keywords: Velocity-based training, Percentage-based loading, Load prescription, Strength adaptation, Hypertrophy, Power development

I. INTRODUCTION

Velocity-based load prescription (VBLP) and traditional percentage-based load prescription (PBLP) are widely used to optimize resistance training adaptations. However, their comparative impact on strength, hypertrophy, and power in trained populations remains unclear. This systematic review evaluates current evidence, quantifies differential outcomes between VBLP and PBLP, and highlights methodological inconsistencies to guide practitioners and researchers toward evidence-based resistance training recommendations [1].

II. METHODS

We conducted a systematic review per a pre-specified protocol registered in PROSPERO (CRD420251053818) on 1 July 2025, adhering to PRISMA 2020 guidelines. Four databases (Web of Science, PubMed, Scopus, OVID MEDLINE) were searched using PICO-based MeSH/Emtree terms and keywords through January 10, 2025[3]. Additional hand-searching and forward/backward citation tracking ensured comprehensive coverage [2].

After duplicate removal, 1,405 records underwent title/abstract screening, of which 1,054 underwent dual screening and 524 were excluded, yielding 530 full texts for eligibility assessment. Independent reviewers resolved conflicts by consensus. Ultimately, six studies met all the inclusion criteria for comparative VBLP and PBLP analysis.

Data extraction used REDCap-piloted forms with automated range checks. Extracted items included study and participant characteristics, VBT and PBT parameters, primary strength and secondary power and hypertrophy outcomes, adherence, adverse events, and summary statistics [5]. Twenty percent of entries were independently validated. Risk of bias was assessed via RoB 2, ROBINS-I, and RoB-B-T with GRADE applied to outcome confidence [4].

III. RESULTS AND DISCUSSION

A. Hypertrophy

Meta-analytic pooling across six randomized trials yielded a small-to-moderate effect size for muscle hypertrophy

(*Hedges' g* = 0.28) with substantial heterogeneity ($I^2 \approx 58\%$) [7]. Variability in measurement protocols, imaging modalities, and velocity-loss thresholds contributed to outcome dispersion. Standardized assessment techniques and reporting guidelines are necessary to improve comparability and reduce methodological bias [6].

B. Strength

Quantitative synthesis revealed a robust effect on maximal strength gains (*Hedges' g* = 0.78) with moderate heterogeneity ($I^2 \approx 54\%$) across velocity-loss thresholds and device types. Sensitivity analyses, leave-one-out, and high-risk study exclusion confirmed stability. Publication bias assessment via funnel plots and Egger's test indicated minimal asymmetry, supporting result validity.

C. Power

Power performance improved moderately in pooled analyses, with a *Hedges' g* of 0.65 and moderate heterogeneity ($I^2 \approx 48\%$) [8]. Subgroup examinations by velocity-loss cutoff and device type demonstrated consistent enhancement in jump height, sprint velocity, and change-of-direction metrics [9]. These findings suggest both velocity-based and percentage-based prescriptions effectively augment power outputs in resistance-trained athletes.

D. Discussion

Methodological diversity in velocity-loss thresholds, device types, and intervention lengths, alongside small male-dominant samples, constrained meta-analytic synthesis and generalizability [10]. Inconsistent reporting of nutritional controls and training status further complicated interpretations. Future studies should standardize velocity-cutoff protocols, extend intervention durations beyond eight weeks, and include varied athlete populations to refine evidence-based load-prescription recommendations.

E. Figure and Table

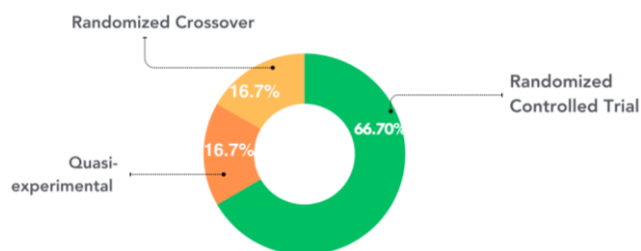


Fig. 1 A donut chart in distinct grey shades that separates Randomized Controlled Trial, Single-arm/Feasibility, and Other designs.

TABLE I
SUBJECT CHARACTERISTICS

Characteristic	Mean	Median	Min	Max
Age (yrs)	23.4	22.7	21.7	26.2
Height (cm)	174.9	179.2	168.5	181.4
Weight (kg)	69.8	67.2	59.5	89.3
BMI (kg/m2)	22.8	20.9	21	27.1

Fig. 2 shows an example of an image with country distribution. Check the country distribution to reveal the important detail in the figure.

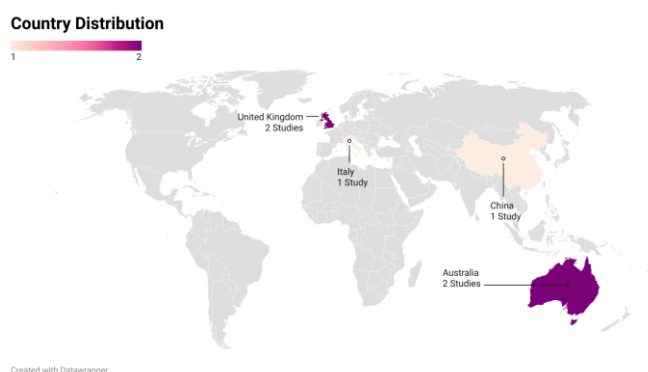


Fig. 2 Map showing the geographic origin of the 4 studies included in this systematic review. Colour intensity reflects the number of studies per country (scale 1–3).

IV. CONCLUSIONS

This systematic review demonstrates that velocity-based and percentage-based load prescriptions both enhance strength, hypertrophy, and power outcomes in resistance-trained athletes, with VBLP offering superior power gains via autoregulation. Standardization of protocols and inclusion of diverse populations are recommended to optimize prescription strategies.

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Differences in Range of Motion on Gastrocnemius Hypertrophy Among Untrained Males

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Keywords: Range of motion (ROM), Gastrocnemius, Muscle hypertrophy, Strength training, Resistance exercise

I. INTRODUCTION

While muscle hypertrophy has been extensively studied, the gastrocnemius remains underexplored, particularly in the context of range of motion (ROM) in resistance training. Recent evidence indicates that training at longer muscle lengths may lead to superior hypertrophic adaptations; however, the majority of existing research has focused on larger muscle groups such as the quadriceps or biceps [1][2]. This study examines the effects of full, initial, and final ROM on gastrocnemius hypertrophy and strength development in untrained males. By employing field-practical assessment tools such as circumference measurements and submaximal one-repetition maximum (1RM) testing, this research aims to address notable gaps in the literature related to muscle-specific adaptations, training adherence, and the practical application of ROM-specific protocols in real-world settings [3][4].

II. METHODS

A randomized pretest-post-test experimental design was employed involving thirty healthy, untrained males aged 18–25 years from local gyms. Participants had no structured resistance training experience within the previous 12 months and were classified as physically inactive using the International Physical Activity Questionnaire (IPAQ). Participants were randomly assigned to one of three intervention groups: Full Range of Motion (FULLROM), Initial Range of Motion (INITIALROM), or Final Range of Motion (FINALROM). The intervention consisted of an eight-week supervised resistance training program using the seated calf raise exercise, performed three times per week. Each session comprised three sets of 10–12 repetitions at a load between 65–75% of estimated one-repetition maximum (1RM), with rest intervals of 2–3 minutes between sets. Range of motion was standardized using a goniometer: FULLROM (–25° dorsiflexion to +25° plantarflexion), INITIALROM (–25° to 0°), and FINALROM (0° to +25°), with all sessions monitored for adherence and technique. Gastrocnemius muscle hypertrophy was assessed pre- and post-intervention via circumference measurements at the widest part of the muscle using a non-elastic measuring tape, following ISAK anthropometric standards. Muscular strength was evaluated using a submaximal indirect 1RM testing protocol, involving 3–5 repetitions at a challenging load on a pin-loaded seated calf raise machine; estimated 1RM values were derived using the Baechle & Earle [5] equation to ensure participant safety. Participants also recorded sessional data, including repetitions, load, and rate of perceived exertion (RPE), to

monitor progression and ensure training consistency. Data were analyzed using repeated measures ANOVA to evaluate within-group and between-group differences in muscle hypertrophy and strength, with significance set at $p \leq 0.05$.

III. RESULTS AND DISCUSSION

A. Effects of Range of Motion (ROM) Training on Gastrocnemius Hypertrophy and Strength

A statistically significant improvement in estimated 1RM performance was observed across all groups in Table I. The FULLROM group increased from 48.3 ± 5.61 kg to 57.9 ± 5.13 kg ($t = -18.5$, $p < 0.001$, $d = 5.84$), the INITIALROM group from 47.5 ± 4.28 kg to 57.8 ± 4.45 kg ($t = -10.9$, $p < 0.001$, $d = 3.44$), and the FINALROM group from 49.7 ± 5.05 kg to 59.5 ± 5.23 kg ($t = -14.5$, $p < 0.001$, $d = 4.58$). These substantial strength gains align with previous literature indicating that untrained individuals typically experience rapid neural adaptations during the initial weeks of resistance training, including increased motor unit recruitment and improved neuromuscular coordination [6].

In terms of hypertrophy, all ROM groups showed significant increases in gastrocnemius girth. The FULLROM group improved from 36.8 ± 1.49 cm to 38.5 ± 1.56 cm ($t = -11.6$, $p < 0.001$, $d = 3.66$), the INITIALROM group from 36.7 ± 1.35 cm to 38.6 ± 1.40 cm ($t = -21.1$, $p < 0.001$, $d = 6.66$), and the FINALROM group from 36.6 ± 1.39 cm to 38.3 ± 1.43 cm ($t = -14.8$, $p < 0.001$, $d = 4.67$). The greatest mean difference was observed in the INITIALROM group, supporting the hypothesis that training at longer muscle lengths promotes greater stretch-mediated hypertrophy due to increased mechanical tension in lengthened positions [1][2].

TABLE I
PAIRED SAMPLES T-TEST RESULTS FOR PRE-POST GIRTH AND 1RM
STRENGTH ACROSS ROM GROUPS

Group	Variable	Mean Difference	t(df)	p-value	Cohen's d
FULL	Girth	–1.67	–11.60(9)	< 0.001	–3.66
	1RM Strength	–9.65	–18.50(9)	< 0.001	–5.84
INITIAL	Girth	–1.88	–21.10(9)	< 0.001	–6.66
	1RM Strength	–10.34	–10.90(9)	< 0.001	–3.44
FINAL	Girth	–1.70	–14.80(9)	< 0.001	–4.67
	1RM Strength	–9.88	–14.50(9)	< 0.001	–4.58

Although all groups demonstrated significant improvements, a mixed ANOVA in Table II revealed a significant main effect of group ($F(2,27) = 5.69, p = 0.009, \eta^2_p = 0.296$).

TABLE II
MIXED ANOVA RESULTS

Source	df	F	p-value	Partial η^2
Time (Girth)	1, 27	654.77	0.000	0.960
Group	2, 27	5.69	0.009	0.296
Time $\times$ Group	2, 27	0.89	0.424	0.062

Post-hoc analysis in Table III indicated a significant difference between FULLROM and FINALROM ($p = 0.007$), but no significant difference between INITIALROM and either of the other two groups. This suggests that, while INITIALROM showed the largest individual gains, within-group variability may have obscured statistically significant differences between groups.

TABLE III
POST HOC PAIRWISE COMPARISONS (BETWEEN GROUPS)

Comparison	Mean Diff	p-value	95% CI
FULL vs. FINAL	1.227	0.007	[0.297, 2.157]
FULL vs. INITIAL	0.567	0.393	[-0.363, 1.497]
FINAL vs. INITIAL	-0.660	0.243	[-1.590, 0.270]

These findings align with prior studies showing that ROM can critically influence hypertrophic adaptations [2]. Specifically, partial ROM at extended muscle lengths (INITIALROM) may offer a hypertrophic advantage, particularly for biarticular muscles such as the gastrocnemius, due to sustained mechanical tension and favourable sarcomere length conditions [3]. Overall, these results affirm the effectiveness of resistance training for gastrocnemius development in untrained individuals and highlight that ROM selection can significantly affect strength and hypertrophy outcomes. This holds practical relevance for designing targeted training programs based on specific anatomical or performance goals.

IV. CONCLUSIONS

Training in the initial range of motion significantly enhances gastrocnemius hypertrophy and strength in untrained males. These findings challenge the traditional emphasis on full ROM and support emerging evidence favouring lengthened-position training. This has practical implications for optimizing resistance programs targeting the calf muscles using accessible, field-based methods.

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Effect FIFA 11+ Level Three on Speed and Agility Among Soccer Athletes Under 15

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Keywords: FIFA 11+ Level Three, Sprint performance, Agility, Youth soccer, Warm-up protocols

I. INTRODUCTION

FIFA 11+ Level Three, a recent extension of the widely used injury prevention program, may offer untapped benefits for youth performance enhancement. However, little is known about its effects on sprint speed and agility, particularly in soccer athletes under 15. This study investigates its impact versus traditional warm-ups, addressing key developmental and methodological gaps in current sports science literature.

II. METHODS

Sixteen male soccer players (ages 12–15) were assigned to experimental and control groups in a quasi-experimental pre-post design. The experimental group followed FIFA 11+ Level Three; the control group used a traditional warm-up. Sprint speed (20-Meter Sprint Test) and agility (Illinois Agility Test) were assessed before and after a brief intervention period to evaluate performance changes.

III. RESULTS AND DISCUSSION

A. Impact of FIFA 11+ Level Three on Speed and Agility in Youth Soccer Players

Table I showed that the FIFA 11+ Level 3 group demonstrated significant improvements in both speed and agility. Specifically, the mean 20-meter sprint time improved from 3.62 ± 0.11 seconds to 2.88 ± 0.27 seconds ($p = 0.001$), while agility performance improved from 18.00 ± 0.90 seconds to 16.81 ± 0.55 seconds ($p = 0.003$). These findings indicate that FIFA 11+ Level 3, which incorporates high-intensity, multidirectional movement patterns and neuromuscular activation, can effectively enhance physical performance in youth players, especially in explosive and reactive tasks [1][2].

TABLE I
PAIRED T-TEST RESULTS (FIFA 11+ GROUP)

Assessment	Pre-F11+	Post-F11+	p value
20-Meter Sprint (s)	3.62 ± 0.11	2.88 ± 0.27	0.001
Illinois Agility Test (s)	18.00 ± 0.90	16.81 ± 0.55	0.003

B. Impact of Normal Warm-up on Speed and Agility in Youth Soccer Players

In contrast, Table II showed that the traditional warm-up group demonstrated only a modest but statistically significant improvement in 20-meter sprint time (from 3.50 ± 0.18 s to 3.19 ± 0.30 s, $p = 0.028$). However, no significant change was observed in agility performance (from 19.47 ± 2.79 s to 18.23 ± 3.63 s, $p = 0.059$). This suggests that while traditional warm-ups may offer basic physiological readiness, they lack the targeted neuromuscular components required to meaningfully enhance agility-related performance.

TABLE II
PAIRED T-TEST RESULTS (TRADITIONAL GROUP)

Assessment	Pre-T	Post-T	p value
20-Meter Sprint (s)	3.50 ± 0.18	3.19 ± 0.30	0.028
Illinois Agility Test (s)	19.47 ± 2.79	18.23 ± 3.63	0.059

C. Comparative Analysis of FIFA 11+ Versus Traditional Warm-Up on Speed and Agility

Table III showed that the 20-meter sprint performance was better in the FIFA 11+ group (2.88 ± 0.27 s) compared to the traditional group (3.19 ± 0.30 s), with a borderline significant difference ($p = 0.050$). This suggests that the FIFA 11+ Level 3 program may offer a practical advantage in short-distance sprinting, which is a critical component of match performance in youth soccer. Despite the lack of statistical significance in the Illinois Agility Test (FIFA 11+ = 16.81 ± 0.55 s; Traditional = 18.23 ± 3.63 s; $p = 0.226$), the FIFA 11+ group still demonstrated numerically superior agility performance. The absence of significance could be attributed to the high variability in the traditional group's performance (as seen in the larger standard deviation), as well as a relatively small sample size, which may have reduced the statistical power. These findings are consistent with previous studies indicating that FIFA 11+ programs, especially advanced levels like Level 3, can contribute to improvements in explosive and reactive movement qualities due to their dynamic and sport-specific structure [3][4]. However, the modest between-group differences imply that while FIFA 11+ may be more effective,

traditional warm-ups may still offer baseline physiological readiness, albeit with less consistency and specificity.

TABLE III
INDEPENDENT T-TEST (FIFA 11+ AND TRADITIONAL GROUP POST-TEST)

Assessment	Fifa 11+	Traditional	t(df)	P value
20-Meter Sprint (s)	2.88 ± 0.27	3.19 ± 0.30	t (14) = -2.147	0.050
Illinois Agility Test (s)	16.81 ± 0.55	18.23 ± 3.63	t (14) = -1.268	0.226

IV. CONCLUSIONS

This study demonstrated that the FIFA 11+ Level 3 warm-up program significantly improved sprint speed and agility among under-15 soccer athletes. Compared to traditional warm-up routines, the FIFA 11+ Level 3 produced greater enhancements in 20-meter sprint and Illinois Agility Test performance, although between-group differences were only borderline significant for speed and non-significant for agility. These findings suggest that incorporating FIFA 11+ Level 3 into regular training may offer meaningful short-term performance benefits, especially in explosive movements critical to soccer performance. Future studies with larger samples and longer durations are recommended to further validate these effects.

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The author would like to express sincere gratitude to all participants and coaches for their cooperation and commitment throughout the study. Special thanks are extended to the research assistants and data collectors for their valuable support. Appreciation is also given to the faculty and institutional management for providing access to the facilities and resources necessary for completing this research.

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Effects of FIFA 11+ Level 2 Warm-up on Physical Performance Among U-15 Soccer Players

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Keywords: FIFA 11+ Level 2, Youth soccer, Agility, Muscular power, Warm-up protocols

I. INTRODUCTION

Despite widespread use of FIFA 11+ for injury prevention, little is known about the performance-enhancing effects of its Level 2 variant [1]. This study evaluates its impact on agility, core strength, and muscular power in U-15 soccer players, addressing key gaps in youth training research and informing evidence-based warm-up strategies for improved athletic performance [2].

II. METHODS

This true experimental study involved 22 male U-15 soccer players from PLD Seremban (aged 13–14). Participants completed either a FIFA 11+ Level 2 or a traditional warm-up in a single session. Pre- and post-test comparisons assessed acute effects on agility, core strength, and muscular power using the Illinois Agility Test, 7-Level Sit-Up test, and Vertical Jump, respectively [3][4].

III. RESULTS AND DISCUSSION

A. Effects of Warm-Up on Physical Performance

Table I demonstrated that the FIFA 11+ Level 2 warm-up significantly improved vertical jump ($p = 0.031$) and agility performance ($p = 0.046$), while no significant improvement was observed in core strength ($p = 0.192$). These findings are consistent with previous research suggesting that structured neuromuscular warm-up programs like FIFA 11+ can enhance explosive lower-limb power and agility in youth athletes [5][6]. Although absolute gains were modest, the findings suggest the program may acutely enhance specific physical attributes relevant to youth soccer performance.

TABLE I
PAIRED T-TEST RESULTS (FIFA 11+ LEVEL 2 GROUP)

Assessment	Pre-F11+	Post-F11+	P value
Vertical Jump (cm)	248.15 ± 17.392	250.23 ± 16.349	0.031
7 Level Sit-Up (score)	6.09 ± 0.831	6.36 ± 0.505	0.192
Illinois Agility Test (s)	18.51 ± 0.887	18.5 ± 0.847	0.046

In contrast, Table II demonstrated that the traditional warm-up led to a significant increase only in vertical jump performance ($p = 0.014$), with no observable improvements in core strength or agility. These results highlight the more comprehensive benefit of FIFA 11+ Level 2, likely due to its multifaceted design incorporating plyometrics, dynamic balance, and sport-specific movements [3]. The agility gains in particular may be attributed to the reactive and directional change elements embedded in the FIFA 11+ routines, which mimic actual game demands more closely than general warm-up exercises.

TABLE II
PAIRED T-TEST RESULTS (NORMAL GROUP)

Assessment	Pre-N	Post-N	P value
Vertical Jump (cm)	252.82 ± 9.850	255.59 ± 10.135	0.014
7 Level Sit-Up (score)	6.00 ± 0.632	6.36 ± 0.924	0.104
Illinois Agility Test (s)	18.90 ± 1.047	18.65 ± 1.152	0.500

B. Comparison Between Warm-Up Methods

Between-group comparisons in Table III revealed that although effect sizes were small, the FIFA 11+ group consistently outperformed the traditional group in all three metrics, particularly in vertical jump and agility. These subtle yet meaningful improvements support existing evidence that FIFA 11+ enhances functional performance parameters, which are vital for competitive soccer [7]. However, the non-significant difference in core strength suggests that the short-term application of FIFA 11+ Level 2 may not be sufficient to elicit central trunk adaptations, which often require longer intervention durations and focused core training [8].

TABLE III
INDEPENDENT T-TEST RESULT (FIFA 11+ AND NORMAL GROUP)

Assessment	FIFA 11+	Normal	<i>t(df)</i>	<i>P</i> value
Vertical Jump (<i>cm</i>)	2.078 ± 2.740	2.771 ± 3.101	0.555	0.750
7 Level Sit-Up (<i>score</i>)	0.273 ± 0.674	0.364 ± 0.674	0.323	0.464
Illinois Agility Test (<i>s</i>)	-0.575 ± 0.840	-0.249 1.181	0.747	0.585

IV. CONCLUSIONS

Taken together, the findings reinforce the utility of FIFA 11+ Level 2 as a more effective warm-up strategy for promoting acute performance benefits in youth soccer players, particularly in explosive and agility-related movements. Future research should explore longitudinal adaptations and include biomechanical analysis to further elucidate the mechanisms behind these acute gains.

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The author would like to express sincere gratitude to all participants and coaches from PLD Seremban for their cooperation and commitment throughout the study. Special thanks are extended to the research assistants and data collectors for their valuable support. Appreciation is also given to the faculty and institutional management for providing access to the facilities and resources necessary for completing this research.

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Comparison Between Internal and External Focus of Attention Instruction on Dart Throwing Performance Among Young Adults

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Keywords: Motor learning, Internal feedback, External feedback, Dart throwing performance, Skill retention

I. INTRODUCTION

Attentional focus has been widely recognized as a key factor in enhancing motor skill performance and learning across various domains [1]. Among the most commonly investigated forms of attentional focus are internal focus, which directs attention to the performer's own body movements [2], and external focus, which shifts attention to the effects of those movements on the environment [3]. While both strategies are frequently applied in instructional and coaching settings, a growing body of evidence suggests that external focus may promote more efficient, automatic motor control, particularly in tasks requiring accuracy [4]. However, the relative effectiveness of internal versus external focus appears to be influenced by variables such as skill level and age [5]. This study compares internal and external focus feedback to determine which strategy more effectively enhances dart-throwing performance among young adults.

II. METHODS

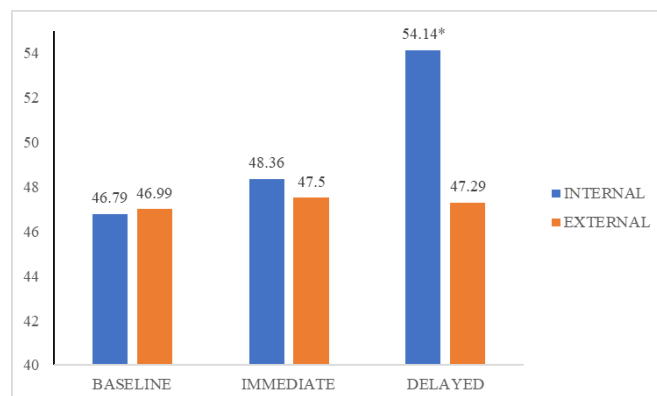
A total of 24 young adults were randomly and equally assigned to either an internal or external focus of attention group, with group allocation balanced using pre-test scores to ensure comparable skill levels. Following a nine-throw pre-test, participants completed 48 acquisition trials, organized into six blocks of eight throws (6 blocks $\times$ 8 throws). Verbal attentional focus instructions were delivered every two throws based on group assignment. Dart throwing performance was scored on a 0–10 scale according to accuracy. A nine-throw post-test was conducted immediately after acquisition, followed by a delayed retention test 24 hours later.

III. RESULTS AND DISCUSSION

A. Effect of Internal and External Focus of Attention on Dart-Throwing Performance Among Young Adults

Paired t-test results for the internal focus of attention revealed no significant improvement in dart performance during immediate retention ($p > 0.05$), although there was a slight increase in mean scores from $M = 46.79 \pm 2.445$ to $M = 48.36 \pm 2.352$. However, a significant improvement was observed during delayed retention ($p < 0.05$), with mean scores increasing to $M = 54.14 \pm 1.414$, indicating enhanced long-term performance with internal feedback. For participants who received external focus of attention, paired t-

test results showed no significant differences in dart performance for both immediate and delayed retention ($p > 0.05$). Mean scores increased only slightly from $M = 46.00 \pm 3.358$ to $M = 47.50 \pm 1.657$ in the immediate phase, and from $M = 46.00 \pm 3.358$ to $M = 47.29 \pm 1.943$ in the delayed phase.

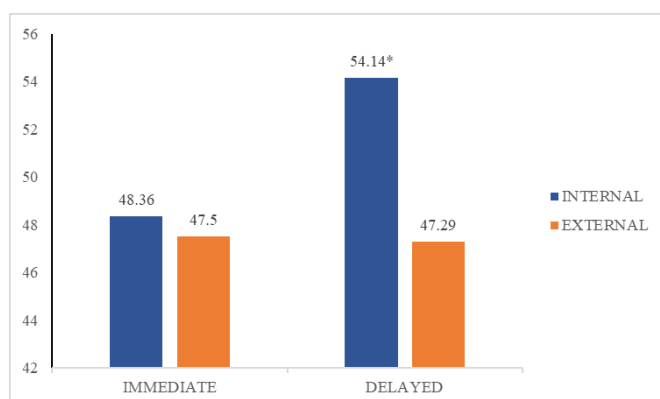


* $p < 0.05$

Fig. 1 Comparison of feedback types during baseline, immediate, and delayed.

B. Comparison Between Internal and External Focus of Attention on Dart-Throwing Performance Among Young Adults

Independent t-tests showed no significant difference in dart throwing performance between the internal and external focus groups during immediate retention ($p > 0.05$). Although both groups exhibited slight performance gains, the internal focus group showed a marginally higher mean score ($M = 48.36 \pm 2.352$) compared to the external focus group ($M = 47.50 \pm 1.657$). In contrast, the independent t-test for delayed retention revealed a significant difference between the two groups ($p = 0.008$), with the internal focus group achieving a higher mean score ($M = 54.14 \pm 1.414$) compared to the external focus group ($M = 47.29 \pm 1.943$).



* $p < 0.05$

Fig. 2 Comparison between feedback types during immediate and delayed retention.

IV. CONCLUSIONS

Although no immediate retention differences were observed, internal focus of attention demonstrated significantly greater effectiveness in enhancing delayed retention of dart-throwing skills. These findings highlight the value of internal focus of attention in supporting long-term motor learning, suggesting its potential as a beneficial instructional strategy for sustained skill retention. Internal focus of attention leads to better retention because learners become more adjusted to body mechanics, enabling self-correction and long-term skill refinement [6].

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The Effect of Swimming Exercise on Body Composition Among Sedentary Young Males

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Keywords: Swimming, Weight loss, Sedentary males, Body composition, Exercise intervention

I. INTRODUCTION

Obesity and sedentary lifestyles are rising among young males, increasing the risk of chronic health conditions [1]. While exercise is known to aid weight loss, swimming remains underexplored in this context. This study investigates the effects of regular swimming on weight, waist, and hip circumference among sedentary young males, and compares outcomes with a control group not engaged in physical activity.

II. METHODS

Thirty-four sedentary males aged 18–30 were purposely assigned to a swimming ($n = 17$) or control group ($n = 17$). The intervention group completed six weeks of supervised freestyle swimming, three sessions weekly, each lasting 60 minutes. Body weight, waist, and hip circumference were measured pre- and post-intervention using standard instruments. Data were analyzed using paired and independent sample t-tests at $p < 0.05$ to assess within- and between-group differences.

III. RESULTS AND DISCUSSION

A. Effect of Swimming on Body Weight, Waist, and Hip Circumference

After six weeks of swimming, participants lost an average of 0.6 kg. This reduction was statistically significant ($p < 0.001$), supporting [2], that aquatic exercise promotes weight loss in sedentary groups. Although modest, the consistent pattern suggests swimming is a viable intervention for early-stage weight management in inactive populations.

Waist and hip circumferences significantly decreased following the swimming program. Waist size dropped from 33.0 to 32.2 inches ($p < 0.001$), while hip circumference declined from 38.7 to 37.4 inches ($p = 0.032$). These results indicate improved body composition and support earlier findings that swimming reduces central adiposity [3].

B. Comparisons Between the Swim Group and Control Group on Body Composition

Weight changes between the swimming and control groups were not statistically significant ($p = 0.141$). While the swimming group experienced a larger average reduction (0.6 kg vs. 0.1 kg), the difference did not reach statistical significance, possibly due to sample size limitations, which

aligns with Cox et al. [4] and the suggestion that aquatic interventions may require more time to reach between-group significance. Nonetheless, the trend favours swimming for better weight-related outcomes.

TABLE I
ANTHROPOMETRIC MEASUREMENTS BEFORE AND AFTER THE INTERVENTION (MEAN $\pm$ SD)

Variables	Swim Gp (pre)	Swim Gp (post)	Control Gp (pre)	Control Gp (post)	p-value (within group)	p-value (between-group)
Weight (kg)	75.1 $\pm$ 10.7	74.5 $\pm$ 10.5	68.9 $\pm$ 14.6	67.9 $\pm$ 14.4	<0.001	0.141
Waist (in)	33.0 $\pm$ 2.77	32.2 $\pm$ 2.93	31.4 $\pm$ 5.34	31.2 $\pm$ 5.19	<0.001	0.522
Hip (in)	38.7 $\pm$ 4.54	37.4 $\pm$ 3.60	37.0 $\pm$ 3.68	36.8 $\pm$ 3.79	0.032	0.646

*Note: Within-group p-values reflect paired sample t-tests. Between-group p-values reflect independent sample t-tests. $N = 17$ per group. Measurements are in kilograms (kg) and inches (in).

IV. CONCLUSIONS

Regular swimming for over six weeks significantly improved body weight and composition in young sedentary males. Although between-group differences were not significant, changes within groups suggest that structured aquatic exercise is a promising short-term intervention. Longer periods and larger groups best serve future validation and generalizability.

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Effect of Proprioceptive Neuromuscular Facilitation on Flexibility Performance Among Male University-Level Handball Players

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Keywords: Proprioceptive neuromuscular facilitation, Flexibility training, Handball athletes, Shoulder and hamstring mobility, Static stretching

I. INTRODUCTION

Flexibility is vital for handball athletes to achieve optimal performance and prevent injuries, yet current training approaches often neglect specialized methods. This study investigates the effect of proprioceptive neuromuscular facilitation (PNF) compared to traditional static stretching on flexibility among male university handball players, focusing on shoulders and hamstrings. Addressing limited research on sport-specific flexibility enhancement, the work aims to provide evidence-based recommendations for targeted flexibility training in handball.

II. METHODS

Sixteen male handball athletes (18–25 years, injury-free, ≥6 months experience) were divided into groups for a six-week program with three sessions weekly. Each session included a five-minute warm-up, 10–15 minutes of PNF stretching using contract-relax and contract-relax antagonist-contract techniques targeting shoulders and hamstrings, and a five-minute cool-down. Flexibility was assessed pre- and post-intervention using a goniometer and the sit-and-reach test.

III. RESULTS AND DISCUSSION

A. Objective 1:

Baseline flexibility measurements showed an overall good range among athletes. The PNF group exhibited slightly higher mean shoulder flexion (174° vs. 171°) and abduction (169° vs. 163°) than the static group. Hamstring sit-and-reach averages were 24.3 cm (PNF) and 21.2 cm (Static). These findings highlight variability in baseline flexibility, particularly in the shoulders. Table 1 below shows the data collected.

B. Objective 2:

After six weeks, only shoulder abduction improved significantly under PNF ($p=0.021$, $d=0.725$), while flexion and hamstring measures showed no significant differences between methods. This suggests PNF stretching provides targeted benefits for certain joint motions, likely due to neuromuscular facilitation effects, whereas traditional static stretching yields comparable results for other flexibility measures.

TABLE I
DESCRIPTIVE STATISTICS FOR FLEXIBILITY

Variable	Group	Flexion	Abduction	Sit and reach
N	PNF	16	16	16
	STATIC	16	16	16
Mean	PNF	174	169	24.3
	STATIC	171	163	21.2
Median	PNF	175	169	24.6
	STATIC	171	164	21.1
Standard Deviation	PNF	3.79	6.04	2.64
	STATIC	2.52	2.68	1.12

IV. CONCLUSIONS

PNF stretching demonstrated significant improvement in shoulder abduction flexibility compared to static stretching, while other measures showed no clear advantage. These findings suggest integrating PNF into training can selectively enhance joint mobility crucial for handball performance, supporting evidence-based flexibility programs tailored to specific movement demands.

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Examining the Association Between Recreational Sports Participation and Mental Health Among University Students

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Keywords: Recreational sports, Mental health, Depression, Anxiety, Stress, University students

I. INTRODUCTION

University students often contend with high academic pressure, stress, anxiety, and depression, which negatively impact their mental health. [1] A study on the prevalence of mental health disorders among undergraduate university students in the United States identified that the prevalence of mental health disorders is high, and the subsequent impact on this population is worrying. Therefore, a way to tackle this issue is by considering the participation of university students in physical and sports activities, including recreational sports. Hence, this study aims to explore how recreational sports participation may contribute to better mental health outcomes and integrate them into university programs to support students' mental well-being and promote a balanced lifestyle.

II. METHODS

A quantitative research design was employed to examine recreational sports participation and mental health among 378 students at UiTM Seremban 3, Negeri Sembilan. Data were collected via an online survey distributed through Google Forms. In the present study, the recreational sports participation was assessed using the frequency of played in the past week [2], and the level of mental health was assessed using the Depression, Anxiety, and Stress Scale (DASS-21) [3]. These instruments were used to measure the studied variables among the target population. Chi-Square tests were conducted to determine the relationship between recreational sports participation and the mental health dimensions.

III. RESULTS AND DISCUSSION

A. Frequency of Recreational Sports Participation

Out of 378 respondents, the majority reported participating in recreational sports 1 or 2 times during the week, accounting for 43.4% of the sample ($n = 164$). This was followed by 139 respondents (36.8%) who engaged in sports 3 or 4 times, and 39 respondents (10.3%) who did so 5 or more times. Only 36 participants (9.5%) indicated that they did not engage in sports at all during the week. The cumulative percentage shows that 89.7% of respondents engaged in sports at least once, indicating a generally active sample with a strong inclination toward recreational sports activity.

B. Level of Mental Health

The DASS-21 scale was used to evaluate depression, anxiety, and stress levels among the students. 43.7% of the respondents reported normal levels of depression. A significant proportion (26.5%) experienced extremely severe depression. Interestingly, mild depression was found to be relatively high at 19.6%, much higher than mild levels of stress and anxiety. Combined moderate to extremely severe depression accounts for approximately 36.9%, reflecting a need for psychological intervention in a notable portion of the population.

Findings on the anxiety level showed that less than half (43.1%) had normal anxiety levels, lower than the normal stress category. A larger percentage (27.5%) experienced extremely severe anxiety, even higher than those with extremely severe stress. When combining moderate, severe, and extremely severe levels, over 56% of respondents are affected by significant anxiety, suggesting widespread issues. This may reflect chronic or untreated anxiety in the population.

The stress results depict that most respondents (64%) reported normal stress levels, indicating a relatively mentally stable group. However, a significant portion (24.9%) experienced extremely severe stress, highlighting a notable subgroup with high psychological distress. Moderate to severe stress (combined 10.6%) also presents a concern, albeit a smaller one. Very few respondents (0.5%) reported mild stress, showing a stark jump between normal and high stress levels, possibly indicating underreporting or rapid escalation of stress symptoms.

C. Relationship Between Recreational Sports Participation and Mental Health

Chi-Square analysis revealed significant associations between recreational sports participation and both depression and anxiety ($p < 0.05$), suggesting that active students were less likely to experience these conditions. However, no significant link was found between sports and stress, indicating that academic or external pressures might influence stress beyond physical activity. These findings support prior research advocating for recreational sports as a preventive mental health measure and underscore the need for institutional support to promote active student lifestyles.

CONCLUSIONS

This study confirms that higher engagement in recreational sports is associated with lower levels of depression and anxiety among university students. While stress was not significantly affected, the overall findings highlight the potential of non-competitive physical activity in improving mental health. Institutions should integrate recreational sports into wellness programs to enhance psychological well-being and academic performance.

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Acute Effect of Plyometric Training on Kicking Speed and Jump Performance Among Youth Silat Athletes

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Keywords: Plyometric training, Acute effects, Jump performance, Kicking speed, Pencak silat

I. INTRODUCTION

Pencak Silat, a traditional Southeast Asian martial art, demands high levels of explosive power, particularly for jumping and kicking manoeuvres that are critical in both offensive and defensive action [1]. Among various training modalities, plyometric training has gained attention for its effectiveness in enhancing neuromuscular performance by utilizing the stretch-shortening cycle (SSC) to improve power output [2][3]. While the chronic effects of plyometric training on athletic performance have been widely documented across sports disciplines, including improvements in vertical jump height, sprinting speed, and muscular strength, its acute effects hosted immediately after a training session remain underexplored, especially within the context of martial arts such as Pencak Silat [4].

Understanding the acute responses to plyometric exercise is crucial for coaches and practitioners who aim to optimize short-term performance, particularly during competition phases or preparatory warm-ups [2][3]. Current literature examines long-term training adaptations, offering limited guidance for designing effective acute interventions that can yield immediate improvements in performance metrics relevant to Pencak Silat [4]. Moreover, existing studies often lack a sport-specific focus, thus reducing the ecological validity of the findings when applied to Silat athletes.

This study aims to fill this gap by examining the acute effects of a single bout of plyometric training on two key performance indicators: jumping performance and kicking speed among youth Pencak Silat athletes. By offering insight into the short-term physiological responses induced by plyometric exercises, this research aims to provide practical applications for training periodization, warm-up strategies, and performance enhancement in competitive Silat settings.

II. METHODS

This study employed a quasi-experimental, pre- and post-test design to investigate the acute effects of plyometric training on jumping performance and kicking speed. A total of 30 youth Pencak Silat athletes, aged between 13 and 18 years, were selected based on inclusion criteria requiring at least one year of basic Silat training. Athletes with current injuries or scheduled for upcoming competitions were excluded to avoid performance bias and health risks. The sample size was

determined through power analysis using G*Power software, indicating that 30 participants [5] would be sufficient to detect a large effect size (*Cohen's d* = 0.95) with 80% statistical power.

This study included 30 participants (22 males and 8 females), divided into a Control Group (15) and an Experimental Group (15). The Experimental Group did both a Silat routine and plyometric exercises (box jumps, skater jumps, and jumping lunges), while the Control Group only did the Silat routine. Researchers compared both groups' performance on the standing broad jump, vertical jump, and kicking speed before and after the training. Data was analysed using SPSS version 25, and included tests for normality, descriptive statistics, and independent T-tests.

III. RESULTS AND DISCUSSION

Objective 1: To Determine the Acute Effect of Plyometric Training on Jump Performance

TABLE I
COMPARISON BETWEEN TWO MEANS JUMP PERFORMANCE OF THE
STANDING BROAD JUMP AND THE VERTICAL JUMP (N=30)

Assessment	Group	Independent T-Test	
		Mean (SD)	p value
Standing Broad Jump	Experimental	217.18 ± 63.02	0.375
	Control	198.88 ± 46.9	
Vertical	Experimental	27.4 ± 7.32	0.608
	Control	23.41 ± 6.31	

*p-value ≤ (α) 0.05, reject *H*₀.

Table I shows the comparison of jump performance between the Experimental and Control groups. The Experimental group for the standing broad jump had a mean score of (217.18 ± 63.02), while the Control group had a mean score of (198.88 ± 46.9). The *p*-value was 0.375, which is greater than 0.05, indicating no significant difference between the groups. For the vertical jump, the Experimental group had a mean of (27.4 ± 7.32), and the Control group had a mean of (23.41 ± 6.31). The *p*-value was 0.608, also above 0.05, showing no significant difference between the groups.

Objective 2: To Evaluate the Acute Effect of Plyometric Training on Kicking Speed

TABLE II
COMPARISON BETWEEN TWO MEANS OF KICKING SPEED RIGHT AND LEFT

Independent T-Test			
Assessment	Group	Mean (SD)	p value
Kicking Speed Right	Experimental	217.18 ± 63.02	0.375
	Control	198.88 ± 46.9	
Kicking Speed Left	Experimental	27.4 ± 7.32	0.608
	Control	23.41 ± 6.31	

* p -value $\leq (\alpha) 0.05$, reject H_0 .

Table II presents a comparison of right and left kicking speed between the Experimental and Control groups. For right kicking speed, the Experimental group recorded a mean score of (7.35 ± 0.83), while the Control group recorded a mean score of (7.05 ± 0.85). The p -value obtained was 0.375, which exceeds the significance threshold of 0.05, indicating that the difference between the groups is not statistically significant. Regarding left kicking speed, the Experimental group achieved a mean of (7.32 ± 0.95), compared to the Control group's mean of (6.77 ± 0.85). The p -value of 0.608 is also greater than 0.05, signifying no significant difference between the two groups.

A. Discussion

In terms of jumping performance, the experimental group showed slightly higher mean values in both the standing broad jump and the vertical jump compared to the control group. However, these differences were not statistically significant ($p > 0.05$). This may be attributed to post-training fatigue or insufficient recovery time before testing, which can acutely mask performance improvements [6]. Additionally, the measurement tools used, while practical, may lack the resolution to detect small yet meaningful changes in jump performance over a single session [7]. These findings highlight the complexity of capturing acute neuromuscular responses immediately following high-intensity plyometric exercises in youth athletes.

For kicking speed, the experimental group exhibited higher post-test mean scores than the control group for both dominant and non-dominant legs. Nevertheless, these increases were not statistically significant ($p > 0.05$). This result may reflect a lack of specificity in the plyometric exercises selected, which may not have directly mimicked the dynamic and rotational patterns characteristic of Silat kicks [8]. Furthermore, the short-term intervention limited to a single session will likely constrain the degree of neuromuscular adaptation possible, as plyometric benefits typically emerge after repeated exposures over multiple weeks [4]. This underscores the need for more tailored and longitudinal training programs in sport-specific contexts.

IV. CONCLUSIONS

The study found that although a single session of plyometric training combined with a Silat routine did lead to some increases in jump performance and kicking speed, these changes were not statistically significant and did not result in notable acute improvements among Silat athletes. Several factors are likely to have contributed to these findings. First, the brief duration of the intervention may not have provided sufficient stimulus for measurable improvements to occur. Second, the principle of training specificity suggests that the exercises performed may not have precisely matched the requirements for the tested performance outcomes. Additionally, the sensitivity of the measurement tools and methods used could have limited the ability to detect subtle changes in performance. Finally, factors related to athlete recovery, such as fatigue or inadequate rest between assessments, may have influenced the results. Altogether, these considerations may help to explain why statistically significant immediate effects were not observed in this study.

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Evaluating the Impact of NetballSmart Warm-Up on Youth Agility and Power

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Keywords: NetballSmart, Dynamic warm-up, Youth netball, Agility, Muscular power

I. INTRODUCTION

Injury prevention programs like NetballSmart have grown in popularity, yet evidence on their performance benefits remains limited [1]. This study explores the impact of NetballSmart Dynamic Warm-Up on agility and power among JMIX youth netball players, comparing it with normal routines to evaluate effectiveness in enhancing physical performance.

II. METHODS

Twenty JMIX netball players aged 12–17 was randomly assigned to NetballSmart (NSDW) or normal (NW) warm-up groups. Agility was measured via the Illinois Agility Test, muscular power via vertical and broad jump tests. The NetballSmart dynamic warm-up [2] was delivered biweekly for four weeks, progressively targeting strength, balance, and neuromuscular control. The normal group performed general jogging and static stretching.

III. RESULTS AND DISCUSSION

A. Effects of Warm-Up on Agility and Power

Table I presents the pre- and post-intervention performance outcomes for both NSDW and NW groups. The aim was to evaluate the effects on agility, explosive horizontal power (broad jump), and vertical power (vertical jump). A significant improvement in agility performance was observed in both groups. The NSDW group showed a substantial reduction in mean Illinois test times from 20.3 ± 1.60 s to 16.5 ± 0.96 s ($p < 0.001$). Similarly, the NW group improved from 20.4 ± 1.34 s to 16.9 ± 1.82 s ($p < 0.001$). These results suggest that both warm-up protocols were effective in enhancing agility, but the greater mean reduction in the NSDW group indicates that NetballSmart may be more efficient. This aligns with previous studies highlighting the value of structured, multi-component warm-up routines like NetballSmart in improving neuromuscular control, balance, and movement efficiency [1]. The NSDW program's inclusion of dynamic movements, change-of-direction drills, and sport-specific activation likely contributed to these gains.

Both groups experienced non-significant improvements in broad jump performance. The NSDW group increased from 159.1 ± 18.55 cm to 170.3 ± 23.24 cm ($p = 0.129$), while the NW group improved from 156.7 ± 16.31 cm to 162.9 ± 21.13 cm ($p = 0.336$). Although the changes were not statistically significant, the NSDW group showed a larger absolute

improvement, suggesting potential benefits with longer intervention periods. Previous research supports the idea that neuromuscular warm-ups can positively influence lower-body power over time, particularly when they include plyometric elements [2].

Likewise, vertical jump performance showed non-significant improvements in both groups. The NSDW group improved from 25.3 ± 4.30 cm to 27.2 ± 6.91 cm ($p = 0.218$), while the NW group changed from 26.5 ± 3.34 cm to 26.9 ± 1.85 cm ($p = 0.678$). These findings suggest that while the NetballSmart warm-up may begin to elicit adaptations in lower-body explosive strength, a longer intervention or supplemental strength training may be necessary to achieve statistical significance. Studies by [3] suggest that consistent exposure to dynamic and plyometric warm-up elements over several weeks is required to produce meaningful gains in vertical power.

TABLE I
PAIRED T-TEST RESULTS (NSDW AND NW GROUPS)

Variables	Groups	Pre	Post	p value
Illinois (s)	NSDW	20.3 ± 1.60	16.5 ± 0.96	$<0.001^*$
	NW	20.4 ± 1.34	16.9 ± 1.82	$<0.001^*$
Broad Jump (cm)	NSDW	159.1 ± 18.55	170.3 ± 23.24	0.129
		156.7 ± 16.31	162.9 ± 21.13	
	NW	156.7 ± 16.31	162.9 ± 21.13	0.336
		156.7 ± 16.31	162.9 ± 21.13	
Vertical Jump (cm)	NSDW	25.3 ± 4.30	27.2 ± 6.91	0.218
	NW	26.5 ± 3.34	26.9 ± 1.85	0.678

*Significant difference between pre and post

B. Effects of Warm-Up on Agility and Power

The comparison between the NetballSmart Dynamic Warm-Up (NSDW) and normal warm-up (NW) groups in Table II showed no statistically significant differences in agility ($p = 0.536$), broad jump ($p = 0.896$), or vertical jump ($p = 0.464$). However, the NSDW group consistently recorded slightly better performance in all three tests, suggesting a potential advantage of sport-specific, neuromuscular-focused warm-ups. Although the improvements were not significant, these findings align with previous research indicating that dynamic warm-ups like NetballSmart can enhance movement

quality, coordination, and lower-body power when applied consistently over time [1][4].

TABLE II
INDEPENDENT T-TEST RESULT (NSDW AND NW)

Variables	NSDW	NW	t (18)	P value
Illinois (s)	16.5 ± 0.96	16.9 ± 1.82	-0.63	0.536
Broad Jump (cm)	27.2 ± 6.91	26.9 ± 1.85	0.13	0.896
Vertical Jump (cm)	170.3 ± 23.24	162.9 ± 21.13	0.75	0.464

IV. CONCLUSIONS

Both the NetballSmart Dynamic Warm-Up (NSDW) and normal warm-up (NW) effectively improved agility among youth participants, with NSDW showing slightly greater gains. Although improvements in broad jump and vertical jump were not statistically significant, the NSDW group consistently performed better across all measures. These results suggest that structured, sport-specific warm-up routines like NetballSmart may offer practical benefits for enhancing agility and lower-body power, especially with continued use over time.

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Post-Traumatic Stress Disorder and Its Influence on Fear Return to Sports Among Injured Athletes

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Keywords: PTSD, Return to sport, Fear of re-injury, PCL-5, FRESS, Sports injury, Psychological readiness

I. INTRODUCTION

Post-traumatic stress disorder (PTSD) is a psychological condition triggered by traumatic events, including severe sports injuries [1]. Injured athletes may suffer from intrusive thoughts, hypervigilance, and avoidance, which can delay recovery and hinder return to sport (RTS). The prevalence of PTSD among athletes is a significant concern, with rates reported as high as 13%-25% in certain populations [2]. Negative perceptions of themselves and fear of reinjury serve as psychological barriers during the RTS process [3]. This study examines the relationship between PTSD severity and fear of RTS, highlighting the importance of integrating mental health assessments into return-to-play (RTP) protocols.

II. METHODS

A cross-sectional design was chosen by using purposive sampling. Forty-two athletes aged 18–30 with a sports injury in the last month were selected. Two instruments were used: the PTSD Checklist (PCL-5) for the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) [4] and the Fear of Return to Sport Scale (FRESS) [5]. Descriptive and inferential statistics were analyzed using Jamovi v2.3.28.

III. RESULTS AND DISCUSSION

A. Scoring Summary for PTSD and FRESS

Table I presents the PTSD mean of 29.55 ($SD=19.04$) was below the cutoff score of 31, showing that the population has a low probability of PTSD symptoms. The PTSD symptoms were present, although they did not meet a full PTSD diagnosis, which can negatively impact the psychological readiness in RTS. However, in another study, 28.8% of baseball players had probable PTSD and 18.3% had severe PTSD [6]. As for FRESS, the mean 57.22 ($SD=23.48$) showed a moderate level of fear in returning to sport. Fear of reinjury, anxiety of RTS, confidence level, and social pressure were the key elements measured in FRESS. Additionally, an elevated level of Kinesio phobia and pain catastrophizing is less likely to RTS among Autologous Chondrocyte Implantation (ACI) patients [7]. Nevertheless, athletes with a successful RTS were associated with more social support, making it easier to maintain their pre-injury psychological state [8].

Table II showed that the most reported cluster among the athletes was Avoidance 1.76 ($SD=1.36$). Fear avoidance is

usually elevated in the early rehabilitation but improves over time in most patients [9].

B. Relationship Between PTSD and Fear of Returning to Sport

There was a significant positive correlation between PTSD and fear of RTS among injured athletes ($r=+0.60$, $p<0.001$; Table III). This indicates that athletes with higher PTSD scores tend to experience greater psychological fear when considering RTS. Supporting findings revealed that athletes characterized by high anxiety, high depression, and low self-esteem and optimism scores had the highest rate of non-RTS [7]. Therefore, psychological barriers hinder athletes' progression in RTS after experiencing a sports injury. In contrast, athletes with higher self-confidence and intrinsic motivation showed better adherence to rehabilitation [8].

TABLE I
SCORING SUMMARY FOR PTSD AND FRESS

Variables	Percentage (n)	Mean	Std. Dev.
PTSD	42	29.55	19.04
FRESS	42	57.22	23.48

TABLE II
PTSD SYMPTOMS CLUSTERS

Variables	Percentage (n)	Mean	Std. Dev.
Intrusion	42	1.67	1.09
Avoidance	42	1.76	1.36
Mood	42	1.31	1.0
Arousal	42	1.42	0.99

TABLE III
PEARSON'S CORRELATION BETWEEN PTSD AND FRESS

FRESS		
PTSD	Pearson's R	+0.60
	Sig. (2-tailed)	<0.001
	N	42

IV. CONCLUSIONS

It confirms that PCL-5 and FRESS are relevant and measurable assessment tools for psychological response to sports injury. Addressing psychological factors is equally

important as physical recovery, where we can better support injured athletes in making a confident and prolonged RTS in their respective sports. Establishing a gradual RTS protocol that also consists of group support and spreading awareness of their injury can determine their recovery speed.

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The Impact of Aging to Performance in Malaysian Professional Football Perspective

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Keywords: Aging, Soccer, Performance indicators, Video analysis, Professional

I. INTRODUCTION

Aging presents physiological and cognitive challenges that influence football performance, especially in competitive leagues like the Malaysian Super League (MSL). This study investigates how age affects key performance indicators such as passing accuracy, defensive decisions, and positional play. By analyzing video footage of experienced MSL players, the research aims to provide context-specific insights into the aging-performance relationship, offering valuable guidance for training and career management strategies in professional football.

II. METHODS

Video analysis of three 34–36-year-old professional football players from the Malaysian Super League was used in a correlational study. For each player, three complete match recordings were used to extract performance data. Offensive, defensive, and cognitive indicators were used to classify important metrics, such as positional awareness, defensive duels, and pass completion. To investigate the connection between aging and in-game football performance, descriptive statistics were computed, and performance trends were compared across categories.

III. RESULTS AND DISCUSSION

The analysis showed no statistically significant differences in defensive, possession, or offensive performance across age groups (all $p > 0.05$). For example, one-way ANOVA for Shots on Target revealed $F(2,6) = 0.0455$, $p = 0.956$, and for Passes Successful, $F(2,6) = 1.189$, $p = 0.367$. These findings suggest that despite physical aging, performance metrics remain stable, potentially due to players' increased experience, tactical awareness, and positional intelligence.

TABLE I
ANOVA SUMMARY FOR KEY INDICATORS BY AGE GROUP

Variable	F	df1	df2	p-value
Shots on Target	0.0455	2	6	0.956
Dribbles	0.7500	2	6	0.512
Passes Successful	1.189	2	6	0.367
Interceptions	0.1045	2	6	0.902

Although age-related trends in dribbling and cross accuracy were observed, these were not statistically significant. The results imply that performance sustainability in the Malaysian Super League may depend more on tactical maturity and experience than on age alone.

Player age and performance metrics in the offensive, defensive, and possession categories (such as passes, goals, and tackles) did not significantly correlate, according to the analysis ($p > 0.05$). According to the data, older players can continue to produce at a level that is comparable to that of their younger counterparts, despite the expectation that performance will decline with age. This suggests that players may be able to maintain high levels of performance in professional football by compensating for age-related physical changes through elements like experience, tactical knowledge, and positional awareness.

IV. CONCLUSIONS

Most aging players in the Malaysian Super League demonstrate stable or declining performance depending on the performance domain assessed. While some physical indicators show reduced effectiveness, cognitive elements such as passing accuracy and positioning remain consistent. However, no strong correlation was identified across all aspects of aging and performance. These findings highlight the need for further research into other factors influencing veteran player performance in professional football contexts.

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Influence of Social Media Use on the Mental Health of Overweight Individuals

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Keywords: Social media, Mental health, Overweight

I. INTRODUCTION

The rising prevalence of mental health issues among overweight individuals has prompted concern, especially in relation to social media use [1]. This study explores various perceptions of social media, such as comparison, validation, and exposure, that affect mental health in overweight individuals. It seeks to identify key perception factors and examine their relationships with psychological outcomes, contributing to a deeper understanding of technology's role in mental well-being [2].

II. METHODS

Data were collected from 200 overweight individuals using standardized questionnaires: the Social Media Use Scale (SMUS) and the Depression Anxiety Stress Scales (DASS-21) [3]. Participants self-reported their perceptions of social media and mental health status. Descriptive statistics summarized the data, while correlation analysis examined relationships between social media perception factors and mental health outcomes, offering insights into the psychological effects of digital engagement on this demographic [4].

III. RESULTS AND DISCUSSION

A. Scoring Summary of SMUS score

Descriptive findings indicate that consumption was the most frequent social media behavior among overweight individuals ($M = 4.98$, $SD = 2.08$), suggesting high levels of passive engagement with digital content. Comparison followed closely ($M = 4.20$, $SD = 2.09$), while image ($M = 3.38$, $SD = 1.66$) and belief ($M = 1.49$, $SD = 1.19$) were less common.

B. Correlation Between SMUS and DASS-21

Correlation analysis revealed that comparison and belief factors had the strongest and most significant associations with anxiety, depression, and stress (Spearman's $\rho > 0.39$, $p < 0.001$). Image and consumption activities showed weaker but still significant relationships, especially with stress. Despite their lower frequency, comparison and belief-based activities were more strongly tied to anxiety symptoms than consumption [5]. These findings highlight that not all frequent activities equate to the most psychologically impactful [6].

TABLE I
SCORING SUMMARY OF SMUS SCORE

Assessment	Frequency (N)	Mean	Std. Dev.
Image	200	3.38	1.66
Comparison	200	4.20	2.09
Belief	200	1.49	1.19
Consumption	200	4.98	2.08

TABLE II
CORRELATION BETWEEN SMUS AND DASS-21

		IMAGE	COMPARISON	BELIEF	CONSUMPTION
	Spearman's R	0.203	0.463	0.471	0.140
	Sig. (2-tailed)	0.004	<0.001	<0.001	0.049
	N	200	200	200	200
ANXIETY	Spearman's R	0.164	0.494	0.415	0.117
	Sig. (2-tailed)	0.020	<0.001	<0.001	0.098
	N	200	200	200	200
DEPRESSION	Spearman's R	0.215	0.474	0.397	0.210
	Sig. (2-tailed)	0.002	<0.001	<0.001	0.003
	N	200	200	200	200
STRESS	Spearman's R	0.203	0.463	0.471	0.140
	Sig. (2-tailed)	0.004	<0.001	<0.001	0.049
	N	200	200	200	200

IV. CONCLUSIONS

Comparison and belief-based social media use are strongly linked to poorer mental health among overweight individuals, while high-frequency consumption has a limited psychological impact. These findings suggest that the type of engagement, not just frequency, matters in mental health outcomes, emphasizing the need for targeted digital literacy and mental health interventions [7].

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Acute Effects of Weighted Plyometric Exercises on Sprint, Agility, and Jump Performance in UiTM Football Players

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Keywords: Plyometric training, Weighted vests, Sprint performance, Agility, Vertical jump

I. INTRODUCTION

Explosive performance is crucial for football athletes, especially at the collegiate level, where sprinting, jumping, and quick directional changes are key to success. Plyometric training, which utilizes the stretch-shortening cycle (SSC), is widely used to improve neuromuscular efficiency and explosive power. Recently, the addition of external loads, such as weighted vests, has been integrated into plyometric training to enhance its intensity and potential benefits.

Despite its increasing use, limited research has focused on the acute effects or the immediate impact of weighted plyometric exercises, particularly among university-level football players. Most existing studies have targeted elite or professional athletes, leaving a gap in understanding how these interventions affect collegiate populations with different conditioning levels. This study investigates the short-term effects of weighted versus unweighted plyometric training on sprint time, agility, and jump height in UiTM football players

II. METHODS

This study employed a quasi-experimental pretest-post-test control group design. A total of 24 healthy male football players (aged 18–25) from UiTM were selected and divided into two groups: the weighted plyometric group (WPG) and the non-weighted plyometric group (NWPG). Participants were matched by fitness level and training background using stratified random sampling.

The performance variables assessed were:

- Sprint performance: 20-meter sprint test using electronic timing gates.
- Agility performance: Illinois Agility Test.
- rest period, post-test measurements were taken to assess acute effects.
- Jump performance: Vertical jump height measured using a Vertec device

Each group performed a standardized warm-up, followed by specific plyometric exercises. WPG used weighted vests (adjusted by body weight) during drills.

III. RESULTS AND DISCUSSION

Results revealed significant improvements ($p < 0.05$) in sprint, agility, and jump performance in the WPG. The

NWPG showed a significant improvement only in jump height. The inclusion of weighted resistance likely enhanced muscle activation and force output during SSC movements.

These findings align with previous research suggesting that external loading during plyometrics may stimulate neuromuscular priming, leading to better short-term performance. For collegiate players, integrating weighted drills may enhance warm-up effectiveness and match readiness.

TABLE I
GROUP DESCRIPTIVES

Group	N	Mean	Median	SD	SE
UPG	12	3.24	3.25	0.0303	0.00874
WPG	12	3.25	3.25	0.0363	0.0105
UPG	12	3.20	3.20	0.0402	0.01161
WPG	12	3.11	3.11	0.0505	0.0146
UPG	12	10.54	10.58	0.2203	0.06359
WPG	12	10.51	10.47	0.1979	0.0571
UPG	12	10.43	10.46	0.2444	0.07054
WPG	12	10.13	10.08	0.1972	0.0569

TABLE II
INDEPENDENT SAMPLE T-TEST

		Statistic	df	p	Mean difference	SE difference
Sprint_Pre	Student's t	-0.733	22.0	0.471	-0.0100	0.0136
Sprint_Post	Student's t	4.696	22.0	<0.001	0.0875	0.0186
Agility_Pre	Student's t	0.292	22.0	0.773	0.0250	0.0855
Agility_Post	Student's t	3.300	22.0	0.003	0.2992	0.0907
Jump_Pre	Student's t	-0.140 ^a	22.0	0.890	-0.1083	0.7764
Jump_Post	Student's t	-3.626	22.0	0.001	-3.1583	0.8710

Note. $H_a \mu_{UPG} \neq \mu_{WPG}$

^a Levene's test is significant ($p < 0.05$), suggesting a violation of the assumption of equal variances



Fig. 1 Pre-test and post-test performance.

IV. CONCLUSIONS

Weighted plyometric exercises elicit greater acute performance improvements compared to non-weighted exercises in sprinting, agility, and jumping among university football players. This supports their implementation in pre-competition routines to boost performance safely and efficiently. Further research should explore long-term effects, different age groups, and female athletes to enhance generalizability.

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Effect of Foam Rolling (FR) and Proprioceptive Neuromuscular Facilitation (PNF) Stretching on Muscle Soreness Among U-17 Negeri Sembilan Football Club (NSFC) Female Soccer Players

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Keywords: Foam rolling (FR), PNF stretching (PNF), Delayed-onset muscle soreness (DOMS), Pain scale (PS), Range of motion (ROM)

I. INTRODUCTION

Delayed Onset Muscle Soreness (DOMS) is a common affliction among athletes, particularly those engaged in high-intensity sports such as soccer [1]. The efficacy of various recovery techniques, including Foam Rolling (FR) and proprioceptive neuromuscular facilitation (PNF) stretching, in mitigating muscle soreness is well-established within the sports science community [2]. However, there is a notable gap in research comparing these techniques, especially in female soccer players. The majority of existing studies focus on male athletes, leaving uncertainty regarding the applicability of these methods for females, whose physiological responses may differ due to hormonal fluctuations, muscle composition, and training adaptations [3]. Accordingly, this study aims to investigate the effects of Foam Rolling (FR) and PNF stretching on muscle soreness among U-17 female soccer players from Negeri Sembilan Football Club (NSFC).

II. METHODS

A. Subjects

The participants in this study were female football players from the Negeri Sembilan Football Club (NSFC) U17 team. A total of twenty players were randomly assigned to one of two intervention groups: the Foam Roller (FR) group ($n = 10$) or the Proprioceptive Neuromuscular Facilitation (PNF) stretching group ($n = 10$). Before participation, informed consent was obtained for each procedure to ensure that all participants voluntarily agreed to take part in the study. The inclusion criteria for participants were as follows: (1) Female football players under the age of 17 from Negeri Sembilan Football Club (NSFC), (2) Actively engaged in both training and competitive activities with the Negeri Sembilan Football Club, (3) Good physical health without any current injuries, and (4) Have no history of metabolic, cardiovascular, or pulmonary disorders.

B. Instrumentation

Range of Motion

To assess active range of motion (AROM), the researcher employed a goniometer, a standard instrument for measuring joint angles. Participants were instructed to flex their knees to the maximum extent possible while maintaining a neutral position at the hips and ensuring full contact with the testing

surface. AROM measurements were recorded at four intervals: before the match (baseline), and at 24, 48, and 72 hours following the intervention. The knee joint was selected for assessment due to its susceptibility to exercise-induced muscle soreness. All data were systematically recorded using individualized data collection forms. According to normative values, knee flexion typically ranges from 0 to 135–150 degrees [4].

Pain Scale

The participants were instructed to evaluate their pain intensity both at rest and during movement, using a scale ranging from 0 to 10. Pain perception was measured with the Visual Analogue Scale (VAS), a 10-cm horizontal line where 0 represents "no pain," 1 to 3 indicates "mild pain," 4 to 6 corresponds to "moderate to severe pain," 7 to 9 denotes "very severe pain," and 9 to 10 reflects the "worst pain imaginable." The VAS was administered at several time points: before the match, immediately post-match, and at 24, 48, and 72 hours after the treatment. The VAS scores were employed to evaluate the impact of the interventions on pain intensity among the female football players [5].

C. Procedure

Baseline measurements of pain intensity and knee range of motion (ROM) were taken before the match. Participants then played an 80-minute football match to induce delayed onset muscle soreness (DOMS) [6]. Participants were randomly assigned to either a Foam Rolling (FR) group or a PNF stretching group. The FR group performed five foam rolling exercises targeting the calf muscles, quadriceps, hamstrings, iliotibial band, and gluteal muscles. Each muscle group was rolled slowly for 30 seconds in a guided 15–20-minute session [7]. In the PNF group, participants held a stretch for 10 seconds, then performed a 6-second contraction against the researcher's resistance, followed by a passive stretch until a stretch sensation was reported [8]. Pain and ROM were measured again at 24, 48, and 72 hours post-treatment to compare the effects of the two recovery methods.

D. Statistical Analysis

A quasi-experimental design was employed to evaluate the effects of Foam Rolling (FR) and proprioceptive neuromuscular facilitation (PNF) stretching on markers of exercise-induced muscle soreness. Before analysis, the dataset was reviewed for missing or inconsistent values, and basic data cleaning procedures were performed. Statistical analyses were conducted using JAMovi software (version 2.6.22). Repeated measures ANOVA was used to compare mean pain scores and ROM between the FR and PNF groups, as well as to assess changes in pain scores across multiple time points.

III. RESULTS

The results indicated a significant effect of both the Foam Rolling (FR) and PNF stretching interventions on the measured outcomes, pain scale (PS), and active range of motion (AROM) in knee flexion across all four time points. As presented in Table 1, the main effects for both interventions on PS and AROM were statistically significant, with a p -value of 0.001. These findings suggest that both recovery strategies led to significant changes in pain intensity and knee range of motion over time.

TABLE I
EFFECT TOWARDS ROM

Effect	p	Eta Square
PS	<0.001	0.846
AROMR	<0.001	0.368
AROML	<0.001	0.394

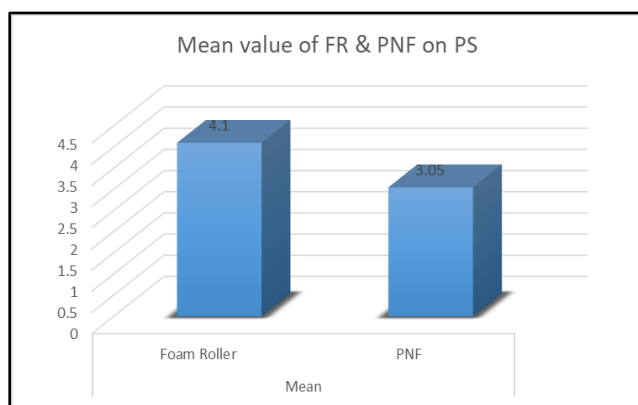


Fig.1 Mean value of FR and PNF on Pain Scale (PS).

Figure 1 illustrates a consistent decrease in pain scale (PS) scores across the four time points for both intervention groups. Based on the mean (M) values, the PNF stretching group reported a lower overall PS ($M = 3.05$) compared to the Foam Roller (FR) group ($M = 4.10$), indicating a greater reduction in perceived pain for the PNF group. Figure 2 displays changes in active range of motion (AROM) over time, showing an

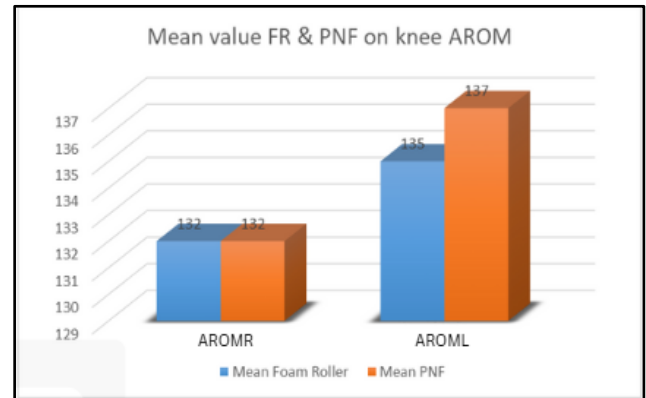


Fig.2 Mean value of FR and PNF on AROMR and AROML

overall increase in both right (AROMR) and left (AROML) knee flexion. The PNF group demonstrated slightly higher mean values for AROMR and AROML (132° and 137°, respectively), compared to the FR group (132° and 135°, respectively). Although both interventions resulted in improved AROM, statistical analysis revealed a significant difference between groups only for the pain scale, with no significant group differences for AROM outcomes.

IV. DISCUSSIONS

The present study investigated the effects of Foam Rolling (FR) and Proprioceptive Neuromuscular Facilitation (PNF) stretching on markers of exercise-induced muscle soreness, specifically pain intensity and knee range of motion (ROM) in U17 female football players from the Negeri Sembilan Football Club (NSFC). Both interventions are commonly used to facilitate post-exercise recovery, and the findings of this study support their effectiveness in reducing muscle soreness following match play.

The results revealed a significant reduction in pain scale (PS) across both intervention groups, with PNF stretching demonstrating a greater effect. This suggests that PNF stretching may be more effective in relieving symptoms of delayed onset muscle soreness (DOMS). This outcome aligns with previous findings indicating that PNF techniques can modulate nociceptive input, thereby decreasing pain sensitivity through neuromuscular mechanisms. Specifically, the activation of Golgi tendon organs during PNF stretching is believed to play a key role in promoting muscle relaxation and reducing tension [9]. These physiological responses likely contributed to the greater pain relief observed in the PNF group.

With respect to active range of motion (AROM) in knee flexion, both the FR and PNF interventions led to improvements over time. While the PNF group showed slightly higher mean values for AROM in both the right and left knees, the difference between the groups was not statistically significant. These findings suggest that both interventions are comparably effective in restoring knee mobility post-exercise. This is supported by prior research demonstrating that PNF stretching, particularly using hold-relax and contract-relax techniques can enhance both passive

and active ROM through neuromuscular adaptations [10]. Similarly, other studies have shown that foam rolling improves muscle flexibility and AROM, particularly in the hamstrings, over a period of consistent application [11].

In addition to reducing pain and improving flexibility, both interventions may contribute to reducing the risk of muscle injuries associated with high-intensity physical activity. The treatments appear to alleviate DOMS symptoms, enhance functional recovery, and potentially improve muscular performance. These outcomes highlight the practical relevance of incorporating FR and PNF stretching into post-match recovery routines for adolescent athletes.

Overall, the findings suggest that while both FR and PNF are effective recovery strategies, PNF stretching may offer superior benefits in reducing pain. However, both methods appear equally beneficial in improving the active knee range of motion. Coaches and sports practitioners may consider integrating either technique based on specific recovery goals and individual athlete response.

V. CONCLUSIONS

This study concluded that Proprioceptive Neuromuscular Facilitation (PNF) stretching was more effective than Foam Rolling (FR) in reducing post-match muscle soreness, as evidenced by significantly lower pain scale (PS) scores among U17 female football players from the Negeri Sembilan Football Club (NSFC). Both interventions significantly improved pain and knee range of motion (ROM) over time, indicating their general effectiveness as recovery strategies.

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Influence of External Focus Feedback Frequencies on Dart Throwing Among Young Adults

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Keywords: External focus feedback, Motor learning, Retention performance, Feedback frequency, Dart throwing task

I. INTRODUCTION

Feedback plays a crucial role in facilitating motor learning. Among various feedback strategies, external focus feedback, which directs the learner's attention toward the outcome of the movement rather than the movement itself, has consistently been shown to improve both performance and retention [1]. However, the frequency at which feedback is delivered remains a critical factor [2]. While high-frequency feedback may enhance immediate performance, it can lead to learner dependency. In contrast, reduced feedback frequencies are believed to encourage self-regulation and support long-term learning, as proposed by the guidance hypothesis. Therefore, this study aims to examine the effects of varying frequencies of external focus feedback (100 %, 50%, and 33 %) on dart-throwing performance.

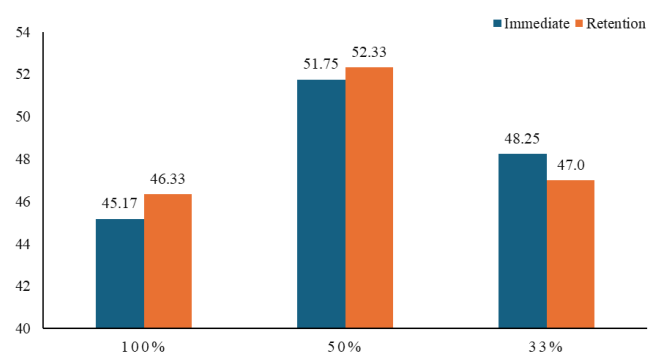
II. METHODS

Thirty-six young adults were randomly and equally assigned to one of three groups, each receiving external focus feedback at a frequency of 100%, 50%, or 33%. The group assignment was based on pre-test scores to ensure comparable skill levels among all groups. Following a pre-test of nine dart throws, all participants completed 48 acquisition trials, organized into six blocks of eight throws (6 blocks × 8 throws). Verbal external focus feedback was administered according to the assigned frequency for each group. Dart throwing performance was scored on a scale from 0 to 10, based on the accuracy of dart placement [3]. A post-test involving nine throws was conducted immediately after, while a delayed retention test was administered 24 hours later.

III. RESULTS AND DISCUSSION

A. Comparison Between Feedback Frequency

One-way ANOVA showed no significant group differences in immediate or delayed retention performance. Yet, the 50% feedback group had the highest mean scores across both phases. This trend implies that moderate feedback may be more effective for performance, even if not statistically conclusive.



* $p < 0.05$

Fig. 1 Comparison between different feedback frequencies during immediate and retention.

IV. CONCLUSIONS

Although no significant differences were found between groups, the 50% feedback group showed the highest mean scores and consistent improvement. This suggests that a moderate frequency of external focus feedback may be most effective for enhancing performance and long-term retention. Reduced feedback allows learners to rely more on intrinsic cues, promoting deeper learning. Excessive feedback, on the other hand, may lead to dependency, improving short-term performance but hindering independent skill execution [4][5] [6].

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Effect of Foam Rolling vs. PNF Stretching on Hamstring Flexibility Among Female Teenage Netball Athletes

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Keywords: Foam rolling, PNF stretching, Hamstring flexibility, Adolescent athletes, Netball performance

I. INTRODUCTION

Optimal hamstring flexibility is pivotal for explosive movement and injury mitigation in competitive netball [1] [2]. This study critically examines the acute impacts of foam rolling versus proprioceptive neuromuscular facilitation (PNF) stretching on flexibility gains among female teenage netball athletes [3][4][5]. By contrasting these popular interventions, we aim to inform evidence-based warm-up strategies tailored for youth sport performance and rehabilitation protocols [1][6][7].

II. METHODS

Twenty female netball athletes (aged 13–17) were allocated to foam rolling or PNF stretching. Both groups completed a single session following a warm-up. Foam rolling involved 3 sets per leg, 30–40 seconds each [1][4]; PNF used a towel with 6-second contractions and 10-second stretches, 3 sets per leg [3][7]. Hamstring flexibility was assessed pre- and post-intervention via the stand and reach test [5][8]. Standardized protocols, ethical clearances, and calibrated equipment ensured consistency [6].

III. RESULTS AND DISCUSSION

A. Acute Flexibility Response to Foam Rolling

Foam rolling improved hamstring flexibility from 4.40 cm to 8.90 cm, with a mean gain of 4.50 cm (± 4.06) [1][4][8]. Although individual responses varied widely, likely due to technique or muscle condition, foam rolling may promote acute flexibility via increased blood flow and reduced tension [4][6]. However, no statistical significance was found compared to the PNF group [3][5].

B. Acute Flexibility Response to PNF Stretching

PNF stretching led to a 3.35 cm (± 1.89) average improvement, with scores increasing from 3.45 cm to 6.80 cm [2][3]. Compared to foam rolling, PNF produced more consistent outcomes, possibly due to controlled muscle activation and relaxation phases [4][5]. Yet, the between-group difference remained statistically insignificant, suggesting both methods yield comparable short-term flexibility gains [1][3][5].

C. Practical Applicability of Foam Rolling and PNF

Foam rolling proved more practical and autonomous, requiring minimal equipment and no partner [6][8]. PNF, though effective, may be less feasible in group settings due to its reliance on assistance [3][7]. Coaches should consider context when selecting techniques; foam rolling suits self-managed routines, while PNF may benefit supervised training [1][5]. Instruction may enhance foam rolling's inconsistent outcomes [8][6].

TABLE I
SUMMARY OF FLEXIBILITY SCORES (CM)

Group	Pre-Test	Post-Test	Improvement
Foam Rolling	4.40 $\pm$ 12.69	8.90 $\pm$ 10.37	4.50 $\pm$ 4.06
PNF Stretching	3.45 $\pm$ 5.10	6.80 $\pm$ 4.80	3.35 $\pm$ 1.89

Both groups showed improved hamstring flexibility after one session. Foam rolling had a slightly higher mean gain (4.50 cm) compared to PNF stretching (3.35 cm), suggesting greater practical benefit.

TABLE II
BETWEEN-GROUP COMPARISON (IMPROVEMENT)

Test	p-value	Effect Size	Result
Mann-Whitney U	0.969	r = 0.02	No significant difference

Note: Mann-Whitney U was used due to violation of normality ($p = 0.001$)

No significant difference was found between groups ($p = 0.969$). The effect size was negligible, indicating similar effectiveness of foam rolling and PNF stretching in improving flexibility.

IV. CONCLUSIONS

This study highlights that both foam rolling and PNF stretching can acutely enhance hamstring flexibility in young netball athletes. While no method proved superior, foam rolling's accessibility offers practical value in sports settings. These findings support informed flexibility training decisions and underscore the importance of individualized, well-executed intervention strategies.

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Artificial Intelligence Applications in Mental Health Care: A Systematic Review of Current Implementation, Benefits, Challenges, and Methodology Quality of Empirical Evidence

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Keywords: Artificial intelligence, Mental health, Systematic review, Ethics and equity, Methodological quality

I. INTRODUCTION

Artificial intelligence (AI) is increasingly applied in mental health care, yet empirical evidence on its implementation, effectiveness, and ethical dimensions remains fragmented. This systematic review maps AI tools used in mental health, synthesizes reported benefits and challenges, evaluates methodological quality, and identifies critical gaps to inform future research and policy, especially regarding transparency, equity, and ethical safeguards.

II. METHODS

We conducted a systematic review of studies on AI applications in mental health by searching five databases: PubMed, Scopus, Web of Science, IEEE Xplore, and PsycINFO. We used the PICO framework to construct search terms combining "AI," "mental health," "diagnosis," and "therapy." Inclusion criteria were peer-reviewed studies focused on AI in mental health screening, diagnosis, or intervention, while excluding non-English studies, duplicates, editorials, and conference abstracts.

We extracted data by categorizing studies according to the AI methods used, such as machine learning, natural language processing, and deep learning, and the mental health conditions addressed, including depression, anxiety, and schizophrenia. We also recorded study design types, such as randomized controlled trials and observational studies, along with outcomes like diagnostic accuracy and symptom improvement. Demographic details, including age, sample size, and region, were also documented. Findings were grouped into themes like diagnosis, symptom tracking, and treatment support for clear analysis.

To assess methodological quality, we used established tools, which are PRISMA for reporting review quality, ROBINS-I for non-randomized studies, RoB 2.0 for randomized trials, and GRADE to assess evidence confidence. Risk of bias was categorized as low, moderate, high, or critical, guiding interpretation of results. This approach ensured transparency and rigor in evaluating the strength of the included studies, providing a robust foundation for synthesizing findings and drawing conclusions.

III. RESULTS AND DISCUSSION

A. Dominant AI Techniques and Application Areas

Most studies used machine learning or NLP, employing models like SVMs and neural networks. Depression was the dominant target. AI tools were mostly applied in early detection, fewer supported treatment or real-time monitoring.

B. Reported Benefits and Common Challenges

Benefits included early symptom recognition, scalability, and round-the-clock support. However, challenges like biased datasets, opacity, and ethical risks were common. Patient or clinician feedback was rarely assessed.

C. Methodological Quality and Study Designs

Five studies met high-quality standards; most were moderate. Frequent issues included small samples and inadequate validation. Stronger designs, like RCTs and externally validated ML models, yielded more credible findings.

D. Future Research Priorities and Equity Concerns

Future research should prioritize real-world testing, cultural adaptation, and ethical evaluation. Despite frequent mentions, ethical risks were seldom empirically assessed. Underrepresented groups and LMICs remain largely excluded, signaling equity as a critical area for future AI research.

Figure 1 shows the study design distribution for included studies.

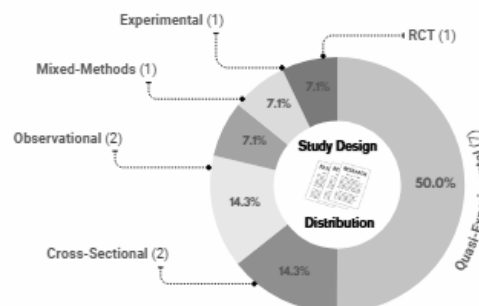


Fig. 1 A donut chart in distinct grey shades that separates Randomized Controlled Trial, Cross-Sectional, and Other designs.

TABLE I
SUBJECT CHARACTERISTICS

Characteristic	Mean	Median	Min	Max
Age (yrs)	35.3	29.6	15.0	55.0

Fig. 2 shows an example of an image with country distribution. Check the country distribution to reveal the important detail in the figure.



Fig. 2 Map showing the geographic origin of the 14 studies included in this systematic review. Colour intensity reflects the number of studies per country (scale 1–4).

IV. CONCLUSIONS

AI tools show promise for early mental health detection, but their effectiveness and ethics remain unevenly studied. Methodological weaknesses and limited diversity hinder generalizability. Future work must emphasize real-world validation, ethical safeguards, and inclusion of marginalized groups to ensure trustworthy and equitable AI integration in global mental health care.

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The Impact of Beetroot Juice Consumption on Swimming Performance in Young Active Males

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Keywords: Beetroot juice, Nitrate supplementation, Swimming performance, Perceived exertion, RPE scale

I. INTRODUCTION

Beetroot juice, rich in dietary nitrates, has gained attention for its potential to enhance athletic performance through improved oxygen efficiency. While its effects are well-documented in endurance sports, limited data exist regarding its influence on anaerobic aquatic activities. This study investigates whether acute beetroot juice supplementation improves 50-meter swimming performance and perceived exertion among young active males.

II. METHODS

Nineteen active males (aged 21–25) completed two 50-meter freestyle swim tests in a single-blind, randomized, crossover design. Participants consumed either 70 mL beetroot juice (400 mg nitrate) or a placebo 2 hours before each trial, with a 2-day washout. Swim times were recorded via stopwatch; perceived exertion was assessed immediately post-swim using the Borg RPE scale (0–10). All data were collected by the researcher.

III. RESULTS AND DISCUSSION

The descriptive statistics of swimming time and Rating of Perceived Exertion (RPE) among participants before and after beetroot juice supplementation are shown in Table I. A total of 19 participants took part in the study. The mean pre-test time was 93.16 seconds with a standard deviation (*SD*) of 25.85, while the post-test time slightly decreased to 92.97 seconds (*SD* = 28.23). The minimum swimming time recorded was not stated, but the median was 90.52 seconds in the pre-test and 91.25 seconds in the post-test.

For RPE, the mean pre-test score was 6.00 (*SD* = 1.94), which decreased to 5.11 (*SD* = 1.20) in the post-test. This shows that participants felt less exertion after consuming beetroot juice. The mean difference in time was -0.191 seconds, and for RPE it was -0.895.

TABLE I
DESCRIPTIVE STATISTICS FOR SWIMMING TIME & RPE

Variable	N	Mean	SD	Median	SE
Pre Test Time (sec)	19	93.16	25.85	90.52	5.929
Post Test Time (sec)	19	92.97	28.23	91.25	6.477
Pre Test RPE	19	6.00	1.94	6.00	0.446
Post Test RPE	19	5.11	1.20	5.00	0.275
Time Difference (sec)	19	-0.191	10.13	-1.79	2.325
RPE Difference	19	-0.895	1.05	-1.00	0.241

Table II shows the results of the paired samples t-test. The statistical analysis revealed that there was no significant difference between pre- and post-test swimming time ($p = 0.936$), with a very small effect size ($d = 0.0188$). However, a significant reduction in RPE was found ($p = 0.002$), with a large effect size ($d = 0.8533$), indicating that beetroot juice had a strong impact in lowering perceived exertion. There was no significant relationship between changes in time and changes in RPE ($p = 0.756$).

TABLE II
PAIRED SAMPLE T-TEST FOR SWIMMING TIME & RPE

	t-value	df	p	Mean diff	SE diff	Effect Size
Pre Test Time vs Post Test Time	0.0819	18.0	0.936	0.191	2.325	0.0188
Pre Test RPE vs Post Test RPE	3.7196	18.0	0.002	0.895	0.241	0.8533
Time Difference vs RPE Difference	0.3151	18.0	0.756	0.704	2.235	0.0723

Table III shows the results of the Shapiro-Wilk test of normality. All variables tested had p-values less than 0.05, indicating that the data violated the assumption of normality. This includes swimming time, RPE, and their differences. Despite this, the paired t-test was used due to its robustness in small samples.

TABLE III
NORMALITY TEST (SHAPIRO-WILK) FOR SWIMMING TIME & RPE

	W	p
Pre Test Time - Post Test Time	0.418	< 0.001
Pre Test RPE - Post Test RPE	0.833	0.004
Time Difference - RPE Difference	0.451	< 0.001

IV. CONCLUSIONS

While beetroot juice did not significantly improve 50-meter swim times, it notably reduced perceived exertion among young active males. These findings suggest potential benefits for subjective effort reduction, though not for short-distance performance enhancement. Future research should explore chronic supplementation or longer-distance events.

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Therapeutic Effectiveness of Artificial-Intelligence-Enabled Applications for Reducing Anxiety and Depression: A Systematic Review of Short- and Long-Term Interventions

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Keywords: AI chatbots, Digital mental health, Anxiety, Depression, Systematic review

I. INTRODUCTION

Artificial intelligence-enabled chatbots are increasingly used in mental health interventions, yet their long- and short-term effectiveness remains unclear. This systematic review and meta-analysis synthesize randomized controlled trials to evaluate AI chatbot interventions targeting anxiety and depression, addressing treatment duration, risk of bias, and evidence certainty. Our study uniquely integrates both immediate and follow-up outcomes while assessing intervention quality across diverse populations and designs.

II. METHODS

We conducted a comprehensive search of PubMed, Scopus, Web of Science Core Collection, OVID-MEDLINE, ClinicalTrials.gov, and WHO ICTRP from inception to January 10, 2025. The search strategy, guided by the PICO framework, included Boolean logic and both subject headings and free-text terms related to AI, chatbots, psychotherapy, depression, anxiety, and RCTs. Manual forward and backward citation tracing was also performed to ensure comprehensive coverage.

Eligible studies were randomized controlled trials involving adults (≥ 18 years) with clinical or subclinical depression or anxiety, using AI-driven psychotherapeutic interventions (e.g., CBT, ACT, mindfulness) lasting at least four weeks. Only trials using validated scales (e.g., PHQ-9, GAD-7) and random allocation with ≥ 20 participants per arm were included. Studies were excluded if they involved hybrid AI-human interventions, physiological-only outcomes, severe mental illness populations, or were non-English or non-randomized.

Data extraction was performed using REDCap with built-in validation. Risk of bias was assessed using Cochrane RoB 2 and supplemented with RoB-B-T. Effect sizes (Hedges' g) were computed using random-effects models in CMA software. We conducted subgroup analyses by intervention duration and sensitivity tests (e.g., leave-one-out, risk-of-bias exclusion). Publication bias was evaluated using funnel plots, Egger's test, and trim-and-fill procedures. Evidence certainty was graded using GRADE.

III. RESULTS AND DISCUSSION

A. Study Characteristics and Populations

We included 23 RCTs from 10 countries, with the U.S. most represented. AI chatbots primarily used CBT, ACT, or mindfulness and were accessed via mobile or web apps (Figure 1). Most studies were published post-2021, involving 5,748 adults (mean age 32.8) as shown in Table 1. Recruitment was mainly online, with samples drawn from both clinical and non-clinical settings. In Figure 2, the majority of studies (91.4%) employed a randomized controlled trial design, while the remaining comprised pilot and quasi-experimental studies.

TABLE I
SUBJECT CHARACTERISTICS

Characteristic	Mean	Median	Min	Max
Age (yrs)	32.8	30.7	18.9	65.0
Study Duration (days)	58.4	42	7	180

B. Pooled Treatment Effects

Pooled analyses showed moderate-to-large treatment effects: Hedges' $g \approx 0.6$ – 0.8 for depression and 0.5 – 0.8 for anxiety. Both outcomes reached statistical significance, particularly in short-term trials and minimal-contact control designs. Depression trials showed more consistency in symptom reduction, while anxiety trials demonstrated broader but more variable effects, especially in studies using active comparators.

C. Subgroup Analysis by Treatment Duration

Subgroup analyses found the strongest effects in 4–8 week interventions. Longer-term follow-ups (≥ 3 months) showed attenuated benefits or plateauing, with limited available data reducing certainty. Some >3 -month studies revealed non-significant results, suggesting AI chatbot efficacy may decline without sustained use or reinforcement, raising questions about long-term durability of treatment effects.

D. Bias, Heterogeneity, and Evidence Certainty

Risk of bias was mixed, with several studies flagged as “High Risk” or having “Some Concerns.” Heterogeneity was substantial ($I^2 > 50\%$), indicating methodological variability [6]. Sensitivity analyses confirmed robustness across models. Although funnel plots and Egger’s test suggested minor publication bias, trim-and-fill corrections did not meaningfully alter results, supporting overall reliability.

Figure 1 shows the country distribution for included studies, while Figure 2 shows the study design distribution.

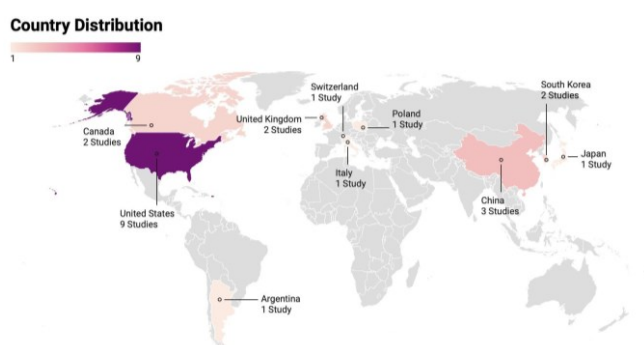


Fig. 1 Map showing the geographic origin of the 23 studies included in this systematic review. Colour intensity reflects the number of studies per country (scale 1–9).

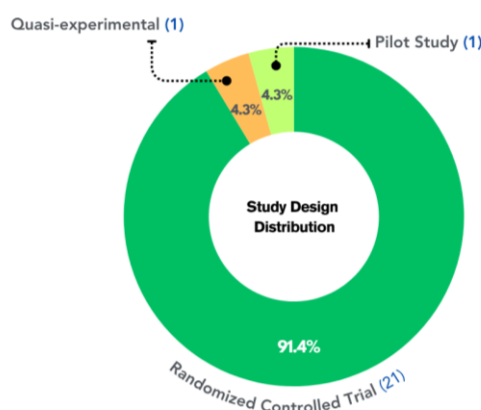


Fig. 2 A donut chart in green, apple green, and orange differentiates Randomized Controlled Trial, Quasi-experimental, and Pilot Study.

IV. CONCLUSIONS

AI-based psychotherapeutic chatbots show moderate-to-large short-term benefits for anxiety and depression, especially over 4–8 weeks. However, long-term effects remain uncertain. Despite heterogeneity and moderate bias, findings were robust. Focused design and extended follow-up are needed to optimize sustained mental health outcomes through autonomous, scalable digital interventions.

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Short-Term Effects of Bench Press Training on Muscle Hypertrophy and Strength in Untrained Males

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Keywords: Resistance training, Muscle hypertrophy, Bench press, Untrained males, Short-term adaptations

I. INTRODUCTION

Resistance training produces significant physical and muscle changes that improve strength, functional ability, and hypertrophy of skeletal muscles. The bench press, a popular multi-joint upper-body exercise targeting the pectoralis major, anterior deltoids, and triceps brachii, has been extensively studied for long-term adaptations, but limited knowledge exists about early-phase hypertrophic and strength responses in untrained males [1]. Traditional models suggest that initial strength gains (4–6 weeks) are primarily driven by neural mechanisms, while morphological changes develop subsequently. However, recent research challenges this paradigm, showing observable hypertrophy within the first weeks of training [2]. This study investigated the short-term effects of a four-week bench press training program on muscle hypertrophy and strength in untrained males, addressing critical gaps in understanding early-phase adaptations and the relationship between regional hypertrophy and strength gains.

II. METHODS

A randomized pretest-post-test experimental design was employed with eight healthy, untrained males aged 18–24 years at Universiti Teknologi MARA. Participants had no structured resistance training experience within the previous 12 months. The intervention consisted of a four-week supervised bench press training protocol: three sessions per week at 75% of one-repetition maximum (1RM), performing three sets of ten repetitions with 2–3 minutes rest between sets. Muscle hypertrophy was assessed through pectoralis major and triceps brachii circumference measurements using standardized anthropometric techniques, and whole-body muscle mass via bioelectrical impedance analysis (BIA) using the Omron HBF-375 device. Strength was evaluated using standardized 1RM bench press testing at baseline, mid-intervention, and post-intervention. Data were analyzed using paired sample t-tests and Pearson correlation analysis, with significance set at $p \leq 0.05$.

III. RESULTS AND DISCUSSION

A. Effects of Bench Press Training on Muscle Hypertrophy and Strength

Figure 1 illustrates a statistically significant improvement observed in 1RM bench press performance, with mean strength increasing from 42.9 ± 4.96 kg to 55.0 ± 5.00 kg ($t = -13.678$, $p < 0.001$), reflecting a large effect size ($d = 5.17$). This substantial gain in maximal strength aligns with early-phase neural adaptations typically observed in novice individuals undergoing resistance training [3]. These improvements are likely due to enhanced motor unit recruitment, synchronization, and firing rate, as commonly reported in the first few weeks of training [4]. Significant hypertrophy was also found in the pectoralis major (from 87.2 ± 5.50 cm to 90.2 ± 4.37 cm, $t = -3.440$, $p = 0.014$, $d = 1.30$) and triceps brachii (from 27.9 ± 2.59 cm to 30.0 ± 1.87 cm, $t = -6.200$, $p < 0.001$, $d = 2.34$). These changes reflect the primary involvement of these muscles in the bench press movement, emphasizing the exercise's specificity in targeting pushing musculature [5]. The large effect sizes indicate meaningful hypertrophic changes even within a short time frame, demonstrating that untrained individuals are particularly responsive to resistance training stimuli. However, there was no significant change in overall muscle mass (from 37.6 ± 3.31 kg to 37.4 ± 3.05 kg, $t = 0.795$, $p = 0.457$, $d = 0.30$). This suggests that the hypertrophy was localized, likely restricted to the upper body pushing musculature, and not sufficient in magnitude or duration to reflect in whole-body mass metrics. Similar findings have been reported by [6], where short-term interventions often resulted in site-specific hypertrophy without significant alterations in overall lean mass.

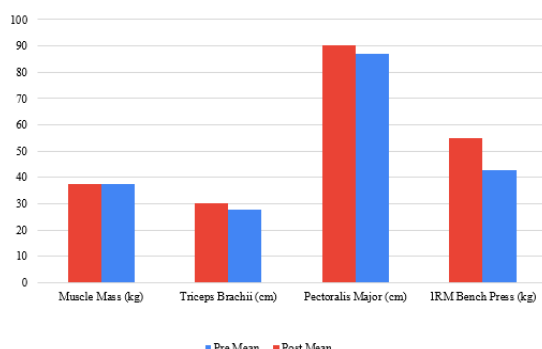


Fig. 1 Changes in muscle thickness of the triceps brachii, pectoralis major, and maximal (1-RM) strength during 4weeks of heavy bench press training.

B. Relationship Between Hypertrophy and Strength Gains

The analysis in Table I revealed weak, non-significant negative correlations for both PM circumference ($r = -0.276$, $p = 0.549$) and TB circumference ($r = -0.236$, $p = 0.610$). These findings indicate that increases in upper-body muscle size were not significantly associated with gains in bench press strength. This suggests that the observed strength improvements may have been driven more by neural adaptations than by morphological changes during the short training duration. Early-phase strength gains in novice lifters are typically attributed to enhanced motor unit recruitment, firing rate, and intramuscular coordination [4]. Additionally, the short duration of the program and small sample size ($df = 5$) may have limited the detection of meaningful associations. Previous research has noted that hypertrophy becomes a more dominant contributor to strength gains in later phases of training, while initial improvements are largely neural [7].

TABLE I
PEARSON CORRELATION

		PM Circumference	TB Circumference
1RM		-0.276	-0.236
	<i>df</i>	5	5
	<i>p-value</i>	0.549	0.610

IV. CONCLUSIONS

This study demonstrates that a four-week bench press training program at 75% 1RM effectively enhances upper-body strength and induces regional hypertrophy in untrained males. The findings support the dual-pathway model of adaptation, with neural mechanisms dominating early strength improvements while morphological adaptations manifest rapidly at specific sites. The results provide evidence-based guidance for beginner programming, suggesting that even brief resistance training protocols can yield substantial functional and aesthetic benefits. Future research should employ larger samples, advanced imaging techniques, and longer intervention periods to further clarify the mechanisms underlying early-phase adaptations.

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Effect of Foam Rolling and Proprioceptive Neuromuscular Facilitation (PNF) Stretching on Agility and Muscular Performance Among U-17 Negeri Sembilan Football Club (NSFC) Female Players

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Keywords: Foam rolling (FR), PNF stretching (PNF), Agility test, Muscular endurance

I. INTRODUCTION

Agility is widely believed to be a crucial physical component necessary for successful performance in many sports, particularly football, where quick changes in direction and rapid responses are essential [1]. In addition, muscular endurance enables players to sustain repeated high-intensity efforts throughout a full match, contributing significantly to overall performance [2]. Among the commonly used methods to enhance these components, foam rolling and proprioceptive neuromuscular facilitation (PNF) stretching have gained popularity for their potential to improve muscle function, neuromuscular control, and recovery. While these techniques are widely used in athletic training, there is limited empirical evidence specifically examining their effects on agility performance, especially among adolescent female football players in youth academies [3]. Coaches and trainers working with this population require evidence-based strategies to design training programs that address their unique physiological characteristics and developmental needs [4]. Furthermore, studies suggest that young female athletes respond differently to training interventions due to factors such as neuromuscular control, injury risk profiles, and the effects of puberty [5][6]. Therefore, this study aims to investigate and compare the individual and combined effects of foam rolling and PNF stretching on agility and muscular endurance performance among female players from the U17 Negeri Sembilan Football Club (NSFC), to fill a critical gap in the current sports science literature and support the development of more targeted training practices.

II. METHODS

A. Subjects

The study involved twenty trained female football players from the Negeri Sembilan Football Club (NSFC) Under-17 (U17) team. Participants were randomly assigned to two intervention groups: the Foam Rolling (FR) group ($n = 10$) and the Proprioceptive Neuromuscular Facilitation (PNF) stretching group ($n = 10$). Before participation, written informed consent was obtained from all participants, ensuring voluntary involvement in the study.

Inclusion criteria required participants to be female football players registered with the NSFC U17 team, aged

below 17 years, and actively participating in regular football training for a minimum of six months. All participants were required to be in good physical health, free from musculoskeletal injuries, and without any known history of metabolic, cardiovascular, or pulmonary disorders.

B. Instrumentation

Agility

The Illinois Agility Test was used to measure change-of-direction speed, which is important in football [1][7]. The test was done on a 10 m $\times$ 5 m course with cones, and time was recorded using a stopwatch. Each participant completed one trial. This test is reliable for football players ($ICC = 0.89\text{--}0.93$) [8]. Agility was tested before the intervention and again 72 hours after to assess changes.

Muscular Endurance

Muscular endurance was measured using the 1-minute push-up test, which assesses upper-body endurance important for football [9]. Participants performed as many correct push-ups as possible in 60 seconds, keeping a straight body line and full range of motion. Two researchers recorded the total number for accuracy. This test is practical and shows a strong correlation with overall endurance in female athletes ($r = 0.82$) [10].

C. Procedure

Baseline measurements of agility (Illinois Agility Test) and muscular endurance (1-minute push-up test) were recorded for all participants. Players were then randomly assigned to either the Foam Rolling (FR) or PNF stretching group. The FR group completed a 15-minute session targeting five lower-body muscle groups: calves, quadriceps, hamstrings, iliotibial band, and glutes. Each muscle was rolled for 30–45 seconds with 15-second rest intervals, applying moderate pressure (rated 5–7 on a 10-point discomfort scale) [11]. The PNF group performed assisted hold-relax-contract stretches consisting of a 10-second passive stretch, a 6-second isometric contraction at 75% effort, and a 30-second deeper stretch [12]. Agility and muscular endurance were reassessed immediately after the intervention, as well as at 24 and 72 hours post-intervention to measure both short- and longer-term effects.

D. Statistical Analysis

A randomized controlled trial design was used to compare the effects of Foam Rolling (FR) and Proprioceptive Neuromuscular Facilitation (PNF) stretching on agility and muscular endurance among female U17 players from the Negeri Sembilan Football Club (NSFC). Performance data were collected using the Illinois Agility Test and the 1-minute push-up test. Prior to analysis, the dataset was screened for missing or inconsistent values, and basic data cleaning procedures were performed. Statistical analyses were conducted using JAMOVI software (version 2.3.28). Independent samples t-tests were used to compare baseline performance between the FR and PNF groups. Repeated measures ANOVA was then applied to evaluate changes in agility and muscular endurance over time within and between groups.

III. RESULTS

The results demonstrated a significant effect of both the Foam Rolling (FR) and Proprioceptive Neuromuscular Facilitation (PNF) stretching interventions on agility performance and muscular endurance across the two time points (pre- and 72 hours post-intervention). As shown in Table 1, the main effects for both the Illinois Agility Test and the 1-minute push-up test were statistically significant ($p = 0.001$), indicating meaningful performance changes following the interventions.

Further analysis revealed that the FR group showed greater improvement in agility scores, while the PNF group achieved better results in muscular endurance. These findings suggest that each intervention may offer specific benefits depending on the targeted performance outcome.

TABLE I
TEST OUTPUT

Effect	<i>p</i> value	<i>Eta Square</i>
Agility (sec)	<0.001	0.009
Muscular Endurance (<i>reps</i>)	<0.001	0.028

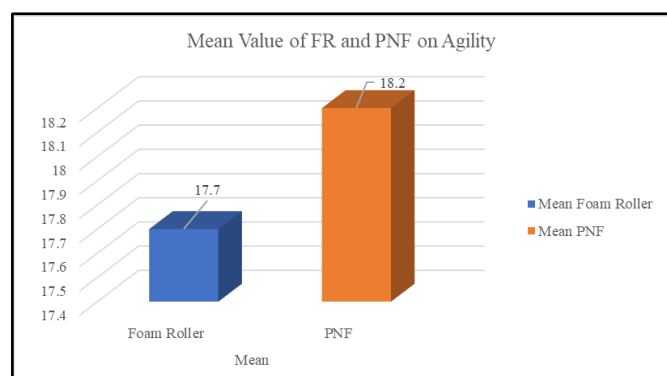


Fig.1 Mean Value of FR and PNF on Agility.

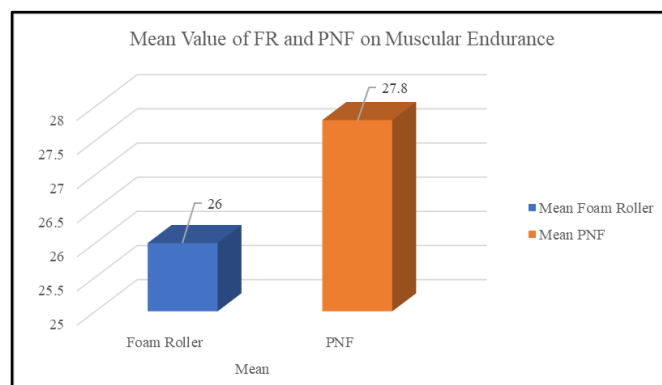


Fig.2 Mean Value of FR and PNF on Muscular Endurance.

Figure 1 shows a difference in mean agility scores between the two groups. The Foam Rolling (FR) group recorded a lower mean completion time ($M = 17.9$ seconds) compared to the PNF group ($M = 18.1$ seconds), indicating better agility performance in the FR group, as lower times represent faster performance on the Illinois Agility Test.

In contrast, Figure 2 demonstrated that the PNF group achieved a higher mean score ($M = 27.8$ repetitions) in the 1-minute push-up test compared to the FR group ($M = 26$ repetitions), suggesting that PNF stretching was more effective in enhancing muscular endurance.

IV. DISCUSSION

This study compared the effects of Proprioceptive Neuromuscular Facilitation (PNF) stretching and Foam Rolling (FR) on agility and muscular endurance among U17 female football players from the Negeri Sembilan Football Club (NSFC). While both methods are commonly used in athletic settings to enhance performance and facilitate recovery, limited research has explored their specific effects on adolescent female athletes.

The findings demonstrated that foam rolling was more effective in improving agility performance. Participants in the FR group achieved faster times on the Illinois Agility Test compared to those in the PNF group. This supports previous studies suggesting that foam rolling may reduce muscle stiffness and improve neuromuscular coordination, thereby enhancing the ability to perform rapid directional changes as an essential skill in football [3]. The application of moderate pressure to the lower-body musculature may have contributed to increased blood flow, reduced fascial restrictions, and improved movement efficiency during agility tasks.

In contrast, the PNF stretching group exhibited greater improvements in muscular endurance, as indicated by a higher number of push-ups completed in the 1-minute test. These results are consistent with the literature that highlights the effectiveness of PNF stretching in enhancing neuromuscular control, flexibility, and fatigue resistance [13]. The hold-relax-contract method used in PNF may have facilitated greater

muscle activation and endurance capacity, particularly in repetitive upper-body movements.

Overall, the findings suggest that both FR and PNF stretching provide performance benefits but in different domains. Foam rolling may be more effective for enhancing agility, while PNF stretching appears more beneficial for improving muscular endurance. These results offer practical value for coaches and strength and conditioning professionals working with youth athletes, as interventions can be tailored to target specific performance outcomes based on training or recovery goals.

IV. CONCLUSIONS

This study concluded that foam rolling was more effective for improving agility, while PNF stretching was better for enhancing muscular endurance in U17 female football players. Both treatments had significant effects, showing that different methods work best for different performance goals. These findings can help coaches choose the right recovery strategies to support young athletes during training and competition.

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A Case Study on Biomechanical Parameters Related to Archery Performance Among UiTM Seremban 3 Student Archers

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Keywords: Biomechanics, Archery performance, Draw force line, Shooting accuracy, Gender differences

I. INTRODUCTION

An archer's success is determined not just by technical proficiency, but also by the biomechanical factors that determine their movements. Archery performance is influenced by various biomechanical factors, such as the alignment of the draw force line (DFL) and shooting accuracy [1]. Misalignment can cause muscular fatigue and increased injury risk, eventually reducing performance [2]. Past researchers attribute chronic injuries primarily to repetitive strain and improper technique—conditions like misalignment heighten fatigue, elevate injury risk, and eventually impair performance [3]. When the elbow deviates from the draw force line, the archer must compensate using additional muscle effort (e.g., biceps/triceps), increasing fatigue and risking instability and injury, which negatively impacts performance [4]. Therefore, this case study examined the relationship between these factors among UiTM Seremban 3 student archers, comparing male and female participants.

II. METHODS

This study utilized a digital camera and Kinovea software to analyze the draw force line (DFL) of 7 right-handed, recurve archers from UiTM Seremban 3 with at least two years of experience. Shooting accuracy was assessed using a standard 122 cm target at 10 meters. The accuracy was assessed by assigning points based on the proximity of the arrows to the target center, with higher scores indicating greater accuracy. This approach follows the method used by [5], who assessed archery accuracy by comparing shot scores between experienced and inexperienced archers. Reflective markers on the wrist (condyloid joint), elbow (hinge joint), shoulder (ball-and-socket joint), and sternum are effectively used to accurately measure joint angles and track DFL alignment [6][1]. Descriptive statistics were applied, and independent t-tests compared male and female participants, while Pearson correlation analyzed the relationship between DFL and accuracy.

III. RESULTS AND DISCUSSION

A. Draw Force Line Comparison

There was no significant difference ($p = 0.683$, $p > 0.05$) in the draw force line between male and female archers. This suggests that gender does not influence the alignment of the draw force line in recurve archery [1], implying that other

factors, such as technique or individual differences, may play a more critical role.

B. Shooting Accuracy Comparison

Similarly, no significant difference ($p = 0.066$, $p > 0.05$) was observed in shooting accuracy between male and female archers. This indicates that both genders performed equally in terms of accuracy, further supporting the idea that skill and technique may have a greater impact on performance than gender-based differences [7].

C. Relationship Between Draw Force Line and Accuracy

A moderate negative correlation was found between the draw force line and shooting accuracy, although not significant. As the angle of the draw force line increased, shooting accuracy decreased. This suggests that misalignment in the draw force line could lead to reduced accuracy [1], highlighting the importance of proper technique to optimize performance and prevent potential injuries.

D. Figure and Table

TABLE I

COMPARISON BETWEEN MALE AND FEMALE IN DRAW FORCE LINE ANGLE

	Group	Mean	SD	t	df	p
Draw Force Line	Male	39.2	1.71	0.433	5.00	0.683
	Female	42.1	11.1			

*The significance level was set at $p < 0.05$

TABLE II

COMPARISON BETWEEN MALE AND FEMALE IN SHOOTING ACCURACY

	Group	Mean	SD	t	df	p
Total Score	Male	39.2	1.71	-2.33	5.00	0.066
	Female	42.1	11.1			

*The significance level was set at $p < 0.05$

TABLE III
RELATIONSHIP BETWEEN DRAW FORCE LINE ANGLE AND SHOOTING
ACCURACY

Total Score	Draw Force Line Angle	
	Pearson's R	-0.533
	Sig. (2-tailed)	0.218
	N	7

IV. CONCLUSIONS

This study demonstrates that gender does not significantly influence the draw force line or shooting accuracy among recurve archers. A moderate negative correlation ($r = -0.533$) was found between draw force line and accuracy, highlighting the importance of proper alignment to enhance performance and reduce injury risk, consistent with the findings of [8]. Future research should conduct detailed biomechanical assessments and apply advanced motion analysis techniques to better understand the relationship between draw force line alignment and accuracy. These insights could support improved injury prevention strategies and guide the development of equipment tailored to individual archers.

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Examining the Interplay Between Environmental Barriers, Demographic Factors, and Sports Participation Among University Students

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Keywords: Recreational sports, Environmental barriers, Sports participation, Gender differences, University students

I. INTRODUCTION

Promoting physical activity and recreational sports participation among university students has garnered attention as a critical component of fostering physical and mental well-being. A study of university students revealed that physical activity significantly impacts students' health and well-being, showing that those who are not physically active in their leisure time are more likely to have moderate levels of disbelief and high levels of emotional burnout [1]. Thus, understanding factors that influence recreational sports participation is vital for promoting student well-being. Hence, this study investigates the interplay between environmental barriers, demographic factors (i.e., age and gender), and recreational sports participation among UiTM Seremban 3 students. By identifying patterns in perceived barriers and understanding the demographic factors, the research provides insights that can support inclusive recreational planning and reduce obstacles to student engagement in recreational sports.

II. METHODS

A quantitative approach using questionnaires was employed with 365 UiTM Seremban 3 students from FSR and FSKM. Data were collected via an online survey distributed through Google Forms. The present study used the environmental barriers instruments [2] to measure the environmental barriers, and the recreational sports participation was assessed using the frequency of playing in the past week [3]. Spearman's rho tested age-based perceptions, while the Mann-Whitney U test examined gender differences.

III. RESULTS AND DISCUSSION

A. Frequency of Recreational Sports Participation

Only 40.3% of UiTM Seremban 3 students reported regular participation, typically under two times weekly. Findings revealed an average of 2.25 as the mean play frequency, implying that respondents would have participated in sports activities an average of two times the previous week. This means that not all the population is playing sports daily but are taking up recreational sport activities as they get the opportunity in some periodic way. The standard deviation of 0.869 indicates that there is a moderate difference in the frequency of participation in sports activities among people. Others are likely to play a lot, and others get less involved with

fewer activities. The low standard deviation indicates that all responses are in line, and the majority of them group around the mean frequency of play.

B. Environmental Barriers to Participation

As per the results, the average score is 6.098, and this implies that the students experience an average to severe level of environmental barriers. Minimum scores are 0.33, and the maximum scores are 10.00, which shows that the number of students who feel considerably barred is not at all high, and there is also no exception denoting having high scores, that is, feeling strongly affected. The standard deviation of 2.81 indicates a certain range in the perceptions of students on these barriers.

C. Age-Based Differences in Environmental Barrier Perception

Spearman's rho showed a very weak, non-significant correlation between age and environmental barrier perception ($r = 0.019, p = 0.719$). The analysis indicates that age does not produce any significant difference in the manner in which students perceive or feel environmental barriers. The perception of these barriers by the students, whether younger or older, is quite similar, and age is not a leading factor in their responses in the study. Shared academic demands and routines across age groups may explain the minimal variation in perceived environmental constraints.

D. Gender-Based Differences in Environmental Barrier Perception

Mann-Whitney U results indicated no significant gender-based differences. The mean rank of the male students stood at 180.51, whereas the girls stood at a slightly higher value of 187.61. This indicates a minor variation in the score of the environmental barriers by each gender. Nevertheless, p -value (Asymp). The p -value (Sig. 2-tailed) = 0.538, and it is of a higher value than the standard value of 0.05. This implies that the gap between the two groups cannot be regarded as statistically significant. The test indicates that both groups seem to feel and evaluate these obstacles in quite a similar manner.

CONCLUSIONS

This study highlights low recreational sports participation among UiTM Seremban 3 students, shaped by space constraints, inadequate facilities, and shared environmental barriers. Demographic factors such as age and gender showed minimal impact, suggesting universal challenges. Addressing these barriers could enhance inclusive participation and promote healthier student lifestyles across faculties. Hence, by introducing the campus enhancements and people-friendly policies, these concerns can be fixed, and more students can prefer more active and healthier lifestyles.

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Effect of FIFA 11+ Warm-Up Kids on Agility and Power Among Youth Soccer Kids

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Keywords: FIFA 11+, Youth soccer, Agility, Lower-body Power, Warm-up intervention

I. INTRODUCTION

Youth soccer performance relies on agility and power, often enhanced through effective warm-up routines. FIFA 11+ has been proposed as a structured program improving motor skills and reducing injuries [1][2]. However, its superiority over traditional warm-ups in enhancing agility and power among young players remains unclear. This study evaluates FIFA 11+ effects on youth performance and compares outcomes with conventional warm-up practices to inform evidence-based training strategies.

II. METHODS

Sixteen youth soccer players aged 8–12 were assigned to either a control group with traditional warm-ups or an experimental group performing FIFA 11+. The intervention lasted four weeks with one session per week. Agility was assessed using the T-Test, while lower-body power was evaluated through the standing long jump. Pre- and post-intervention comparisons examined performance differences between groups.

III. RESULTS AND DISCUSSION

A. Effects of Warm-up on Physical Performance

Table I shows the pre- and post-test results for the FIFA 11+ Warm-Up Kids group. Participants demonstrated significant improvements in both lower-body power and agility. The mean standing long jump distance increased from 142.19 ± 12.66 cm to 147.06 ± 12.72 cm ($p < 0.001$), indicating enhanced explosive leg strength. Similarly, agility performance improved, with T-test times decreasing from 8.25 ± 0.44 s to 8.01 ± 0.55 s ($p < 0.001$). These results support the effectiveness of the FIFA 11+ Kids warm-up program in developing neuromuscular coordination, balance, and power in young athletes, as previously reported by Bizzini and Dvorak [1]. The inclusion of plyometric and directional movement drills likely contributed to these improvements.

TABLE I
PAIRED T-TEST RESULTS (FIFA 11+ WARM UP KIDS)

Assessment	Pre	Post	p value
Standing Long Jump (cm)	142.19 ± 12.66	147.06 ± 12.72	<0.00
Agility T-Test (s)	8.25 ± 0.44	8.01 ± 0.55	<0.00

Table II presents the results for the normal warm-up group, which also showed significant gains in physical performance. The standing long jump improved from 148.75 ± 6.45 cm to 152.00 ± 154.00 cm ($p < 0.001$), and agility T-test times decreased from 8.16 ± 0.43 s to 7.90 ± 0.58 s ($p < 0.001$). These findings suggest that even standard warm-up routines can yield short-term performance benefits in youth athletes by increasing muscle temperature, activating the nervous system, and preparing the body for movement. However, when compared to the structured approach of FIFA 11+ Kids, the normal warm-up may lack the targeted neuromuscular and sport-specific components needed for long-term athletic development [2].

TABLE II
PAIRED T-TEST RESULTS (NORMAL GROUP)

Assessment	Pre	Post	p value
Standing Long Jump (cm)	148.75 ± 6.45	152.00 ± 154.000	<0.00
Agility T-Test (s)	8.16 ± 0.43	7.90 ± 0.58	<0.00

B. Comparison Between Warm-up Methods

Table III compares the mean improvements between the FIFA 11+ and normal warm-up groups using independent t-tests. A statistically significant difference was observed in standing long jump performance, with the FIFA 11+ group showing a greater improvement (6.50 ± 2.56 cm) compared to the normal group (3.25 ± 0.89 cm, $p = 0.004$). This suggests that the FIFA 11+ Kids warm-up is more effective in enhancing lower-limb explosive power, likely due to its structured inclusion of plyometric drills and strength-based activities that target key jumping muscles [1]. In contrast, no significant difference was found between groups for agility T-test performance ($p = 0.637$), indicating that while both warm-up routines improved agility over time, the between-group differences were minimal. This aligns with prior research by Asgari et al. [3], which suggests that agility development may require longer intervention periods or more targeted change-of-direction training to show clear differences between protocols. Overall, the findings support the utility of FIFA 11+ Kids in enhancing youth physical performance, particularly in explosive movements.

TABLE III
INDEPENDENT T-TEST RESULT (FIFA 11+ AND NORMAL GROUP)

Assessment	FIFA 11+	Normal	<i>t</i> (14)	<i>P</i> value
Stand Long Jump (cm)	6.50 ± 2.56	3.25 ± 0.89	-0.52	0.004
Agility T-Test (s)	-0.21 ± 0.14	-0.260 ± 0.28	0.294	0.637

IV. CONCLUSIONS

The findings of this study indicate that the FIFA 11+ Warm-Up Kids program is effective in improving lower-body power and agility among youth soccer players. Both warm-up methods led to significant performance gains, but the FIFA 11+ group showed greater improvements in the standing long jump and comparable gains in agility. These results support the use of structured, sport-specific warm-ups like FIFA 11+ to enhance physical performance in young athletes.

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The Impact of Coaching Leadership Style on Athlete's Performance Among Students at FELDA Semarak Institute (ISEF)

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Keywords: Coaching Leadership Style, Athlete Performance, Football Academy, Training & Instruction, ISEF

I. INTRODUCTION

Effective coaching leadership plays a critical role in influencing the performance of student-athletes, especially in academy institutions such as ISEF. With increasing participation in competitive youth sports, coaching behaviours such as training and instruction, social support, and feedback can directly impact motivation, performance, and athlete development. Despite their importance, limited research exists on the actual and preferred leadership styles within Malaysia's sports academies. Therefore, this study aims to examine the relationship between coaching leadership styles and athlete performance from the perspective of student-athletes.

II. METHODS

A quantitative research design was employed using structured questionnaires to gather data from 58 student-athletes at ISEF who participated in the Malaysia Minister of Education League Cup and the MILO Challenger Cup. The study adopted a non-probability convenience sampling method. Descriptive statistics (mean and standard deviation) and inferential analysis (linear regression) were conducted to explore the relationship between coaching leadership styles. Training & Instruction, Autocratic Behaviour, Democratic Behaviour, Social Support, and Positive Feedback. Multiple dimensions of athlete performance, such as psychological skills, athlete development, preparedness, mastery, and injury prevention.

III. RESULTS AND DISCUSSION

A. Coaching Leadership Styles

The most dominant leadership style perceived by athletes was Training & Instruction ($M = 4.31$, $SD = 0.296$), followed by Autocratic Behaviour ($M = 2.52$, $SD = 0.509$) and Democratic Behaviour ($M = 2.21$, $SD = 0.645$). Positive Feedback and Social Support ranked lower, indicating a strong preference for instructional and structured approaches among athletes at ISEF.

TABLE I
COACHING LEADERSHIP STYLE

Variables	Mean	Standard Deviation
Training and Instruction	4.31	0.296
Positive Feedback	2.21	0.581
Social Support	2.52	0.509
Democratic Behavior	1.52	0.412
Autocratic Behavior	2.26	0.645

B. Athlete Performance

Athletes demonstrated high performance across key domains, particularly in Psychological Skills ($M = 6.25$, $SD = 0.588$) and Athlete Development ($M = 6.03$, $SD = 0.645$), highlighting the effectiveness of leadership that prioritizes mental preparedness and long-term skill mastery.

TABLE II
ATHLETES PERFORMANCE

	Mean	Standard Deviation
Athlete Development	6.03	0.645
Mastery & Development	6.25	0.440
Preparedness & Strategy	5.90	0.588
Recovery & Injury Prevent	5.89	0.668
Psychological Skills	5.96	0.788

C. Relationship Between Coaching Leadership Style and Athlete Performance

Regression analysis revealed a positive impact of coaching leadership styles on athlete performance. The Training & Instruction style showed the most significant influence, supporting the notion that clear and instructional coaching enhances not only technical skills but also psychological resilience and strategic readiness among athletes.

TABLE III
RELATIONSHIP BETWEEN COACHING STYLE AND ATHLETE PERFORMANCE

Model	R	R ²
1	0.661	0.436

IV. CONCLUSIONS

This study concludes that coaching leadership styles significantly impact student-athletes' performance at ISEF. Training & Instruction emerged as the most effective coaching approach. The findings underscore the importance of aligning coaching strategies with athlete needs to optimize performance outcomes. Future research should consider expanding the sample size and including qualitative insights for a more comprehensive understanding of coaching effectiveness.

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The Relationship Between Physical Activity and Sleep Quality Among Gamers at UiTM Seremban 3

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Keywords: Physical Activity, Sleep Quality, Gamers, Sedentary Lifestyle, University Students

I. INTRODUCTION

The rise of gaming as a dominant form of entertainment among university students has contributed to sedentary lifestyles and potential disruptions in sleep quality [1][2]. Gamers often experience reduced physical activity (PA) and irregular sleep patterns due to prolonged screen exposure and nighttime gaming habits [3]. Sleep quality (SQ) is crucial for cognitive performance, mental well-being, and overall health, especially for gamers who rely on focus and endurance [1]. This study aimed to examine the relationship between PA and SQ among gamers at UiTM Seremban 3. By understanding this relationship, the study seeks to promote healthier habits among student gamers.

II. METHODS

This quantitative, non-experimental study employed a correlational survey design. A total of 103 respondents were purposively sampled from among UiTM Seremban 3 students who self-identified as gamers, defined as individuals engaging in gaming for at least three sessions per week. Two validated instruments were used: the International Physical Activity Questionnaire (IPAQ-SF) to assess physical activity levels [4], and the Pittsburgh Sleep Quality Index (PSQI) to evaluate sleep quality [1]. Descriptive statistics (mean, SD) were used to identify PA and SQ levels, while inferential statistics (Chi-square and Independent Samples t-test) were used to test relationships and gender differences using Jamovi software.

III. RESULTS AND DISCUSSION

A. Physical Activity Levels

As shown in Table I, most respondents ($n = 56$) had high physical activity levels ($M = 3.00$, $SD = 0.00$), followed by low ($n = 26$, $M = 1.00$) and moderate ($n = 21$, $M = 2.00$) levels. This indicates that most student gamers were physically active, likely influenced by their sports-related academic background [2].

TABLE I
PHYSICAL ACTIVITY LEVEL AMONG GAMERS AT UiTM SEREMBAN 3

Physical Activity Level	N	Mean	SD
High	56	3.00	0.00
Moderate	21	2.00	0.00
Low	26	1.00	0.00

B. Pittsburgh Sleep Quality Index

Despite high PA levels, 83.5% of respondents were classified as having poor sleep quality, with a mean PSQI score of 8.38 ($SD = 2.56$), indicating that PA alone may not ensure better sleep outcomes in gaming populations [1][3].

TABLE II
SLEEPING QUALITY AMONG GAMERS AT UiTM SEREMBAN 3

		N	Mean	Median	SD
Global PSQI Scores	Poor	86	8.38	8.00	2.563
	Good	17	3.12	3.00	0.993

C. Relationship Between PA and SQ

The as chi-square test showed no statistically significant association between physical activity level and sleep quality ($\chi^2 = 2.89$, $p = .235$). This implies that although physical activity is known to benefit sleep, other behavioural or environmental factors—such as gaming late at night—may override these benefits [3][5].

TABLE III
RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND SLEEPING QUALITY

	Value	df	p
χ^2	2.89	2	0.235
N	103		

D. Gender Differences

An Independent Samples t-test revealed no significant difference in sleep quality between male and female gamers ($t(101) = -1.95$, $p = .054$), although the result was marginal. Both genders were similarly affected in terms of poor sleep outcomes, suggesting a shared pattern of gaming-related habits [2][5].

TABLE IV
COMPARISON BETWEEN GENDER ON SLEEPING QUALITY

		Statistic	df	p
Global PSQI Score	Student's t	-1.95	101	0.054

IV. CONCLUSIONS

Although most of the gamers from this research displayed high levels of physical activity, a significant number still showed poor sleep quality. This indicates that physical activity can be a positive contributor to sleep but may not completely mitigate the negative effects of excessive screen time, gaming-related cognitive stimulation, and inconsistent sleeping patterns seen in many gamers. Such activity or behaviors can negatively influence circadian rhythms, potentially decrease melatonin production due to blue light exposure, and heighten mental arousal, which may interfere with sleep even when a person is active [1][3][5].

Similar results were found by [6] in that high screen time and irregular sleep-wake patterns had a negative impact on the positive effects of physical activity on sleep quality of the university students [6]. Based on the same idea, [7] also found that media use, particularly gaming, negatively influenced sleep quality, even in physically active participants [7]. Collectively, the evidence suggests that physical activity alone is not a protective factor in populations undertaking high amounts of screen-based behaviours. Interventions focused on physical activity alone should not be expected to be successful on its own because a comprehensive intervention—including sleep hygiene education, screen time management, blue light reduction (e.g., night mode filters or reductions in evening gaming), and behavioural interventions—would be needed to improve sleep outcomes in this population.

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The authors extend gratitude to Madam Umami Kalthum Mohd Mokhtar for her guidance and supervision throughout the research. Special thanks to all participants from UiTM Seremban 3 and to the Faculty of Sports Science and Recreation for their support.

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The Role of Sleep Quality Toward Mental Toughness Among FSR Students at UiTM Seremban 3

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Keywords: Sleep Quality, Mental Toughness, University students, Students Performance

I. INTRODUCTION

This study aims to investigate the relationship between sleep quality and mental toughness among FSR students at UiTM Seremban 3 to establish some level of understanding regarding the role sleep might play in influencing psychological endurance in this cohort of students. Sleep quality has been increasingly implicated in cognitive and emotional resilience. Mental toughness is important to university students especially those that study courses related to sport and exercise for academic success and performance success.

II. METHODS

This quantitative study involved a sample of 356 FSR students at UiTM Seremban 3 using random sampling. Sleep quality was measured with the Pittsburgh Sleep Quality Index (PSQI) and mental toughness used the MTQ48. The analysis used descriptive statistics to determine variable levels and used Spearman correlation to determine the relationship between sleep quality and mental toughness in Jamovi.

III. RESULTS AND DISCUSSION

According to the PSQI, most students (88.2%) had poor sleep quality, which is troubling for FSR students, possibly influenced by academic workload, sport participation, and stress. The overwhelming percentage of poor sleep quality points to the need for education and intervention with respect to students' sleep behaviors and the impact poor sleep can have on their health and performance.

Confidence was the highest rated factor in the model of mental toughness ($M = 3.83$), noted in higher cast than commitment, control, and challenge, demonstrating that having insufficient sleep was not limiting their confidence levels, likely due to having been previously exposed to performance requirements in either academic or sporting contexts. Their faith in their own ability may offer a protective factor against tiredness and stress.

The relationship between sleep quality and mental toughness, as measured by Spearman correlation, was low ($r = 0.047$, $p = 0.380$) suggesting there is no significant relationship. This contradicts prior findings and may imply that factors such as motivation, experience or support networks may play a more significant role in the mental toughness of this student population.

TABLE I
FREQUENCY OF SLEEP QUALITY LEVEL

Sleep Quality Level	Frequency (N)	Percentage (%)
Poor	314	88.2
Good	42	11.8

According to table I, the results show that just 314 respondents (88.2%) had poor sleep quality, while 42 respondents (11.8%) had good sleep quality. This indicates that most people are having issues to sleep.

TABLE II
DESCRIPTIVE OF MENTAL TOUGHNESS

Sleep Quality Level	N	Mean	Median	SD
Confidence	356	3.83	4.07	0.951
Commitment	356	3.81	4.00	0.958
Control	356	3.75	4.00	0.971
Challenge	356	3.74	4.00	0.959

The table II shows that 356 respondents in all participated in the study. The mean, median, and standard deviation (SD) for the Challenge component were 3.74, 4.00, and 0.959, respectively. The mean, median, and SD for the Control component were 3.75, 4.00, and 0.971. The mean, median, and SD for commitment were 3.81, 4.00, and 0.958. Finally, Confidence had the greatest mean (3.83), median (4.07), and standard deviation (0.951). The findings show that respondents' mental toughness was typically high, particularly when it came to confidence.

TABLE III
CORRELATION BETWEEN SLEEP QUALITY MENTAL TOUGHNESS

Total MT		
PSOI Level	Spearman;s rho	0.047
	df	354
	p-value	0.380

Based on table III, the relationship between sleep quality (PSQI Level) and mental toughness (Total MT) was analyzed

using Spearman correlation. The result shows a correlation coefficient of 0.047 with a degree of freedom (df) of 354 and a p -value of 0.380. This indicates a very weak positive relationship between sleep quality and mental toughness, but the result is no significant difference since the p -value is greater than 0.05. Therefore, it can be concluded that there is no significant difference between sleep quality and mental toughness among the respondents.

IV. CONCLUSIONS

While most of the FSR students had poor sleep quality, their mental toughness, specifically confidence was high. A significant relationship was not found between sleep and mental toughness, indicating the possibility that other factors are promoting psychological resilience. These findings highlight the complexity of student well-being and the need to implement multifaceted approaches in academic and sporting contexts.

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Motivation and Satisfaction of Sport Volunteers During Badminton Malaysia Masters 2025

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Keywords: Volunteer motivation, Volunteer satisfaction, Sports event volunteers, Intrinsic and extrinsic factors

I. INTRODUCTION

Volunteers are essential to sport event success, particularly in culturally significant competitions like the Badminton Malaysia Masters 2025. Despite global interest in volunteers in Malaysia. This study investigates the intrinsic and extrinsic drivers of volunteerism and their link to satisfaction, offering localized insights to enhance volunteer management practices in Southeast Asian Sporting Contexts.

II. METHODS

This quantitative study used an online survey to collect data on 114 volunteers of the Badminton Malaysia Masters 2025. The questionnaire assessed demographics, motivation and satisfaction. Due to non-normal distribution, Spearman's rank-order correlation and descriptive statistics were applied to examine the relationships between intrinsic and extrinsic motivation and volunteer satisfaction across emotional, cognitive, and social dimensions.

III. RESULTS AND DISCUSSION

A. Primary Motivational Factors

Volunteers showed stronger intrinsic motivation ($M = 4.43$, $SD = 0.52$) than extrinsic ($M = 4.07$, $SD = 0.61$). Top intrinsic drivers included enjoyment ($M = 4.79$), accomplishment ($M = 4.72$), and passion ($M = 4.68$). Leading extrinsic motivations were career enhancement ($M = 4.13$), networking ($M = 4.11$), and recognition ($M = 4.04$).

B. Contribution of Motivation to Satisfaction

Intrinsic motivation had stronger correlation with emotional ($\rho = 0.646$) and social satisfaction ($\rho = 0.602$) than extrinsic motivation ($\rho = 0.469$ and $\rho = 0.500$, respectively). All correlations were statistically significant ($p < 0.001$), though emotional satisfaction was least affected by extrinsic motivation, suggesting its deeper reliance on internal drivers.

TABLE I
PRIMARY MOTIVATIONAL FACTORS

	Mean	SD	Rank
Enjoyment of volunteers	4.79	0.4	1
Sense of accomplishment	4.72	0.44	2
Passion of the sport	4.68	0.47	3
Career Prospects	4.13	0.63	4
Building professional networks	4.11	0.61	5
Recognition and rewards	4.04	0.66	6

TABLE II
CONTRIBUTION OF MOTIVATION TO SATISFACTION

Satisfaction dimension	Spearman's ρ	p
Intrinsic motivation ↔ Emotional satisfaction	0.646	<0.001
Extrinsic motivation ↔ Emotional satisfaction	0.469	<0.001
Intrinsic Motivation ↔ Social satisfaction	0.602	<0.001
Extrinsic motivation ↔ Social satisfaction	0.5	<0.001
Intrinsic motivation ↔ Cognitive satisfaction	0.646	<0.001
Extrinsic motivation ↔ Cognitive satisfaction	0.597	<0.001

C. Overall Relationship Between Motivation and Satisfaction

A strong correlation existed between total motivation and satisfaction ($\rho = 0.684$, $p < 0.001$). Intrinsic motivation consistently showed stronger links with emotional, cognitive, and social satisfaction. Cognitive satisfaction was most associated with both motivation types. These findings suggest prioritizing intrinsic motivators to enhance volunteer retention, satisfaction, and overall engagement in future events

TABLE III
OVERALL RELATIONSHIP BETWEEN MOTIVATION AND
SATISFACTION

	Spearman's ρ Significance (P)	
Total motivation ↔ Total satisfaction	0.684	<0.001

IV. CONCLUSIONS

This study found that intrinsic motivation strongly influences volunteer satisfaction across emotional, cognitive, and social dimensions. Volunteers at the Badminton Malaysia Masters 2025 were primarily driven by internal fulfillment rather than external award. Strengthening intrinsic motivators is essential to enhancing engagement, retention and overall event success.

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The Relationship Between Coach Leadership Styles on Athlete Satisfaction Among UiTM Seremban 3 Sports Club

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Keywords: Coach leadership, Athlete satisfaction, Sports psychology, UiTM Seremban 3, Pearson correlation

I. INTRODUCTION

Coach leadership style significantly influences athlete satisfaction and performance. This study examines the key leadership styles practiced by coaches in sports clubs at UiTM Seremban 3 and their relationship with athlete satisfaction. Understanding these dynamics can enhance coaching effectiveness and improve the overall athlete experience, contributing to better performance outcomes and club development.

II. METHODS

A quantitative survey using structured questionnaires was distributed to 177 male and female student athletes at UiTM Seremban 3. Data were analyzed using descriptive statistics to determine leadership style and athlete satisfaction levels, and Pearson correlation to examine the relationship between variables.

III. RESULTS AND DISCUSSION

A. Coach Leadership Styles

Training & instruction and positive feedback emerged as the dominant coach leadership styles, with the highest mean score ($M = 4.32$). These styles highlight skill development and motivational reinforcement, indicating that UiTM Seremban 3 athletes value structured coaching and recognition.

B. Athlete Satisfaction

Athletes reported high satisfaction with a mean of 5.80 and median of 6.00. They expressed contentment with coaching quality, support, team interactions, and acknowledgment, suggesting a positive overall training experience within the sports club environment.

C. Relationship of Coach Leadership Style on Student Athlete's Satisfaction

Pearson correlation analysis revealed a strong, significant positive relationship ($r = 0.700$, $p < 0.001$) between coach leadership style and athlete satisfaction, affirming the importance of effective coaching behaviour in influencing athlete contentment and engagement.

IV. CONCLUSIONS

Coach leadership styles, particularly training & instruction and positive feedback, significantly influence athlete satisfaction at UiTM Seremban 3. These findings emphasize the need for structured, supportive coaching to enhance athlete experience and performance.

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TABLE I
RELATIONSHIP BETWEEN ATHLETES SATISFACTION AND COACH LEADERSHIP STYLES

Coach Leadership Styles	Athlete Satisfaction	
	Pearson's R	0.700
	Sig. (2-tailed)	< 0.01
	N	177

*Significantly different from Pre-NC ($p < 0.05$)

The Effect of Social Media Usage and Mental Health Among Visitors of Bangi Wonderland

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Keywords: Social media usage, Mental health, Recreational place, Visitors Bangi Wonderland

I. INTRODUCTION

These days, we can see that there has been a trend that most of the community love to use social media but eventually affect their mental health. The prevalence of mental health problems is increasing at a rate of 13% per year [1]. Increased use of social media may also lead to a constant desire to be connected and can promote negative experiences, which in turn can affect the mental health of the users [2]. This study addresses that gap by investigating the influence of social media usage on the mental health of Bangi Wonderland visitors, providing a new perspective within a Malaysian leisure context.

II. METHODS

This quantitative, non-experimental study employed a correlational survey design. A total of 250 respondents were purposely sampled from among visitors of Bangi Wonderland, selected based on their willingness to participate an active use of social media. Two validated instruments were used: the Social Media Use Questionnaire (SMUQ) to assess social media usage patterns, and the Connor-Davidson Resilience Scale (CD-RISC) to evaluate mental health factors. Descriptive statistics (mean, standard deviation) were used to identify levels of social media usage and mental health, while inferential statistics (Linear Regression, Independent Samples T-test, and Chi-square test) were used to examine relationships and gender differences, using Jamovi software.

III. RESULTS AND DISCUSSION

A. Social Media Usage

As shown in Table I, high levels of social media usage across four dimensions. Frequency had a mean of 4.20, Duration 3.85, Platform 4.05, and Engagement 3.70 — all on a 5-point Likert scale. These results suggest that respondents frequently use social media, spend significant time on it, engage across multiple platforms, and interact actively with content.

TABLE I
DESCRIPTIVE ANALYSIS

Social media usage level	N	Mean	Median	SD
Frequency	250	4.20	4.00	0.65
Duration	250	3.85	4.00	0.72
Platform	250	4.05	4.00	0.68
Engagement	250	3.70	4.00	0.75

B. Mental Health

The results showed a mean score of 3.90 for Resilience, indicating high coping ability; 3.75 for Life Satisfaction, reflecting generally positive well-being; 2.60 for Perceived Stress, suggesting moderate stress levels; and 3.45 for Vitality, showing moderate energy and mental alertness. Overall, the respondents demonstrated relatively stable mental health with some variation in stress and vitality levels. [2][3].

TABLE II
MENTAL HEALTH FACTORS

Mental health factor	N	Mean	Median	SD
Resilience	250	3.90	4.00	0.65
Life satisfaction	250	3.75	4.00	0.72
Perceived stress	250	2.60	2.50	0.82
Vitality	250	3.45	3.00	0.74

C. Relationship Between Social Media Usage and Mental Health

A multiple linear regression analysis revealed that social media usage significantly influenced mental health among visitors of Bangi Wonderland ($R^2 = 0.23$, $F(4, 245) = 9.24$, $p < 0.001$). Frequency was a significant positive predictor ($\beta = 0.34$, $p < 0.001$), and Duration showed a significant negative effect ($\beta = -0.25$, $p < 0.01$). In contrast, Engagement and Platform usage were not significant [4][5].

TABLE III
RELATIONSHIP BETWEEN SOCIAL MEDIA USAGE & MENTAL HEALTH

Social media usage level	N	Mean	Median	SD
Frequency	250	4.20	4.00	0.65
Duration	250	3.85	4.00	0.72
Platform	250	4.05	4.00	0.68
Engagement	250	3.70	4.00	0.75

D. Gender Differences

An independent sample t-test was conducted to examine gender differences in social media usage and mental health among 250 visitors of Bangi Wonderland. The results showed a significant difference in social media frequency, where males reported higher usage than females ($p = 0.042$). However, no significant differences were found between males and females in overall mental health scores ($p = 0.225$) or perceived stress levels ($p = 0.058$) [2][5].

TABLE IV
COMPARISON BETWEEN GENDERS

Variables	Group	N	Mean (SD)	t	df	p
Social media frequency	Male	110	4.30 (0.68)	2.04	248	.042
	Female	140	4.10 (0.72)			
Mental health score	Male	110	3.80 (0.66)	1.22	248	.058
	Female	140	3.70 (0.69)			

IV. CONCLUSIONS

Although the respondents in this study reported frequent and active use of social media, some still exhibited signs of moderate stress and fluctuating mental health levels. This suggests that while social media can serve as a platform for relaxation, entertainment, and social connection, it may also contribute negatively to emotional well-being when overused or consumed during inappropriate times such as late at night. Excessive screen time and constant engagement with digital content can heighten mental stimulation, disrupt circadian rhythms, and reduce melatonin production due to prolonged exposure to blue light, which may impact psychological resilience and increase stress levels [2]. Although many Bangi Wonderland visitors actively use social media to share experiences and stay connected, frequent and intense usage, especially during excessive or emotionally charged online interaction may still have detrimental effects on mental health. Recent evidence shows that higher overall screen time and frequent evening use are significantly associated with elevated levels of anxiety and depression among adolescents and young adults [3]. Furthermore, daily use of screens in the evenings has been found to disrupt sleep patterns, delay chronotype, and increase emotional difficulties effects mediated by what is known as “social jetlag” [4].

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The Impact of Social Support on Motivation Level Among Football Association of Malaysia (FAM) Referees

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Keywords: Social support, Motivation, FAM referees, Referee well-being, Sports psychology

I. INTRODUCTION

This study examines the role of social support in influencing motivation levels among FAM referees. It aims to identify the importance of social support, measure motivation levels, and analyze the relationship between both variables to enhance referee performance and well-being [1].

II. METHODS

This study involved 130 FAM referees selected through convenience sampling. Data were collected using structured questionnaires. Descriptive statistics analyzed social support and motivation levels, while linear regression via Jamovi examined the impact of social support on motivation.

III. RESULTS AND DISCUSSION

A. Social Support

Referees reported high overall social support, with Family support rated highest ($M = 5.84$), followed by Friends ($M = 5.72$) and Significant Others ($M = 5.71$). Younger or less experienced referees particularly benefited from emotional and practical support, suggesting varying support needs across experience levels.

TABLE I
DESCRIPTIVE OF SOCIAL SUPPORT

Variables	Mean	Standard Deviation (SD)
Family	5.84	1.57
Friends	5.72	1.54
Significant Other	5.71	1.48

B. Motivation Factor

Referees demonstrated high motivation levels, especially in Identified Regulation ($M = 6.02$), Integrated Regulation ($M = 6.00$), Introjected Regulation ($M = 5.87$), Intrinsic Regulation ($M = 5.82$) and External Regulation ($M = 5.74$). The lowest motivation factor is Amotivation ($M = 2.43$). Most were motivated by personal achievement and meaningful engagement, while newer referees focused on learning, and experienced ones were driven by identity and long-term goals.

TABLE II
DESCRIPTIVE OF MOTIVATION LEVEL

Variables	Mean	Standard Deviation (SD)
Identified Regulation	6.02	1.35
Integrated Regulation	6.00	1.35
Introjected Regulation	5.87	1.41
Intrinsic Regulation	5.82	1.52
External Regulation	5.74	1.52
Motivation	2.43	1.61

C. Impact of Social Support on Motivation Level

A statistically significant and strong relationship was found between social support and motivation levels. Family support had the strongest positive impact on motivation, reinforcing the crucial role of personal networks in enhancing referees' psychological well-being and sustained engagement in officiating roles.

TABLE III
LINEAR REGRESSION FOR SOCIAL SUPPORT ON MOTIVATION LEVEL

Overall Model Test						
R	R ²	Adjusted R ²	F	df1	df2	p
0.809	0.654	0.652	242	1	128	<0.001

IV. CONCLUSIONS

This study highlights the crucial role of social support, especially from family, in sustaining high motivation levels among FAM referees, emphasizing its importance for referee well-being and performance.

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The Impact of Physical Activity on Mental Health Among FSR Students

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Keywords: Physical activity, Mental health, DASS-21, IPAQ, Leisure and occupational activities, Student well-being

I. INTRODUCTION

Physical activity plays a crucial role in promoting both physical and mental health. Among university students, especially those in sports and recreation programs, regular engagement in physical activity may significantly impact mental well-being. This research focuses on students from the Faculty of Sports and Recreation (FSR) at UiTM Seremban 3 to examine how various types of physical activity such as leisure, domestic, occupational, and travel-related affect mental health outcomes, including stress, anxiety, and depression. Mental health challenges among students are on the rise due to academic pressure, social expectations, and lifestyle changes. Regular exercise has been linked to improved mood, reduced stress, and better academic performance. However, little research has been done specifically on FSR students who are more exposed to physical activities through their academic programs. This study aims to explore this connection and provide insights that could guide future student support and wellness initiatives.

II. METHODS

This study used a quantitative cross-sectional survey design to examine the impact of physical activity on mental health among students in the Faculty of Sports and Recreation (FSR), UiTM Seremban 3. A sample of 342 students was selected using stratified random sampling to ensure balanced representation based on gender and academic year. Data were collected using a structured questionnaire consisting of three sections: demographic information, the International Physical Activity Questionnaire (IPAQ) to assess levels and types of physical activity, and the Depression Anxiety Stress Scales (DASS-21) to measure mental health indicators. Descriptive statistics were used to summarize demographic data and activity levels, while Pearson correlation and multiple regression analysis were applied to identify relationships between physical activity and mental health outcomes. Ethical approval was obtained, and participation was voluntary and anonymous. This methodology ensures reliability and validity in exploring how physical activity influences student well-being.

III. RESULTS AND DISCUSSION

A. Physical Activity Among FSR Students

Out of 253 respondents, 216 students considered physical activity important, with most engaging in it more than twice a

week for at least 30 minutes. Male students reported higher activity levels than females. These findings highlight gender differences in participation and a general recognition of physical activity's benefits among FSR students.

TABLE I
FREQUENCIES OF PHYSICAL ACTIVITY RECORDED

Programme	Counts	% of Total	Cumulative %
1	32	12.6%	12.6%
2	5	2.0%	14.6%
3	216	85.0%	99.6%
Category (Recorded)	1	0.4%	100.0%

B. Factors of Mental Health Among FSR Students

The descriptive findings reveal that among the three mental health factors, anxiety recorded the highest mean score at 1.83, followed by depression (1.50) and stress (1.32). All three factors had relatively low standard deviation values (1.28) for anxiety, 0.848 for depression, and (0.621) for stress, indicating that most students had similar responses with only slight variations. A total of 253 students completed this section with no missing data. These results suggest that anxiety is the most experienced mental health concern among FSR students. While the average levels are not alarming, they reflect the presence of emotional challenges. Therefore, efforts like awareness campaigns and counselling services are essential to support student mental well-being and reduce these issues.

TABLE II
DESCRIPTIVE ANALYSIS

	Depression	Anxiety	Stress
N	253	253	253
Mean	1.50	1.83	1.32
Standard deviation	0.848	1.28	0.621

C. Influence of Physical Activity and Mental Health Among FSR Students

To address RO3, a Pearson correlation analysis was conducted to examine the relationship between physical

activity (PI Numeric) and mental health variables anxiety, stress, and depression among FSR students. The results show no significant correlation between physical activity and anxiety ($r = -0.069$, $p = 0.274$), stress ($r = 0.067$, $p = 0.286$), or depression ($r = 0.018$, $p = 0.772$), indicating that physical activity does not significantly influence mental health levels. However, strong and significant positive correlations were found among the mental health variables themselves: anxiety and stress ($r = 0.828$), anxiety and depression ($r = 0.942$), and stress and depression ($r = 0.832$), all with $p < 0.001$. This suggests mental health components are closely interrelated among FSR students.

TABLE III
DESCRIPTIVE ANALYSIS

		Anxiety	Stress	Depression	PI Numeric
Anxiety	Pearson's r	—			
	df	—			
	p-value	—			
Stress	Pearson's r	0.828	—		
	df	251	—		
	p-value	<0.001	—		
Depression	Pearson's r	0.942	0.832	—	
	df	251	251	—	
	p-value	<0.001	<0.001	—	
PI Numeric	Pearson's r	-0.069	0.067	0.018	—
	df	251	251	251	—
	p-value	0.274	0.286	0.772	—

IV. CONCLUSIONS

Physical activity, particularly regular walking, shows a positive trend toward reducing anxiety among FSR students. Though not statistically significant, the results suggest its importance in student wellness strategies. Gender and age-related patterns also highlight the need for targeted mental health support in university settings.

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The Impact of Mental Toughness on Athletes' Achievement Among High School Students in SMK Agama Igan

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Keywords: Mental toughness, Athletes' achievement, High school student, Gender differences, Performance psychology

I. INTRODUCTION

Mental toughness is essential in determining student-athletes' performance, yet its significance is under-examined, especially among Malaysian adolescents. Research shows that mental toughness significantly impacts sports performance perceptions among secondary school athletes in Malaysia, but this area remains underexplored [2]. Additional studies on Malaysian junior athletes affirm that mental toughness is a key factor in distinguishing elite performers from their peers [3]. Mental health issues affect over 16.5% of youth [5], highlighting a need to explore psychological resilience. This study investigates the influence of mental toughness on athletic achievement in high school students and examines gender-based differences, addressing a critical research gap in adolescent mental strength and sports psychology.

II. METHODS

A non-experimental quantitative design was used involving all 214 high school athletes, selected through total population sampling. This method aligns with Krejcie and Morgan's (1970) [1] sampling recommendations, which offer a widely accepted guideline for determining sample size based on population to ensure accuracy in quantitative studies. Data were collected using two validated instruments: the Mental Toughness Questionnaire (MTQ48) and the Achievement Goal Questionnaire (AGQ). The MTQ48 has been widely used to assess mental toughness among student-athletes and has demonstrated predictive validity for academic and athletic success [4]. Each item on the instruments was measured using a 5-point Likert scale. Descriptive statistics were utilized to calculate mean scores and rankings. Additionally, linear regression analysis was applied to determine the relationship between athletes' mental toughness and their athletic achievement, with significance assessed at the $p < 0.05$ level.

III. RESULTS AND DISCUSSION

A. Mental Toughness

The findings showed a high level of mental toughness among student-athletes at SMK Agama Igan. Confidence had the highest mean (4.54), followed by Commitment (4.52) and Challenges (4.51), indicating strong self-belief, goal focus, and resilience. Control had the lowest mean (4.44), suggesting some students may struggle with emotional regulation.

TABLE I
DESCRIPTIVE RESULTS OF MENTAL TOUGHNESS AMONG HIGH SCHOOL STUDENTS

Factors	Mean	SD	Ranking
Confidence	4.54	0.521	1
Commitment	4.52	0.524	2
Challenges	4.51	0.447	3
Control	4.44	0.603	4

B. Athletes' Achievement

The results showed that the level of athletes' achievement among students was high, with the highest mean scores in Task-Approach and Other-Approach goals (both 4.56), followed closely by Self-Approach (4.55). This indicates that students are motivated by personal improvement and competition with others. For avoidance goals, Task-Avoidance scored the highest (4.61), showing some students are also driven to avoid failure. However, Self-Avoidance (4.51) had the lowest mean and highest variation, indicating mixed personal motivations. Overall, students showed strong achievement motivation, especially through positive, approach-based goals.

TABLE II
DESCRIPTIVE RESULT OF ATHLETES' ACHIEVEMENT AMONG HIGH SCHOOL STUDENTS

Level Athletes' Achievement	Mean	SD	Ranking
Task – Avoidance Goal Item	4.61	0.534	1
Task - Approach Goal Item	4.56	0.478	2
Other - Approach Goal Item	4.56	0.556	3
Self - Approach Goal Item	4.55	0.481	4
Other - Avoidance Goal Items	4.53	0.575	5
Self - Avoidance Goal Items	4.51	0.600	6

C. Impact of Mental Toughness on Athletes' Achievement

The regression analysis showed a strong positive impact of mental toughness on athletes' achievement, with an R -value of 0.867 and R^2 of 0.752. This means that 75.2% of the variation in athletes' achievement is explained by mental toughness. Among the four factors, Confidence had the strongest and most significant influence ($\beta = 0.385$, $p < 0.001$), followed by

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Commitment and Challenges, both with significant contributions ($p < 0.05$). Control had no significant impact ($p = 0.920$). In short, Confidence is the key mental toughness factor that drives better performance among student-athletes.

TABLE III
LINEAR REGRESSION

Model Fit Measures		
Model	R	R ²
1	0.867	0.752

Note. Models estimated using sample size of $N=136$

Predictor	Estimate	SE	t	p
Intercept	0.67308	0.2255	2.985	0.003
Challenges	0.22684	0.0810	2.799	0.006
Control	0.00837	0.0827	0.101	0.920
Commitment	0.23724	0.1069	2.220	0.028
Confidence	0.38501	0.1093	3.523	<0.001

D. Differences Between Genders

Males showed higher mental toughness ($M = 4.62$) and achievement ($M = 4.64$) than females, with more consistent responses. This suggests gender differences in athletic mindset, possibly due to training intensity or socialized resilience. These disparities highlight the need for gender-sensitive coaching strategies to support female athletes' psychological and performance development.

TABLE IV
GROUP DESCRIPTIVE

	Group	N	Mean	Median	SD
Mental Toughness	Female	60	4.35	4.51	0.521
	Male	76	4.62	4.65	0.431
Athletes Achievement	Female	60	4.44	4.50	0.504
	Male	76	4.64	4.78	0.421

IV. CONCLUSIONS

This study highlights the strong impact of mental toughness on high school athletes' achievement, with confidence being the most influential factor. Male athletes showed greater resilience and performance, but emotional control remained a challenge for many, regardless of gender. These findings emphasize the need for targeted psychological support that focuses on emotional regulation, confidence-

building, and adaptive coping strategies for all athletes. By developing mental skills across all core components—confidence, commitment, control, and challenge—educators and coaches can help shape not only high-performing athletes but also balanced individuals. Such interventions should be introduced early to cultivate long-term mental strength and competitive readiness. Ultimately, this can reduce gender disparities, enhance psychological well-being, and promote a more supportive and effective school sports environment.

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The Relationship of Coaching Leadership Style and Athlete Satisfaction Among SUKIPT Athletes in UiTM Shah Alam

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Keywords: Coaching leadership style, Athlete satisfaction, SUKIPT athletes, Leadership Scale for Sports (LSS), Athlete Satisfaction Questionnaire (ASQ)

I. INTRODUCTION

Coaching leadership style significantly influences athlete satisfaction, particularly in competitive university sports settings [1][2]. This study examines the relationship between coaching leadership and athlete satisfaction among SUKIPT athletes at UiTM Shah Alam. Grounded in Chelladurai's multidimensional leadership model [3], the research also considers how motivation, feedback, and emotional support contribute to positive athlete experiences [4], offering insights for coaching effectiveness and athlete well-being in Malaysian university sports.

II. METHODS

This quantitative, non-experimental survey involved 254 SUKIPT athletes from UiTM Shah Alam. Data were collected using structured questionnaires comprising demographic items, the Leadership Scale for Sports (LSS) [3], and the Athlete Satisfaction Questionnaire (ASQ) [5]. The LSS measured coaching behaviors across five dimensions using a 5-point Likert scale, while the ASQ assessed overall athlete satisfaction. Statistical analyses were conducted to determine the relationship between coaching leadership style and athlete satisfaction.

III. RESULTS AND DISCUSSION

A. Coaching Leadership Style

Descriptive analysis revealed that positive feedback ($M = 3.77$), training and instruction ($M = 3.70$), and social support ($M = 3.70$) were the most practiced leadership behaviors. Autocratic leadership scored lowest ($M = 2.56$), indicating that athletes respond better to encouraging, instructional approaches than to strict or controlling leadership styles in university sports settings.

TABLE I
THE RELATIONSHIP OF COACHING LEADERSHIP STYLE

Variables	Mean	Standard Deviation	Rank
Positive feedback	3.77	1.286	1
Training and instruct	3.70	1.216	2
Social support	3.70	1.216	3
Democratic Behavior	3.69	0.734	4
Autocratic Behavior	2.56	0.747	5

B. Athlete Satisfaction

Athlete satisfaction scored a mean of 5.06 ($SD = 1.73$), reflecting generally high satisfaction levels. While most athletes reported positive experiences with coaching and sport environments, some variation existed. This variability may be influenced by coaching style, sport type, or personal needs. Still, the overall satisfaction levels support past findings on the importance of quality coaching practices.

TABLE II
ATHLETE SATISFACTION

	Mean	SD
Athlete satisfaction	5.06	1.73

C. Relationship of Coaching Leadership Style and Athlete Satisfaction

The findings show a very strong positive relationship between coaching leadership style and athlete satisfaction, with a correlation value of 0.986 and a p - value less than 0.001, based on 260 athletes. This means that better coaching leadership is strongly linked to higher athlete satisfaction. The result is statistically significant, suggesting that coaching leadership style has a major impact on how satisfied athletes feel.

TABLE III
RELATIONSHIP OF COACHING LEADERSHIP STYLE AND ATHLETE SATISFACTION

	r	p	n
Coaching leadership style	0.986	<0.001	260
Athlete Satisfaction			

IV. CONCLUSIONS

The study confirms that supportive and instructional coaching leadership styles significantly enhance athlete satisfaction among SUKIPT athletes in UiTM Shah Alam. Positive feedback, guidance, and social support contribute most to satisfaction, while autocratic styles are least favoured. These findings offer valuable direction for optimizing leadership in university sports environments.

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Perception of Eating Disorder and Body Image Dissatisfaction Among Female Elite Gymnastics Club

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Keywords: Eating disorder, Body image dissatisfaction, Female gymnastics

I. INTRODUCTION

Eating disorders are severe mental illnesses marked by irregular eating patterns that have a substantial negative influence on a person's physical and emotional well-being. According to World Health Organization, 14 million people experienced eating disorders including almost 3 million children and adolescents [1]. Body image dissatisfaction is a serious problem that arises from a negative self-perception of one's physical form. Females in Malaysia expressed more dissatisfaction of their body parts and weight as compared to males [2]. Eating disorders and body image dissatisfaction pose significant risks for female elite gymnasts, who face unique pressures to maintain specific physiques for performance and aesthetics. This study investigates eating disorder risks, levels of body image dissatisfaction, and their interrelation among female gymnasts, addressing crucial gaps in understanding and contributing to prevention and intervention strategies for this vulnerable athletic population.

II. METHODS

This study employed a quantitative, non-experimental research design using structured survey questionnaires to collect data from 32 female gymnasts aged 13 and above from the Elite Gymnastics Club. Data collection involved three sections: Section A gathered demographic information such as age, race, education, height, and weight. Next, section B utilized the standardized Eating Attitudes Test (EAT-26) [3] to assess eating disorder risk, attitudes, and pathogenic behaviors through a 6-point Likert scale; Section C applied the Body Image Dissatisfaction Questionnaire (BID) [4] consisting of 19 items rated on a 5-point Likert scale to evaluate perceptions and feelings toward physical appearance. Descriptive analysis described the sample profile, while correlational analysis explored relationships between eating disorder risk and body image dissatisfaction. Jamovi statistical software facilitated data analysis to ensure accuracy and reliability in identifying critical trends and associations among variables relevant to the study objectives.

III. RESULTS AND DISCUSSION

A. Eating Disorder

Pathogenic behaviour showed the highest risk ($M = 4.56$, $SD = 0.592$), indicating consistent concern among gymnasts. High rates of pathogenic behaviors that were found in our sample included binge eating, purging, and the use of laxatives, diet pills, or diuretics [5]. All of which signal a deep-

rooted preoccupation with weight control and body image that transcends ordinary dietary habits. Overall eating disorder risk followed ($M = 4.00$, $SD = 1.25$) with more variation. Eating attitudes were lowest ($M = 3.96$, $SD = 1.11$) which assesses psychological and emotional attitudes toward food and eating habits. Although this dimension scored lower than the others, the findings still point to underlying issues such as guilt associated with eating, fear of gaining weight, and rigid thinking about food choices. These findings highlight pathogenic behaviors as the most prevalent eating disorder risk factor.

TABLE I
DESCRIPTIVE ON THE LEVEL OF EATING DISORDER

	Mean	SD	Ranking
Pathogenic Behaviour	4.56	0.592	1
Eating Disorder Risk	4.00	1.25	2
Eating Attitudes	3.96	1.11	3

*Note. p -value < 0.01

B. Body Image Dissatisfaction

Body image dissatisfaction averaged 3.37 ($SD = 0.584$), showing low variation across participants. This consistency suggests that most gymnasts experience similar levels of dissatisfaction, which often starts young and ties directly to performance and identity. This uniformity can be attributed to the sport's aesthetic-driven environment, where a lean and toned body is not only preferred but often expected for both competitive performance and visual appeal. These results reinforce how body image concerns are widespread and persistent in elite gymnastics.

TABLE II
DESCRIPTIVE OF BODY IMAGE DISSATISFACTION

	Level of Body Image	Mean	SD
Body Image Dissatisfaction	High	3.37	0.584

C. Relationship Between ED and BID

Analysis revealed a very strong positive correlation between eating disorder risk and body image dissatisfaction ($r = 0.904$, $p < 0.001$) among 32 gymnasts. This significant result confirms that higher dissatisfaction strongly predicts increased eating disorder risk. The relationship between being overweight and disordered eating was largely mediated by

BID (desire to be smaller) [6]. By using validated screening tools like the EAT-26 and BID Questionnaire, professionals can identify at-risk athletes early and provide timely support, reducing the potential for long-term health risks in this vulnerable population. These findings highlight the urgent need for early prevention and targeted interventions for female elite gymnasts.

TABLE III
RELATIONSHIP BETWEEN ED AND BID

	r ²	p	n
Eating Disorder	0.904	<0.001	32
Body Image Dissatisfaction	0.904	<0.001	32

IV. CONCLUSIONS

The study confirms that eating disorders and body image dissatisfaction are significant, consistent risks for female gymnasts and suggesting that reduced performance and appearance-related pressures may be associated with fewer disordered eating behaviors [7]. The strong correlation found urges coaches, parents, and policymakers to implement early screening, education, and prevention strategies to protect athletes' health and promote positive body image in competitive sports. As suggested in the study, coaches should be involved in an educational process where the body weight has to remain within certain limits [8]. These findings highlight the importance of cultivating a sport environment that prioritizes psychological well-being alongside physical performance. Coaches and mentors play a critical role in shaping athletes' body perceptions and must be trained to recognize early warning signs and respond with compassion and guidance. Introducing athlete-centred wellness programs, such as routine psychological check-ins and body image education sessions, can serve as proactive measures to mitigate risk. Sports federations should consider developing stricter protocols against weight-shaming and appearance-based feedback during training and competition. Future research should explore longitudinal impacts of body dissatisfaction and expand the sample across different age groups, ethnicities, and gymnastic disciplines to design more inclusive and effective support systems.

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The Effect of Women's Empowerment on Tourism Development Among Women Employees at Legoland Malaysia

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Keywords: Women empowerment, Tourism development, Political empowerment, Gender equality, Women employees

I. INTRODUCTION

Women's empowerment has increasingly become a key component in national development policies, especially in sectors such as tourism that heavily rely on service quality and human engagement. The global Women's Empowerment Index (WEI) score is 0.607, reflecting that women are only empowered to achieve 60% of their full potential. In Malaysia, the Ministry of Women, Family and Community Development (MWFCDD) actively integrate gender equality into national development frameworks such as the Eleventh Malaysia Plan 2. Tourism, a critical economic sector, contributed RM240.2 billion to Malaysia's GDP in 2019 7, and empowering women within this sector has potential for mutual growth and sustainability. Literature suggests that tourism can significantly enhance women's economic and social status 3. This study aims to examine the effect of women's empowerment on tourism development among women employees at Legoland, Malaysia.

II. METHODS

This study applied a quantitative research design using non-experimental survey methods 4, 5. A total of 112 women employees from Legoland Malaysia participated in the study through purposive sampling, based on Krejcie and Morgan's sample size determination. Data were collected using a structured questionnaire comprising three sections: demographic profile, women's empowerment, and tourism development. Women's empowerment was measured through four dimensions, which is economic, psychological, social, and political, adopted from the Resident Empowerment Through Tourism Scale (RETS) by Boley and McGehee. Tourism development was assessed using three

III. RESULTS AND DISCUSSION

A. Women Empowerment

The descriptive analysis revealed that among the four empowerment dimensions, political empowerment scored the highest mean ($M = 3.68$, $SD = 1.25$), followed by social ($M = 3.67$, $SD = 1.29$), psychological ($M = 3.60$, $SD = 1.17$), and economic empowerment ($M = 3.59$, $SD = 1.25$). This indicates that political influence and decision-making opportunities are perceived as the most significant aspects of empowerment among the respondents.

TABLE I
DESCRIPTIVES STATISTIC OF WOMEN EMPOWERMENT

Assessment	Mean	SD	Rank
Psychological empowerment	3.60	1.17	3
Political empowerment	3.68	1.25	1
Social empowerment	3.67	1.29	2
Economic empowerment	3.59	1.25	4

B. Tourism Development

The mean score for tourism development was 3.67 ($SD = 1.12$), reflecting a generally positive perception of women's roles in contributing to tourism growth, especially through active participation, innovation, and promotion of local attractions.

TABLE II
DESCRIPTIVES STATISTIC OF TOURISM DEVELOPMENT

	Mean	SD
Tourism development	3.67	1.12

C. Relationship Between WE and TD

A linear regression analysis demonstrated a strong positive relationship between women's empowerment and tourism development, with $R = 0.942$ and $R^2 = 0.887$. This suggests that 88.7% of the variation in tourism development can be explained by empowerment factors, confirming a significant influence of empowered women on tourism progress.

TABLE III
RELATIONSHIP BETWEEN WOMEN EMPOWERMENT AND TOURISM DEVELOPMENT

Model	R2	R ²
1	0.942	0.887

D. Income Differences

The highest mean score for tourism development was recorded among respondents earning RM4,501 and above ($M = 3.82$), followed closely by those earning RM1,500 and below ($M = 3.80$). Meanwhile, the lowest score was reported by the RM1,501–RM2,500 group ($M = 3.57$), indicating that perceptions of tourism involvement were relatively consistent but slightly lower among mid-income earners.

TABLE IV
ONE-WAY ANOVA RESULT FOR INCOME DIFFERENCES ON TOURISM DEVELOPMENT

	Monthly Income	N	Mean	SD
Tourism Development	Rm 1,500 and below	23	3.80	1.07
	Rm 1,501- Rm 2,500	23	3.57	1.16
	Rm 2,501- Rm 3,500	24	3.58	1.14
	Rm 3,501- Rm 4,500	27	3.64	1.20
	Rm 4,501 and above	15	3.82	1.06

IV. CONCLUSION

The findings of this study demonstrate that women's empowerment, particularly in political and social dimensions, significantly contributes to tourism development among women employees at Legoland Malaysia. Political and social empowerment were rated the highest, reflecting strong involvement of women in leadership and community roles 8, 3. In contrast, economic empowerment was rated the lowest, suggesting ongoing financial barriers that may still hinder full participation in tourism-related opportunities 9. Tourism development was perceived as moderately high 6, and regression analysis revealed a strong relationship between empowerment and tourism development ($R^2 = 0.887$), consistent with earlier empowerment frameworks 10. One-way ANOVA showed no significant differences across income groups, reinforcing the notion that inclusive tourism development benefits women regardless of socioeconomic background. These results support the growing body of literature advocating for inclusive and sustainable tourism strategies 11.

These insights provide evidence-based direction for policymakers, tourism authorities, and corporate stakeholders to develop strategies that elevate women's empowerment as a mechanism for enhancing tourism services and innovation. The study recommends future research to explore long-term impacts of empowerment programs on women's career advancement and leadership within the tourism industry.

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Exploring Relationship Social Media Use and Physical Activity Among UiTM Seremban Students

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Keywords: Social media usage, Physical activity, University students, Digital behaviour, Student health

I. INTRODUCTION

This study focuses on the relationship between social media use and physical activity levels among UiTM Seremban students. Concerns are being raised regarding the low level of physical activity due to social media. This study intends to determine if social media affects students' physical engagement by analysing usage patterns and activity levels, therefore offering insight on balancing online and active lifestyles.

II. METHODS

Data were gathered through face-to-face and online questionnaires of 433 UiTM Seremban students. Participants were chosen just from this campus to maintain consistency. The Social Media Usage Scale (SMUS) monitored digital involvement, and the International Physical Activity Questionnaire (IPAQ) assessed activity levels. These established tools allowed for reliable examination of the relationship between social media use and physical activity.

III. RESULTS AND DISCUSSION

The data indicated a significant level of social media use among UiTM Seremban students. Although individual platform preferences were not recorded, total usage suggests significant daily involvement. No obvious patterns found depending on gender or year of study, indicating that strong social media use is constant across student demographics. Physical activity among students was often poor. Broader comparisons were not possible due to a lack of precise data on activity categories and academic programs. However, the general inactivity trend indicates the need for focused health promotion activities within the academic context to encourage more consistent and moderate physical activity.

There was a statistically significant negative connection between social media usage and physical activity levels. This suggests that increased social media use relates to decreased physical activity participation. Although internet behaviours were not examined, the findings raise concerns about digital habits substituting time for physical activity among students [1].

TABLE I
SOCIAL MEDIA LEVEL USAGE

Social Media Use	Counts	% of Total
High	304	70.2%
Moderate	88	20.3%
Low	41	9.5%

Table I displays the amount of social media use among respondents. Most participants (304, or 70.2%) indicated extensive social media use. In addition, 88 respondents (20.3%) claimed moderate use, while just 41 respondents (9.5%) reported low use of social media. This shows that most of the students in the research were quite engaged on social media sites.

TABLE II
PHYSICAL ACTIVITY LEVEL

Physical Activity Level	Counts	% of Total
High	358	82.7%
Moderate	44	10.1%
Low	31	7.1%

Table II displays the physical activity level of the 433 respondents. Most responders (358, or 82.7%) reported a low level of physical activity. Meanwhile, 44 respondents (10.1%) indicated moderate physical activity, while 31 respondents (7.1%) claimed high physical activity. These findings show that most respondents in this survey engaged in modest levels of physical exercise.

TABLE III
RELATIONSHIP BETWEEN SOCIAL MEDIA LEVEL USAGE PHYSICAL ACTIVITY
LEVEL

Social media use	Physical activity level			
	Low	Moderate	High	Total
High	254	31	19	304
Moderate	63	13	12	88
Low	41	0	0	41
Total	358	44	31	433

TABLE IV
CHI-SQUARE

Value	Df	p
17.3	4	0.002
433		

Table III shows a cross-tabulation of social media use and physical activity levels, as well as the chi-square test results. The chi-square value ($\chi^2 = 17.3$, $df = 4$, $p = 0.002$) shows a strong correlation between social media use and physical activity level among respondents. This suggests that students' physical activity behaviour may be influenced or correlated with their amount of social media usage.

IV. CONCLUSIONS

The study found that UiTM Seremban students use social media excessively and engage in little physical exercise, with a substantial negative relationship between the two. These findings point to the need of promoting healthy student behaviour through balanced digital engagement and active lifestyle initiatives.

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The Relationship Between Service Quality and Student Satisfaction at UiTM Seremban 3

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Keywords: Service quality, Student satisfaction, Facilities, Higher education, SERVQUAL

I. INTRODUCTION

This study investigates the relationship between service quality and student satisfaction toward facilities at UiTM Seremban 3. Service quality in this context refers to the effectiveness and efficiency of various campus facilities, including libraries, study spaces, laboratories, recreational areas, and housing services. These facilities play an essential role in supporting students' academic and social needs. Previous research consistently highlights that well-maintained, accessible, and user-friendly facilities contribute significantly to student satisfaction [1][2][3]. For example, [1] and [2] emphasized that the condition and availability of campus facilities directly affect students' perceptions of service quality and their satisfaction levels. Furthermore, [3] noted that service quality remains a key determinant of student satisfaction across Malaysian universities. Therefore, understanding the extent to which service quality influences student satisfaction is crucial for universities aiming to enhance their educational environment and improve the overall student experience.

II. METHODS

This study employed a quantitative descriptive research design to explore the relationship between service quality and student satisfaction. The target population consisted of students from various academic programs at UiTM Seremban 3. A purposive sampling technique was used to select respondents who were familiar with the campus facilities and could provide meaningful insights, as recommended by similar studies [1][2][4]. Data collection was conducted through face-to-face surveys using structured questionnaires based on the widely recognized SERVQUAL model, which evaluates five key dimensions: tangibility, reliability, responsiveness, assurance, and empathy [2][3][5]. A total of 435 valid responses were gathered for analysis. The collected data were analyzed using descriptive statistics (mean and standard deviation) to summarize student responses regarding service quality, followed by Pearson correlation analysis to examine the relationship between service quality and student satisfaction, consistent with prior research methods in higher education service studies [1][4][6].

III. RESULTS AND DISCUSSION

A. Main factor of Service Quality and Students Satisfaction

The descriptive analysis showed that responsiveness recorded the highest mean score among all service quality dimensions, with a mean of 3.87 and a standard deviation (SD) of 1.24. This was followed by tangibility ($M = 3.80$, $SD = 1.22$), assurance ($M = 3.77$, $SD = 1.18$), reliability ($M = 3.75$, $SD = 1.27$), and empathy ($M = 3.71$, $SD = 1.26$). These findings indicate that responsiveness is perceived most positively by students, suggesting that prompt service and quick assistance play a key role in shaping positive perceptions of service quality at UiTM Seremban 3.

TABLE I
DESCRIPTIVE ON MAIN FACTORS OF SERVICE QUALITY OF FACILITIES AT
UiTM SEREMBAN 3

	N	Mean	Median	SD
Responsiveness	435	387	407	124
Tangibility	435	380	440	127
Assurance	435	377	433	118
Reliability	435	375	433	127
Empathy	435	371	433	126

B. The Level of Service Satisfaction and Students Satisfaction

The mean score for service satisfaction was 3.75 with a standard deviation of 1.20, while student satisfaction recorded a mean of 3.77 and a standard deviation of 1.23. Both scores fall within the high satisfaction range (3.67 - 5.00), showing that students generally feel satisfied with the campus facilities and services offered by the university.

TABLE II
DESCRIPTIVE ASSES THE LEVEL OF SERVICE SATISFACTION AND
STUDENTS' SATISFACTION

Descriptive Statistics	Service Satisfaction	Customer Satisfaction
N	435	435
Missing Data	0	0
Mean	375	377
Median	433	433
Standard Deviation	120	123

C. Relationship Between Service Quality and Students Satisfaction

The analysis revealed a very strong, positive, and statistically significant correlation between the two variables, $r(432) = .987, p < 0.001$.

TABLE III
RELATIONSHIP BETWEEN SERVICE QUALITY AND SATISFACTION

Variable	r	df	p
Service Quality & Student Satisfaction	0.987	432	< 0.001

IV. CONCLUSIONS

This study provides compelling evidence of a strong and positive relationship between service quality and student satisfaction toward campus facilities at UiTM Seremban 3. The findings clearly indicate that higher service quality, particularly in terms of responsiveness, is associated with greater levels of student satisfaction. Among the five dimensions of service quality assessed are tangibility, reliability, responsiveness, assurance, and empathy. Tangibility's responsiveness emerged as the most influential factor. This suggests that the ability of the university to deliver timely, helpful, and effective services is highly valued by students and plays a crucial role in shaping their perceptions of the university's overall service quality [1][2][4].

Furthermore, the study revealed consistently high mean scores for both service satisfaction and student satisfaction, indicating that UiTM Seremban 3 has effectively met students' expectations in many areas of service delivery [2][6]. However, despite these encouraging results, continuous efforts are essential to further enhance facility quality, particularly in dimensions such as empathy and reliability, which showed slightly lower scores compared to responsiveness and tangibility.

The results of this study are consistent with prior research in higher education service quality, reaffirming that well-maintained, accessible, and student-centered facilities contribute significantly to satisfaction and educational experiences [1][2][3][7]. From a managerial perspective, this highlights the need for universities to invest not only in physical infrastructure but also in service processes, staff training, and efficient feedback mechanisms to address student concerns promptly [5][6][8].

Moreover, the implications extend beyond immediate operational improvements. Universities that prioritize service quality improvements may experience long-term benefits, such as increased student loyalty, positive word-of-mouth recommendations, and enhanced institutional reputation factors that are critical in an increasingly competitive higher education landscape [2][4][8].

In conclusion, this study underscores the strategic importance of continuous improvement and proactive facility

management within higher education institutions. Future research could further explore the causal relationships between specific service quality initiatives and student satisfaction, potentially incorporating longitudinal or qualitative approaches for deeper insights [1][8]. By doing so, universities can ensure their facilities not only support academic success but also foster holistic student well-being and institutional excellence.

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The Effect of Self-Esteem on Leadership Orientation Among Faculty of Sports Science and Recreation Universiti Teknologi MARA Seremban 3 Students

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Keywords: Self-esteem, Leadership orientation, Sports Science and Recreation students, Gender differences, University students

I. INTRODUCTION

This study investigates how self-esteem affect leadership orientation among Sports Science and Recreation students at Universiti Teknologi MARA Seremban 3. By exploring gender-based differences and the strength of the self-esteem and leadership link, the research addresses a lack of focused inquiry in student populations within Malaysian sports faculties, contributing valuable insights into academic leadership development.

II. METHODS

A total of 356 Faculty of Sports Science and Recreation students from Universiti Teknologi MARA Seremban 3 were selected based on Krejcie and Morgan's sampling framework [1]. Data were collected using a demographic form, the Two-Dimensional Self-Esteem Scale, and the Multidimensional Leadership Orientations Scale [2]. Descriptive statistics, Pearson correlation, and independent t-tests were employed to analyze the effect and group differences related to self-esteem and leadership orientation.

III. RESULTS AND DISCUSSION

A. Self-Esteem

Students exhibited a moderate level of self-liking ($M = 3.02$) and a higher level of self-competence ($M = 3.56$), indicating they feel capable in performance but less consistent in emotional self-regard [2]. These findings highlight a nuanced self-esteem profile that distinguishes between confidence in ability and overall personal valuation.

TABLE I
SELF-ESTEEM

Variable	N	Mean	Median	Mode	SD
Self-liking	356	3.02	3.00	3.00	0.21
Self-competence	356	3.56	3.88	4.13	0.87

B. Leadership Orientation

Structural leadership was most dominant ($M = 4.08$), followed by Human Resource ($M = 3.98$), Charismatic ($M = 3.91$), and Political leadership ($M = 3.79$). Students favoured structured and relational leadership styles, suggesting their perception of leadership is both organized and people centered

[3]. These are essential traits for future roles in sports and recreation.

TABLE II
LEADERSHIP ORIENTATION

Variable	N	Mean	Median	SD
Political leadership	356	3.79	4.40	1.14
Human resource leadership	356	3.98	4.40	1.07
Charismatic leadership	356	3.91	4.40	1.11
Structural leadership	356	4.08	4.50	1.12

C. Effect Between Self-Esteem and Leadership Orientation

Self-competence showed a strong, significant effect with all leadership dimensions, especially charismatic leadership ($r = 0.874$). In contrast, self-liking had no significant effect. This indicates that students' belief in their abilities, rather than emotional self-worth, plays a critical role in shaping their leadership orientation and perceived effectiveness.

TABLE III
RELATIONSHIP BETWEEN SELF-ESTEEM AND LEADERSHIP ORIENTATION

		Self-Liking	Self-Competence	Political Leadership	Human Resource Leadership	Charismatic Leadership	Structural Leadership
Self-Liking	Pearson's r	—					
	df	—					
	p-value	—					
Self-Competence	Pearson's r	0.069	—				
	df	354	—				
	p-value	0.196	—				
Political Leadership	Pearson's r	0.061	0.849***	—			
	df	354	354	—			
	p-value	0.248	<.001	—			
Human Resource Leadership	Pearson's r	0.069	0.791***	0.865***	—		
	df	354	354	354	—		
	p-value	0.192	<.001	<.001	—		
Charismatic Leadership	Pearson's r	0.057	0.874***	0.884***	0.897***	—	
	df	354	354	354	354	—	
	p-value	0.285	<.001	<.001	<.001	—	
Structural Leadership	Pearson's r	0.055	0.839***	0.801***	0.907***	0.892***	—
	df	354	354	354	354	354	—
	p-value	0.298	<.001	<.001	<.001	<.001	—

D. Gender Differences

Gender differences were minimal in self-liking but slightly favoured females in self-competence. Female students also scored marginally higher across all leadership orientations, particularly in Political and Human Resource dimensions. Although not highly pronounced, these findings suggest a trend toward stronger leadership perceptions among female students in this academic context [4].

TABLE IV
GENDER DIFFERENCES

	Group	N	Mean	Median	SD	SE
Self-Liking	Female / Perempuan	162	3.03	3.00	0.193	0.0152
	Male / Lelaki	194	3.02	3.00	0.220	0.0158
Self-Competence	Female / Perempuan	162	3.63	4.13	0.858	0.0674
	Male / Lelaki	194	3.50	3.88	0.870	0.0625
Political Leadership	Female / Perempuan	162	3.89	4.40	1.086	0.0853
	Male / Lelaki	194	3.72	4.40	1.177	0.0845
Human Resource Leadership	Female / Perempuan	162	4.05	4.40	1.045	0.0821
	Male / Lelaki	194	3.92	4.40	1.093	0.0785
Charismatic Leadership	Female / Perempuan	162	3.97	4.50	1.095	0.0860
	Male / Lelaki	194	3.85	4.40	1.120	0.0804
Structural Leadership	Female / Perempuan	162	4.13	4.25	1.084	0.0851
	Male / Lelaki	194	4.04	4.50	1.159	0.0832

IV. CONCLUSIONS

Findings reveal that self-competence significantly affect leadership orientation among students, particularly in charismatic leadership. Gender differences were minimal yet consistently favored females. These insights emphasize the importance of fostering self-belief to strengthen leadership readiness within sports and recreation education.

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The Effect Between Peer Influence on Interest in E-Sport Participation Toward UiTM Seremban 3 Students

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Keywords: Peer influence, E-sport participation, University students, Gender differences, Motivation in gaming

I. INTRODUCTION

Esports have surged in popularity among youth, yet the role of peer influence in shaping interest remains understudied [1]. This study explores how peer dynamics affect interest in e-sports participation among UiTM Seremban 3 students, addressing motivational gaps and gender-based differences. The findings aim to enhance understanding of social factors driving e-sports engagement within academic communities.

II. METHODS

Data were collected using online surveys, interviews, and observations from 417 students at UiTM Seremban, selected through convenience sampling. The questionnaire assessed peer influence and e-sports interest. Descriptive statistics summarized participant characteristics, Pearson correlation evaluated the relationship between variables, and an independent t-test examined gender-based differences. The mixed-methods approach provided both quantitative and qualitative insights into e-sports participation motivations.

III. RESULTS AND DISCUSSION

A. To Identify Peer Influence Among UiTM Seremban 3 Students

Peer influence was present but not dominant, with most students acknowledging some peer impact on e-sports participation. Differences emerged based on age and academic program, suggesting social influence varies across demographic subgroups.

B. To Determine the Interest on Participation in E-Sport Among UiTM Seremban 3 Students

Students reported a medium level of interest in e-sports, primarily for relaxation and leisure. Prior gaming experience and frequency showed no major influence on their interest.

TABLE I
DESCRIPTIVE ANALYSIS

	Mean Peer Influence	AZ
N	417	417
Missing	0	0
Mean	2.42	3.67
Median	1.60	4.47
Standard deviation	1.28	1.32
Minimum	1.44	1.37
Maximum	4.64	4.68
Shapiro-Wilk W	0.678	0.675
Shapiro-Wilk p	< .001	< .001

C. To Examine the Significant Effect Between Peer Influence and Interest on Participation in E-Sport

A statistically significant yet weak correlation was found between peer influence and e-sports interest. This suggests that while peer dynamics play a role, other motivational factors are more influential.

TABLE II
CORRELATION MATRIX

		Mean Peer Influence	AZ
Mean Peer Influence	Pearson's r	—	
	df	—	
	p-value	—	
	Spearman's rho	—	
	df	—	
AZ	p-value	—	
	Pearson's r	-0.989	—
	df	415	—
	p-value	< .001	—
	Spearman's rho	-0.580	—
	df	415	—
	p-value	< .001	—

D. To Investigate the Differences Between Peer Influence and Interest on Participation in E-Sport Based on Gender

Gender-based analysis revealed significant differences. Male and female students varied in levels of peer influence and e-sports interest, with distinct influencing factors noted between the two groups.

TABLE III
INDEPENDENT T-TEST

		Statistic	df	p
Mean Peer Influence	Student's t	4.83 *	415	< .001
AZ	Student's t	-4.35 *	415	< .001

Note. H_a μ Female/ Perempuan $\neq$ μ Male/ Lelaki
* Levene's test is significant (p < .05), suggesting a violation of the assumption of equal variances

IV. CONCLUSIONS

This study found that while peer influence affects e-sports interest among UiTM Seremban 3 students, the effect is limited. Gender, age, and academic program contributed to variation in interest and influence. Esports engagement appears more leisure-driven than peer-driven, indicating a need to explore intrinsic motivational factors further.

ACKNOWLEDGEMENTS

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Exploring Outdoor Recreation and Physical Well-Being Among Residents in Iskandar Puteri

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Keywords: Outdoor recreation, Physical well-being, Urban residents, Gender comparison, Malaysia

I. INTRODUCTION

Outdoor recreation is increasingly recognized as vital to individual well-being. However, little is known about how such participation affects physical health outcomes in Malaysian urban communities. This study explores the frequency and intensity of outdoor recreation among Iskandar Puteri residents and investigates its association with perceived physical well-being, also considering gender-based differences in health benefits.

II. METHODS

Data were collected via an online Google Forms survey using the GLTEQ and GHQ-12 instruments. A total of 446 Iskandar Puteri residents participated through convenience sampling. Descriptive statistics assessed outdoor recreation patterns, correlation analysis (Spearman) examined links to physical well-being, and Independent t-tests compared well-being by gender. This self-administered method allowed efficient data capture during resource constraints.

III. RESULTS AND DISCUSSION

A. To Determine the Frequency and Intensity of Outdoor Recreation Participation Among Iskandar Puteri Residents

Strenuous activities like running and fast cycling were most common. Residents participated in such activities an average of 3.7 days per week. Participation was slightly higher among males and increased with age, especially in the 38+ group. Overall, monthly outdoor recreation occurred 6–8 times, indicating an active community engagement in outdoor physical activity.

B. To Examine the Relationship Between Outdoor Recreation Participation and Perceived Physical Well-Being

Pearson correlation analysis revealed a very weak positive relationship between outdoor activity and physical well-being. However, this was not statistically significant. Surprisingly, frequent participation did not strongly predict better well-being. This suggests other factors such as diet, stress, or sleep may play more critical roles and warrant further investigation to explain the limited impact observed.

TABLE I
CORRELATION BETWEEN OUTDOOR RECREATION PARTICIPATION AND PHYSICAL WELL BEING

	Physical well being	
	Correlation coefficient	
	Sig. (2 tailed)	
	N	
Outdoor recreation	-0.010	
	0.834	
	431	

C. To Compare the Physical Well-Being Between Male and Female

The T-test showed no significant gender difference in perceived physical well-being. Although males reported slightly better scores, the difference was minimal and not statistically meaningful. This implies that both genders may derive comparable well-being outcomes from outdoor recreation, challenging assumptions about gendered health benefits in physically active urban populations.

TABLE III
COMPARISON BETWEEN MALE AND FEMALE ON PHYSICAL WELL BEING

Variable	Group	N	Mean	t	df	p
Physical well-being	Male	201	2.38	0.30	429	0.082
	Female	230	2.36			

IV. CONCLUSIONS

Outdoor recreation was frequent among Iskandar Puteri residents, especially strenuous activities. However, its link to physical well-being was weak and not statistically significant. No gender-based differences in well-being were found. These results suggest outdoor activity alone may not suffice for improved well-being and should be studied alongside other health-related factors.

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Exploring Social Media Influence on Fan Satisfaction Toward Spectators During Football Matches at UTHM

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Keywords: Social media usage, Fan satisfaction, Spectator engagement, Trust, Commitment, Intimacy

I. INTRODUCTION

This study explored how social media usage influences fan satisfaction among spectators during football matches at Stadium Universiti Tun Hussein Onn Malaysia. As digital interaction increasingly shapes live sports experiences, understanding fans' engagement through social platforms is essential.[1] Addressing factors such as trust, commitment and intimacy, the research fills a gap in localized fan satisfaction studies within the Malaysian university sports context [2].

II. METHODS

A total of 218 spectators at Stadium Universiti Tun Hussein Onn Malaysia participated in this study. Data were collected using a structured questionnaire survey during football matches. Descriptive statistics, including mean and standard deviation, were employed to summarize social media usage and fan satisfaction factors. Pearson correlation analysis was conducted to examine the relationship between social media usage and fan satisfaction among spectators.

III. RESULTS AND DISCUSSION

A. Objective 1 - Results

Social media usage (4.07 ± 0.24) showed very high-level platforms among spectators. Social media engagement peaked during and after matches, with users primarily sharing content, checking live scores, and interacting with others. These findings highlight the growing role of digital platforms in enriching spectatorship and extending the football experience beyond the stadium.

B. Main Factors of Fans Satisfaction

Fan satisfaction was driven by trust ($M = 4.20 \pm SD$), intimacy ($M = 4.14 \pm SD$), and commitment ($M = 4.11 \pm SD$). Trust emerged as the top factor influencing positive spectator experiences.

C. Relationship-Social Media Usage and Fans Satisfaction

A low, positive correlation was found between social media usage and fan satisfaction. This suggests that increased social media interaction during matches enhances overall fan engagement and satisfaction. The findings reinforce the importance of integrated digital strategies in live sports settings, particularly for campus-based sporting events.

TABLE I
RELATIONSHIP-SOCIAL MEDIA USAGE AND FANS SATISFACTION

		Correlations				
Control Variables		Trust	Commitment	Intimacy	Socialmedia	
-none-	Trust	Correlation	1.000	.312	.447	.268
		Significance (2-tailed)		< .001	< .001	< .001
		df	0	216	216	216
	Commitment	Correlation	.312	1.000	.300	.338
		Significance (2-tailed)	< .001	< .001	< .001	< .001
		df	216	0	216	216
	Intimacy	Correlation	.447	.300	1.000	.279
		Significance (2-tailed)	< .001	< .001		< .001
		df	216	216	0	216
	Socialmedia	Correlation	.268	.338	.279	1.000
		Significance (2-tailed)	< .001	< .001	< .001	
		df	216	216	216	0
Socialmedia	Trust	Correlation	1.000	.245	.403	
		Significance (2-tailed)		< .001	< .001	
		df	0	215	215	
	Commitment	Correlation	.245	1.000	.229	
		Significance (2-tailed)	< .001	< .001		
		df	215	0	215	
	Intimacy	Correlation	.403	.229	1.000	
		Significance (2-tailed)	< .001	< .001		
		df	215	215	0	

a. Cells contain zero-order (Pearson) correlations.

IV. CONCLUSIONS

Social media plays a significant role in enhancing fan satisfaction during football matches at Stadium UTHM. Trust, engagement, and intimacy emerged as key satisfaction drivers. A low positive correlation confirms that social media enhances live match experiences, suggesting its strategic importance for improving university-level sports events.

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Exploring Outdoor Leisure Activities and Mental Health Among Hikers in Bukit Pelindung Pahang Malaysia

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Keywords: Outdoor leisure, Hiking, Mental health, Bukit Pelindung, Psychological benefits

I. INTRODUCTION

Hiking is a widely accessible outdoor leisure activity that offers potential psychological benefits [1]. This study investigates how hiking influences the mental health of hikers in Bukit Pelindung, Pahang, Malaysia. It further identifies outdoor leisure factors associated with mental health, examines the relationship between hiking [2] and mental health, and explores gender differences in these benefits [3] to provide insights for promoting psychological well-being through hiking.

II. METHODS

A quantitative, non-experimental survey design was used involving hikers in Bukit Pelindung, Pahang. Data were collected online between April and June 2025 using a structured questionnaire comprising demographic items, the Nature Relatedness Scale, and the Depression, Anxiety and Stress Scale (DASS-21). Participants were selected purposively to capture diverse hiking experiences and mental health outcomes efficiently without manipulating variables in natural hiking settings.

III. RESULTS AND DISCUSSION

A. Psychological Benefits

Most hikers reported positive psychological benefits from hiking, indicated by a mean mental health score of 1.63 ($SD = 0.724$). The slight positive skew suggests benefits were widely experienced, supporting hiking's role in enhancing mental health among Bukit Pelindung hikers.

B. Outdoor Leisure Factors Contributing to Mental Health

There is a strong negative correlation between outdoor leisure and mental health ($r = -0.811$, $p < 0.001$). This means that as outdoor leisure activity increases, mental health issues decrease or in other words, greater participation in outdoor leisure is associated with better mental health among the participants.

TABLE II
CORRELATION MATRIX

Outdoor Leisure		
Mental Health	Pearson's r	-0.811
	df	410
	p	<0.001

C. Relationship

One-Way ANOVA revealed significant differences in mental health outcomes based on hiking participation levels ($F(3,408) = 30.4$, $p < 0.001$). However, assumption violations imply these results should be interpreted cautiously regarding their generalisability to wider hiking populations.

TABLE III
ONE-WAY ANOVA (FISHER'S)

	F	df1	df2	p
Mental Health	30.4	3	408	<0.001

D. Differences Between gender

Independent samples t-test showed no significant gender differences in mental health benefits ($p = 0.903$). Male and female hikers reported similar positive psychological outcomes, suggesting hiking's benefits are broadly accessible regardless of gender.

TABLE IV
DIFFERENCES BETWEEN GENDERS

	Statistic	df	p	Mean difference	SE difference	Effect Size
Mental health	0.122	410	0.903	0.00875	0.0715	0.0121

Group	N	Mean	Median	SD	SE
Female	203	1.63	1.10	0.726	0.0509
Male	209	1.62	1.10	0.725	0.0501

IV. CONCLUSIONS

Hiking in Bukit Pelindung provides significant psychological benefits without gender differences. Key outdoor leisure factors strongly relate to mental health, highlighting hiking's value in promoting well-being. However, caution is needed in interpreting participation level effects due to statistical assumption violations.

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Analyzing Mental Toughness Level on Adventure-Based Residential Program Participation Towards FSR Students

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Keywords: Mental toughness, Adventure-based learning, Residential program, University students, Psychological resilience

I. INTRODUCTION

University students often face high levels of stress that negatively affect academic performance and well-being. Mental toughness is a critical attribute for managing adversity. While adventure-based residential programs show promise in enhancing resilience, limited research has examined their impact on students' mental toughness. This study investigates changes in mental toughness among FSR students before and after participating in such a program to evaluate its psychological benefits in academic settings.

II. METHODS

This study involved 68 FSR students who participated in an adventure-based residential program. The program included outdoor activities such as kayaking, orienteering, campcraft, rope courses, and cycling. Mental toughness levels were measured before and after the program using the Adventure-Based Mental Toughness Inventory (ABMTi). A quantitative approach was employed to assess changes and determine the significance of differences in participants' mental toughness scores.

III. RESULTS AND DISCUSSION

A. Overall Mental Toughness Before the Program

Before the program, FSR students had an average mental toughness score of $M = 3.14$ ($SD = 0.243$), with coping skills and commitment scoring lowest ($M = 2.99$). Males scored higher than females ($M = 3.27$ vs. $M = 2.98$), but the gender difference was not statistically significant ($p > 0.05$), indicating similar baseline resilience.

TABLE I
DESCRIPTIVE ANALYSIS BEFORE THE PROGRAM

	N	Mean	Median	SD	Min	Max
Pre_Overall MT	68	3.14	3.3	0.243	2.19	3.50

B. Overall Mental Toughness After the Program

Post-program scores increased to $M = 4.49$, $SD = 0.0566$, with coping skills showing the highest improvement (Mean Difference = 1.53). This indicates substantial enhancement in mental resilience following participation. Though qualitative data was not collected, observed changes strongly suggest that

the program's experiential design contributed meaningfully to building psychological endurance among students.

TABLE II
DESCRIPTIVE ANALYSIS AFTER THE PROGRAM

	N	Mean	Median	SD	Min	Max
Post_Overall MT	68	4.49	4.44	0.0566	4.44	4.56

C. Significance Difference in Mental Toughness Before and After the Program

A paired t-test showed a statistically significant increase in mental toughness (Mean Difference = 1.35, $SE = 0.0343$, $p < 0.001$) after program participation. This confirms the effectiveness of adventure-based residential interventions in strengthening mental toughness among students, highlighting their value as co-curricular support for academic and emotional resilience.

TABLE I
DIFFERENCES IN MENTAL TOUGHNESS BEFORE AND AFTER THE PROGRAM

Statistic	df	p	Mean difference	SE difference
39.2	67.0	<0.001	1.35	0.0343

IV. CONCLUSIONS

Adventure-based residential programs significantly enhanced FSR students' mental toughness, particularly in coping skills. The findings support their use in fostering resilience in higher education settings. Integrating such programs into student development initiatives may offer effective support for psychological well-being and academic performance.

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Exploring Relationship Between Learning Style and Academic Performance Among FSR Students UiTM Seremban 3

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Keywords: Learning style, Academic performance, Vark, Pearson correlation, Higher education

I. INTRODUCTION

This study explores the predominant learning styles among FSR students at UiTM Seremban 3 and their association with academic performance. Understanding this relationship may enhance teaching strategies and student outcomes. By identifying common learning preferences and analysing academic results, the research aims to determine whether learning style significantly influences academic achievement among this specific student group.

II. METHODS

A total of 333 FSR students from UiTM Seremban 3 were randomly selected to participate. Learning styles were assessed using the VARK model, while academic performance was measured using the Academic Performance Scale (APS). Pearson correlation analysis was applied to examine the relationship between students' learning styles and their academic performance.

III. RESULTS AND DISCUSSION

Visual style emerged as the most common learning style with a median of 2.40 and *SD* of 0.511. Although percentages were not available, patterns varied by gender, year, and program. These demographic differences suggest possible contextual influences on students' learning preferences at UiTM Seremban 3. Among the students, 67.5% achieved excellent academic performance, while 9.0% performed well, 5.7% moderately, and 17.9% poorly. These results indicate most high-achieving students, with no major performance trends observed across different learning styles. A statistically significant, moderate positive correlation ($r = 0.565$, $p < 0.001$) was found between learning style and academic performance. This implies that greater alignment with preferred learning styles is moderately associated with higher academic outcomes. The visual style demonstrated the strongest correlation with academic performance.

TABLE I
DESCRIPTIVE OF LEARNING STYLES

	N	Mean	Median	SD
Visual	335	2.47	2.40	0.511
Auditory	335	2.47	2.40	0.507
kinesthetics	335	2.47	2.40	0.502

Based on table I, all three learning styles Visual, Auditory, and Kinesthetic have the same mean score of 2.47 among 335 respondents. The Visual style has a mean of 2.47 and *SD* of 0.511, while the Auditory style has a mean of 2.47 and *SD* of 0.507. The Kinesthetic style shows a mean of 2.47 and the lowest *SD* of 0.502, indicating slightly more consistent responses. Despite identical mean values, the small differences in median and standard deviation suggest slight variations in learning style preferences.

TABLE II
FREQUENCY OF ACADEMIC PERFORMANCE

Total Score	Counts	% of Total
Poor	60	17.9%
Moderate	19	5.7%
Good	30	9.0%
Excellent	226	67.5%

For table II, the distribution of academic performance among the surveyed students shows that the largest group 226 students (67.5 %) attained excellent performance, indicating that more than two-thirds of the cohort consistently perform at the highest level. 60 students (17.9 %) were classified as having poor performance, 30 students (9.0 %) achieved good performance, and 19 students (5.7 %) demonstrated moderate performance.

TABLE III
CORRELATION MATRIX OF LEARNING STYLE AND ACADEMIC PERFORMANCE

Learning style	Academic performance	
	Pearson r	0.565
	df	333
	p-value	< 0.001

For table III, a Pearson correlation test shows a moderate positive correlation ($r = 0.565$) between the mean learning-style scores and mean academic performance, calculated with 333 degrees of freedom; the association is statistically significant ($p < 0.001$), indicating that students who align strongly with their preferred learning styles tend to achieve higher academic results.

IV. CONCLUSIONS

The findings reveal that visual learning is most common, academic performance is predominantly excellent, and a significant positive relationship exists between learning style and academic success. These results highlight the importance of recognizing students' preferred learning approaches to support academic achievement and inform instructional design in higher education.

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The Relationship Between Facility Service Quality and Player Satisfaction Among UiTM Shah Alam Football Team

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Keywords: Facility service quality, Player satisfaction, SERVQUAL, University football, Sports management

I. INTRODUCTION

This study investigates how facility service quality influences player satisfaction among UiTM Shah Alam football players. Using the SERVQUAL model, the research examines six key service dimensions to identify which most impact player perceptions. The findings aim to guide facility management improvements, ensuring better support for athletic development and overall team performance in Malaysia's competitive university football environment [1].

II. METHODS

This study involved 30 UiTM Shah Alam football players using purposive sampling. Data were collected through a structured SERVQUAL-based questionnaire covering six service quality dimensions and satisfaction measures. The responses were analyzed using descriptive statistics and Pearson correlation with Jamovi software version 2.6.22 to identify key quality factors and examine their relationship with player satisfaction following the approach of [2].

III. RESULTS AND DISCUSSION

Players rated empathy highest ($M = 4.24$), followed by reliability and technical quality ($M = 4.17$), consistent with findings by [1], who emphasized the importance of care and competence in coaching environments. Tangibles scored lowest ($M = 3.95$), echoing concerns raised by [3] about the role of physical infrastructure in athlete experience.

Regarding satisfaction, service ($M = 3.90$) and game experiences ($M = 3.89$) had a median score of 4.00, reflecting general agreement with positive satisfaction statements. This aligns with [3] who found that consistent service delivery promotes satisfaction and retention in sports contexts. The correlation between facility service quality and player satisfaction was weak ($r = 0.216$) and statistically insignificant ($p = 0.251$). This contrasts with stronger links found in previous research suggesting that other factors like coaching quality or team culture may play a more significant role.

TABLE I
DESCRIPTIVE MAIN FACTORS OF FACILITY SERVICE QUALITY

	N	Mean	Median	SD
Empathy	30	4.24	4.30	0.542
Reliability	30	4.17	4.00	0.613
Technical quality	30	4.17	4.17	0.559
Assurance	30	4.10	4.00	0.642
Responsiveness	30	4.13	4.00	0.571
Tangibles	30	3.95	4.00	0.664

Players rated empathy, reliability, and technical quality highest, showing they value staff care and competence. Tangibles scored lowest, indicating dissatisfaction with physical aspects like equipment and facilities as study by [1].

TABLE II
DESCRIPTIVE LEVEL OF SATISFACTION

	N	Mean
Service Satisfaction	30	3.90
Game Satisfaction	30	3.89

Players reported high satisfaction in both service and game experiences, suggesting that current facility support generally meets their expectations and contributes to a positive playing environment [2].

TABLE III
PEARSON CORRELATION TEST

	Total Mean DV
Pearson's r	0.216
Total Mean IV	df
	28
p-value	0.251

The weak and non-significant correlation between service quality and satisfaction suggests that other factors like coaching or team dynamics may influence satisfaction more than facilities alone.

IV. CONCLUSIONS

Although UiTM Shah Alam football players reported high satisfaction and valued empathy, reliability, and technical quality, the relationship between facility service quality and satisfaction was weak. These findings suggest that facility improvements alone may not significantly enhance satisfaction without addressing broader factors like coaching and team environment.

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The Responsibilities of Users in Outdoor Recreation Activity Between Students in UiTM Seremban 3

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Keywords: Outdoor recreation, User responsibility, University students, Psychological factors, Gender differences

I. INTRODUCTION

University students are increasingly engaging in outdoor recreation, yet varying levels of user responsibility can impact safety and environmental sustainability. This study explores the key factors shaping responsible outdoor behavior among UiTM Seremban 3 students and examines how these responsibilities differ between genders, aiming to inform future programming and behavioural interventions.

II. METHODS

A structured questionnaire with close-ended and Likert-scale items was distributed to 332 UiTM Seremban 3 students (166 males, 166 females) using convenience sampling. Descriptive statistics (mean and standard deviation) identified key responsibility factors, while independent t-tests analyzed gender-based differences in outdoor recreation responsibilities. No experimental procedures were involved.

III. RESULTS AND DISCUSSION

A. The Main Factors of Responsibilities of Users in Outdoor Recreation Activity Between Student in UiTM Seremban 3

Motivation and Focus were the highest-rated responsibility factors ($M = 4.02$), while Control was the lowest ($M = 3.96$). All psychological responsibility attributes scored highly, with standard deviations around 1.0, suggesting moderate variability. Students generally demonstrated strong personal responsibility, though perceived control appears slightly weaker, indicating a potential area for targeted support.

TABLE I
DESCRIPTIVE FACTORS OF RESPONSIBILITIES OF USERS IN OUTDOOR RECREATION ACTIVITY BETWEEN STUDENTS IN UiTM SEREMBAN 3

	Mean	Standard Deviation
Self Confidence	4.01	1.016
Motivation	4.02	1.007
Coping Skills	4.00	1.020
Challenge	3.99	1.009
Focus	4.02	1.016
Control	3.96	0.954
Commitment	4.00	1.009

*Significantly different from Pre-NC ($p < 0.05$).

B. The Differences of Responsibilities of Users in Outdoor Recreation Activity Between Student in UiTM Seremban 3 in Term of Gender

Male students scored slightly higher ($M = 4.07$) than females ($M = 3.94$) in responsibility, but the difference was not statistically significant ($p = 0.214$). The small mean difference (0.136) suggests that gender does not meaningfully influence responsibility in outdoor recreation. Both groups exhibit similarly high responsibility levels, supporting the idea of shared values across genders.

TABLE II
INDEPENDENT SAMPLE T-TEST

	Students t	df	p	Mean difference	SE difference
Total Mean	12.5	330	0.214	0.136	0.109

TABLE III
GROUP DESCRIPTIVE

	Group	N	Mean	Median	SD	SE
Total	1	166	4.07	4.45	0.955	0.0742
Mean	2	166	3.94	4.37	1.03	0.0799

IV. CONCLUSIONS

Students at UiTM Seremban 3 demonstrate generally high responsibility in outdoor recreation, particularly in motivation and focus. Gender differences were minimal and statistically insignificant. These findings support the promotion of inclusive, responsibility-focused programming without needing gender-specific interventions.

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The Relationship Between Mental Health on Job Performance Among Employee EPF

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Keywords: Mental health, Job performance, Anxiety, Depression, Stress, Workplace productivity, Employee well-being, Organizational performance, Occupational stress

I. INTRODUCTION

This study investigates the relationship between mental health and job performance among Employees Provident Fund (EPF) employees. It identifies key mental health factors, evaluates employee satisfaction, and examines the significant relationship between mental health and job performance [1]. Additionally, it analyses gender-based differences related to mental health and job performance. The findings will provide insights for EPF in developing targeted strategies to enhance employee well-being and organisational productivity through effective mental health interventions [2].

II. METHODS

A quantitative with non-experimental design was employed using structured questionnaires distributed via Google Forms to 397 EPF employees selected through stratified random sampling. The questionnaire assessed mental health indicators (anxiety, depression, stress), job performance, and employee satisfaction. This approach ensured department and job-level representation. Data were analysed using statistical techniques to determine relationships and differences, providing a clear basis for understanding mental health relationships with job performance at EPF [3].

III. RESULTS AND DISCUSSION

A. Mental Health

Descriptive statistics revealed generally low levels of psychological distress among employees. Mean scores indicated that anxiety ($M = 2.09$, $SD = 1.01$) was the most reported symptom, followed by depression ($M = 1.43$, $SD = 0.72$) and stress ($M = 1.11$, $SD = 0.37$). Despite anxiety being comparatively higher, all mental health indicators remained within a low range, suggesting overall psychological well-being in the workplace [4]. Although anxiety was comparatively more reported, all indicators remained within the low range, reflecting a stable mental health status overall. The presence of even moderate anxiety may warrant preventive strategies to mitigate its potential escalation, as sustained mental strain could impair performance over time [5].

B. Task Performance

Descriptive statistics indicated that task performance was the highest among job performance dimensions ($M = 4.33$, $SD = 0.47$), reflecting strong employee proficiency in core responsibilities. Contextual performance was moderate ($M = 3.08$, $SD = 0.95$), suggesting reasonable involvement in supportive, extra-role behaviors. Counterproductive work behavior ($M = 1.73$, $SD = 0.86$) was reported at a low level, indicating minimal occurrence of negative workplace conduct [5]. The results highlight the importance of maintaining a psychologically supportive environment that enhances core performance while minimizing negative workplace behaviors.

TABLE I
DESCRIPTIVE STATISTICS MENTAL HEALTH

	N	Means	Standard deviation (SD)
Anxiety	398	2.09	1.01
Depression	398	1.43	0.72
Stress	398	1.11	0.37

TABLE II
DESCRIPTIVE STATISTICS JOB PERFORMANCE

	N	Means	SD	Interpretation
Task performance	398	4.33	0.47	High
Contextual Performance	398	3.08	0.95	Moderate
Counterproductive work behavior	398	1.73	0.86	Low

IV. CONCLUSIONS

This study underscores the critical influence of mental health, specifically anxiety, depression, and stress on job performance among EPF employees. Findings suggest that poor mental well-being negatively affects task efficiency, collaboration, and organizational outcomes. Addressing these issues through targeted mental health interventions is essential for fostering a productive and resilient workforce. By prioritizing employee psychological well-being, organizations like EPF can enhance both individual performance and service

delivery, ensuring long-term operational success and employee satisfaction.

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Relationship Between Social Media Marketing and Purchase Intention of Sports Products Among UiTM Seremban 3 Students

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Keywords: Social media marketing, Trendiness, Entertainment, Interaction, Electronic Word of Mouth (eWOM), Purchase intention

I. INTRODUCTION

Social media marketing has emerged as a powerful tool for influencing consumer behavior, particularly among university students. This study explores the relationship between social media marketing patterns and the purchase intention of sports products among UiTM Seremban 3 students. It aims to identify key marketing factors, assess their impact on consumer decisions, and provide insights into the effectiveness of digital strategies in the student demographic.

II. METHODS

This study employed a quantitative research design using a self-administrated structured questionnaire distributed to 234 UiTM Seremban 3 students. Participants were selected through convenience sampling. Descriptive statistics were used to analyze differences in social media marketing patterns and prevailing factors influencing purchase intention, while Pearson correlation analysis was applied to examine the relationship between social media marketing and students' intention to purchase sports products.

III. RESULTS AND DISCUSSION

A. Social Media Marketing

The analysis of Trendiness, Entertainment, Interaction and Electronic Word of Mouth (eWOM) patterns showed no significant differences in students' responses. However, Trendiness emerged as the most influential pattern with the highest mean score ($M = 4.14$). Electronic Word of Mouth (eWOM) pattern indicates the lowest mean score ($M = 4.07$). This suggests that students respond more favorably to marketing content that reflects current trends and popular themes within social media platforms.

TABLE I
SOCIAL MEDIA MARKETING

Variables	Mean	SD
Trendiness	4.14	0.76
Entertainment	4.13	0.71
Interaction	4.10	0.72
eWOMgoo	4.07	0.79

B. Purchase Intention

Trendiness ($M = 4.14$) was the highest-rated social media marketing factor influencing purchase intention. The overall mean for Purchase Intention showed ($M = 4.08$), suggesting a generally strong agreement among respondents. These results emphasize the importance of using trend-based content to shape consumer behavior, aligning with the expectations of digital-native student consumers.

TABLE II
PURCHASE INTENTION

	Mean	SD
Purchase Intention	4.08	0.73

C. Relationship Between Social Media Marketing and Purchase Intention

Results indicated a strong positive and statistically significant correlation was found between Social Media Marketing and Purchase Intention. This indicates that platforms effectively drive purchasing behavior. The findings highlight that peer influence and interactive content outperform entertainment alone, urging marketers to prioritize authenticity, engagement, and community relevance to maximize impact among students.

TABLE III
RELATIONSHIP BETWEEN SOCIAL MEDIA MARKETING AND PURCHASE INTENTION

Social Media Marketing		
	Pearson's R	0.81
Purchase Intention	Sig. (1-tailed)	< 0.001
	N	234

IV. CONCLUSIONS

This study confirms that Social Media Marketing, especially Trendiness, significantly influences students' Purchase Intentions toward sports products. A strong positive

correlation was observed, indicating that engaging, trend-based, and peer driven content can effectively drive consumer behavior among university students in the digital age.

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The Study of Relationship Between Motivation and Participation in Outdoor Recreation Among Students in Universiti Teknologi MARA Seremban 3

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Keywords: Student motivation, Recreation participation, University students, Gender differences, Outdoor recreation

I. INTRODUCTION

Modern students increasingly lead sedentary, tech-oriented lifestyles, reducing outdoor engagement and connection to nature [1]. This study investigates the relationship between motivation and participation in outdoor recreation among UiTM Seremban 3 students, identifying key influencing factors and examining gender-based differences. Findings aim to inform initiatives that promote healthier, more active lifestyles through outdoor recreational involvement.

II. METHODS

A non-experimental quantitative survey was conducted among 428 students from three faculties at UiTM Seremban 3. Participants were selected using Krejcie and Morgan's sample size table with an added 20% buffer [2]. Data were collected via questionnaires and analyzed using descriptive statistics, Pearson correlation, and independent t-tests to examine motivation, participation, and gender differences in outdoor recreation involvement.

III. RESULTS AND DISCUSSION

A. Motivation in Outdoor Recreation

The descriptive analysis in Table I reveals that the highest motivation factor for students participating in outdoor recreation is "Experiencing Nature" ($M = 4.71$, $SD = 0.441$), indicating a strong preference for connecting with the natural environment to relax and escape from daily academic and digital stress. This suggests that nature-related experiences are a key driver for student involvement. On the other hand, the lowest-ranked factor is "Using Equipment and Developing Skills" ($M = 4.60$, $SD = 0.591$), showing that while students still value skill-building and equipment use, these are less motivating compared to emotional and environmental benefits. The slightly lower score could be due to limited access, perceived difficulty, or a lower personal interest in technical aspects of outdoor activities.

TABLE I
DESCRIPTIVE RESULT OF MOTIVATION IN OUTDOOR RECREATION

	Mean	SD	Rank
Experiencing Nature	4.71	0.441	1
Relaxation and Tranquillity	4.69	0.446	2
Challenge and Curiosity	4.68	0.473	3
Social Interaction with the Group	4.63	0.533	4
Using equipment and Developing Skills	4.60	0.591	5

B. Participation in Outdoor Recreation

The analysis in Table II shows that "Attraction" ($M = 4.71$, $SD = 0.459$) is the highest-ranked factor influencing students' participation in outdoor recreation, suggesting that students are primarily driven by the enjoyment, excitement, and overall appeal of outdoor activities. This indicates that recreational experiences that are fun and engaging are more likely to attract student involvement. In contrast, the lowest-ranked factor is "Centrality" ($M = 4.58$, $SD = 0.599$), implying that outdoor recreation is not viewed as a central or defining part of students' daily identity or lifestyle. Although the mean is still relatively high, this lower ranking may reflect that while students enjoy and value recreational activities, they do not necessarily consider them a core part of who they are or prioritize them above other life roles and responsibilities.

TABLE II
DESCRIPTIVE RESULT OF PARTICIPATION IN OUTDOOR RECREATION

	Mean	SD	Rank
Attraction	4.71	0.459	1
Social Bonding	4.70	0.461	2
Identity Expression	4.66	0.465	3
Identity Affirmation	4.66	0.481	4
Centrality	4.58	0.599	5

C. Relationship Between Motivation and Participation in Outdoor Recreation

The correlation analysis in Table III revealed a strong positive relationship between motivation and participation in outdoor recreation among students at UiTM Seremban 3, with a Pearson correlation coefficient of $r = 0.780$ and a p -value less than 0.001. This indicates that students who are more motivated are significantly more likely to engage in outdoor recreational activities. The strength and direction of the correlation suggest that as motivation increases, participation also tends to increase, confirming a meaningful and statistically significant link between these two variables in the student population.

TABLE III
RELATIONSHIP BETWEEN MOTIVATION AND PARTICIPATION IN OUTDOOR RECREATION

		Participation
Motivation	Pearson's r	0.780
	df	426
	p-value	<0.001
	N	428

D. Difference of Motivation Between Genders

The independent samples t-test results in Table IV indicate that there is no statistically significant difference in motivation between male ($M = 4.68$, $SD = 0.413$) and female ($M = 4.64$, $SD = 0.431$) participants, $t(426) = 1.09$, $p = 0.275$. Since the p -value is greater than the conventional alpha level of 0.05, we fail to reject the null hypothesis, suggesting that gender does not significantly influence motivation levels in this sample. However, the Shapiro-Wilk test for normality revealed a significant result ($W = 0.816$, $p < 0.001$), indicating a violation of the normality assumption. Despite this, given the large and equal sample sizes ($N = 214$ for each group), the t-test is considered robust to such violations, and the conclusion remains valid.

TABLE IV
COMPARISON BETWEEN GENDER ON MOTIVATION

	Group	N	Mean	Median	SD
Motivation	Male	214	4.68	5.00	0.413
	Female	214	4.64	4.73	0.431

IV. CONCLUSIONS

This study highlights a strong and significant relationship between motivation and participation in outdoor recreation among UiTM Seremban 3 students. The findings suggest that

students who are more motivated are more likely to engage actively in outdoor recreational activities. Understanding these motivational factors are essential in promoting healthier and more active lifestyles among university students. These insights can guide future programs and initiatives aimed at increasing student involvement in outdoor recreation, ultimately contributing to their physical, mental, and social well-being.

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The Relationship Between Leadership Styles of Tennis Coaches in Kuala Lumpur City Towards the Goal Focused Coaching Skills

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Keywords: Leadership styles, Tennis coaches, Kuala Lumpur, Goal-focused, Coaching skills

I. INTRODUCTION

This study investigates how tennis coaches in Kuala Lumpur apply leadership styles and how these styles influence goal-focused coaching skills among players. Addressing gaps in context-specific research, it explores culturally relevant leadership dimensions in Malaysia's urban tennis scene aiming to inform practical localized coach development. Findings may enhance leadership effectiveness and player development through targeted evidence-based recommendations.

II. METHODS

This quantitative non-experimental study used a structured questionnaire distributed to 157 randomly selected tennis coaches in Kuala Lumpur. The survey measured leadership styles and goal-focused coaching skills using validated Likert-scale instruments. Data were analyzed with Jamovi 2.6, applying descriptive statistics for identification and assessment and Pearson correlation to examine relationships between variables.

III. RESULTS AND DISCUSSION

A. Leadership Styles

Democratic ($M = 3.86$) and Visionary ($M = 3.85$) styles ranked highest among Kuala Lumpur tennis coaches, followed closely by Coaching ($M = 3.80$). Affiliative, Commanding, and Pacesetting styles were less favoured. These results suggest a preference for collaborative player-centred leadership though some variation remains across coaching levels and demographic backgrounds.

B. Goal-focused Coaching Skills

Tennis coaches in Kuala Lumpur showed high levels of goal-focused coaching skills particularly in Working Alliance ($M = 3.92$) and Goal Setting ($M = 3.87$). Moderate scores were found in Solution Force, Managing Process and Accountability, and Outcome of Coaching indicating strengths in relationship-building but room for improvement in implementation and follow-through practices.

C. The Relationship Between Leadership Styles That Tennis Coaches Applied for Their Goal-Focused Coaching Skills Among Players in Kuala Lumpur City

A strong positive and statistically significant relationship was found between leadership styles and goal-focused coaching skills ($r = 0.916$, $p < 0.001$). This suggests that more effective leadership styles are closely associated with higher levels of coaching skill. Emphasizing leadership development may significantly enhance tennis coaching outcomes in Kuala Lumpur.

TABLE I
LEADERSHIP STYLES OF TENNIS COACHES

	Mean	SD	Ranking
Democratic	3.86	1.172	1
Visionary	3.85	1.164	2
Coaching	3.80	1.190	3
Affiliative	3.78	1.191	4
Commanding	3.66	0.837	5
Pacesetting	3.65	0.833	6

*Significantly different from Pre-NC ($p < 0.05$).

TABLE II
LEVEL OF GOAL-FOCUSED COACHING SKILLS

Variable	Mean	Level
Outcome of Coaching	3.33	Moderate
Working Alliance	3.92	High
Solution Force	3.64	Moderate
Goal Setting	3.87	High
Managing Process and Accountability	3.36	Moderate

TABLE III
THE RELATIONSHIP BETWEEN LEADERSHIP STYLES THAT TENNIS COACHES APPLIED FOR THEIR GOAL-FOCUSED COACHING SKILLS AMONG PLAYERS IN KUALA LUMPUR CITY

Goal-focused coaching skills		
Leadership Styles of Tennis coaches	Pearson's r	0.916
	p-value	<0.001
	N	157

IV. CONCLUSIONS

Leadership styles significantly influence goal-focused coaching skills among tennis coaches in Kuala Lumpur. Democratic and Coaching styles correlate strongly with effective coaching practices. These findings highlight the importance of cultivating collaborative and emotionally intelligent leadership in coach development programs to enhance athlete progress and long-term performance outcomes.

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Effects of Work Stress on Mental Health Among Employees at KBS Putrajaya

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Keywords: Work stress, Mental health, Gender differences, Government employees, KBS Putrajaya

I. INTRODUCTION

Work-related stress has become a critical factor influencing employee mental health, particularly in high-demand government sectors. This study examines the relationship between work stress and mental health among employees at KBS Putrajaya, aiming to assess stress levels, mental health conditions, and gender-based differences. The findings offer valuable insights for organizational interventions to support employee well-being [1][2][3].

II. METHODS

A total of 241 employees from KBS Putrajaya were selected via simple random sampling. Work stress was measured using the GWSS-9, and mental health using the DASS-21. Descriptive statistics identified stress and mental health levels. Linear regression examined the effect of work stress on mental health. Independent t-tests were used to assess gender differences in work stress [2][4].

III. RESULTS AND DISCUSSION

A. Work Stress

Suicide cognition ranked highest ($M = 2.38$, 40.8%), followed by hopelessness ($M = 2.30$, 38.5%), and job satisfaction ($M = 2.37$, 20.7%). These findings suggest suicide cognition is the most prominent concern. The instrument showed strong internal consistency ($\alpha = 0.864$), supporting the reliability of the psychological constructs assessed in the study.

TABLE I
DESCRIPTIVE STATISTIC OF WORK STRESS

Variable	Mean	Percentage	Rank
Suicide Cognition	2.38	40.8%	1
Job Satisfaction	2.37	20.7%	2
Hopelessness	2.30	38.5%	3

B. Mental Health

Depression scored highest ($M = 1.76$, 34%), followed by anxiety and stress ($M = 1.70$, 33% each), indicating a slightly higher prevalence of depressive symptoms. The internal reliability of the scale was excellent ($\alpha = 0.881$), confirming consistent measurement across emotional distress variables among participants.

TABLE II
DESCRIPTIVE STATISTIC OF MENTAL HEALTH

Variable	Mean	Percentage	Rank
Depression	1.75	34%	1
Stress	1.70	33%	2
Anxiety	1.70	33%	3

C. Effects of Work Stress and Mental Health

The regression analysis revealed a statistically significant model ($p < 0.001$), with work stress and mental health explaining 76.5% of the variance in suicide cognition ($R = 0.874$, $R^2 = 0.765$). This strong predictive power underscores the substantial influence of occupational and psychological factors on employees' suicide-related thoughts at KBS Putrajaya.

TABLE III
LINEAR REGRESSION BETWEEN WORK STRESS AND MENTAL HEALTH

Model	R	R ²	p
1	0.874	0.765	<0.001

D. Age Differences

Independent t-test results showed a significant gender difference in work stress among KBS Putrajaya employees ($df = 259$, $p < 0.001$). Female employees reported significantly higher work stress ($M = 2.46$, $SD = 0.887$) than males ($M = 2.04$, $SD = 0.961$), indicating that gender plays a meaningful role in perceived occupational stress.

TABLE IV
INDEPENDENT T-TEST ANALYSIS GENDER DIFFERENCE ON WORK STRESS

Variable	Group	N	Mean (SD)	df	p
Work Stress	Male	68	2.04 (.961)	259	<0.001
	Female	193	2.46 (.887)		

IV. CONCLUSIONS

The findings of this study highlight the significant relationship between work-related stress and mental health among employees at KBS Putrajaya. Elevated stress levels, as measured by the GWSS-9, were associated with higher

indicators of depression, anxiety, and stress as identified through the DASS-21. These results are consistent with previous research indicating that workplace stress is a critical predictor of poor psychological outcomes, particularly in high-demand public sector environments [1][3]. Moreover, gender differences in stress levels underscore the need for targeted interventions that consider the unique pressures experienced by male and female employees [4][5]. The use of validated instruments such as the DASS-21 ensures reliable assessment of mental health conditions across gender groups [2]. These findings support the development of organizational policies and mental health programs aimed at reducing work stress and promoting employee well-being within government sectors.

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An Investigation of Leisure Motivation Among Visitors at Taman Perbandaran Tengku Anis

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Keywords: Leisure motivation, Park visitors, Intrinsic motivation, Gender differences, Leisure behaviour analysis

I. INTRODUCTION

Understanding leisure motivation is vital for designing inclusive public spaces. This study investigates leisure motivation among visitors at Taman Perbandaran Tengku Anis, focusing on overall levels and variations by gender, age, and visitation frequency. The findings aim to inform park management strategies that support diverse visitor needs and encourage greater public engagement with urban green spaces.

II. METHODS

This study employed a quantitative, non-experimental survey method using 336 respondents selected after determining the sample size using G*Power. A structured questionnaire comprising demographics and the 28-item Leisure Motivation Scale (LMS-28) was used [1]. Descriptive analysis identified motivation levels, while independent sample t-tests and one-way ANOVA examined differences by gender, age, and visitation frequency.

III. RESULTS AND DISCUSSION

A. Overall Leisure Motivation

Visitors exhibited moderate to high leisure motivation ($M = 4.63$), with intrinsic motivation highest ($M = 4.87$), followed by extrinsic ($M = 4.81$). Amotivation was lowest ($M = 3.36$), indicating that visitors are largely driven by internal enjoyment and purpose. These findings highlight a generally motivated user base, suggesting park features support meaningful engagement.

TABLE I
OVERALL LEISURE MOTIVATION

	N	Missing	Mean	Median	SD	Minimum	Maximum
INTRINSIC	336	0	4.87	5.92	1.77	1.58	7.00
EXTRINSIC	336	0	4.81	5.67	1.40	2.25	7.00
AMOTIVATION	336	0	3.36	2.75	1.90	1.00	7.00

B. Leisure Motivation Based on Gender

Significant gender differences emerged. Females scored higher in intrinsic ($M = 5.03$) and extrinsic motivation ($M = 4.94$), while males reported higher amotivation ($M = 3.81$). This suggests women are more purpose-driven in their park use. These findings, with small-to-moderate effect sizes, indicate that females are more positively engaged in park activities [2], while males may face motivational barriers.

TABLE I
LEISURE MOTIVATION BASED ON GENDER

	Group	N	Mean	Median	SD	SE
INTRINSIC	Female/ Perempuan	192	5.03	5.92	1.69	0.1221
	Male/ Lelaki	144	4.66	5.46	1.84	0.154
EXTRINSIC	Female/ Perempuan	192	4.94	5.75	1.34	0.0964
	Male/ Lelaki	144	4.63	5.04	1.47	0.122
AMOTIVATION	Female/ Perempuan	192	3.02	2.50	1.79	0.1293
	Male/ Lelaki	144	3.81	3.63	1.95	0.162

C. Leisure Motivation Among Different Age Groups

All three motivation types varied significantly by age. Young adults (18–25) reported the highest intrinsic ($M=5.33$) and extrinsic motivation ($M=5.14$). Meanwhile, the 26–35 group had the highest amotivation ($M=3.74$). Younger visitors appear most engaged, with motivation declining with age. Tailored programming could help re-engage older age groups. These results suggest that younger visitors are more purposefully motivated in their park engagement [3].

TABLE I
LEISURE MOTIVATION AMONG DIFFERENT AGE GROUPS

	Age	N	Mean	SD	SE
INTRINSIC	18 - 25 years old/ 18 - 25 tahun	141	5.33	1.35	0.1136
	26 - 35 years old/ 26 - 35 tahun	89	4.55	1.96	0.2080
	36 - 45 years old/ 36 - 45 tahun	68	4.63	1.94	0.2358
	46 years old and above/ 46 tahun dan keatas	38	4.34	1.98	0.3206
EXTRINSIC	18 - 25 years old/ 18 - 25 tahun	141	5.14	1.09	0.0915
	26 - 35 years old/ 26 - 35 tahun	89	4.56	1.57	0.1668
	36 - 45 years old/ 36 - 45 tahun	68	4.63	1.50	0.1824
	46 years old and above/ 46 tahun dan keatas	38	4.47	1.59	0.2587
AMOTIVATION	18 - 25 years old/ 18 - 25 tahun	141	3.02	1.68	0.1416
	26 - 35 years old/ 26 - 35 tahun	89	3.74	2.04	0.2167
	36 - 45 years old/ 36 - 45 tahun	68	3.33	1.99	0.2410
	46 years old and above/ 46 tahun dan keatas	38	3.77	1.97	0.3191

D. Leisure Motivation Based on Frequency of Visitation

Frequency of visitation strongly influenced motivation. Visitors attending 6+ times weekly reported highest intrinsic ($M = 5.60$) and extrinsic motivation ($M = 5.39$), with lowest amotivation ($M = 2.49$). Motivation declines with less frequent visits. This suggests stronger leisure commitment and satisfaction among regular users of the park [4].

TABLE IV
LEISURE MOTIVATION BASED ON FREQUENCY OF VISITATION

	Frequency	N	Mean	SD	SE
INTRINSIC	1 time per week/ Sekali seminggu	98	4.76	1.615	0.163
	2-3 times per week/ 2-3 kali seminggu	106	4.36	1.940	0.188
	4-5 times per week/ 4-5 kali seminggu	47	4.94	1.854	0.270
	6 or more times per week/ 6 atau lebih kali seminggu	85	5.60	1.397	0.151
EXTRINSIC	1 time per week/ Sekali seminggu	98	4.71	1.288	0.130
	2-3 times per week/ 2-3 kali seminggu	106	4.33	1.636	0.159
	4-5 times per week/ 4-5 kali seminggu	47	5.05	1.309	0.191
	6 or more times per week/ 6 atau lebih kali seminggu	85	5.39	0.969	0.105
AMOTIVATION	1 time per week/ Sekali seminggu	98	3.75	1.854	0.187
	2-3 times per week/ 2-3 kali seminggu	106	3.84	1.987	0.193
	4-5 times per week/ 4-5 kali seminggu	47	3.00	1.782	0.260
	6 or more times per week/ 6 atau lebih kali seminggu	85	2.49	1.559	0.169

IV. CONCLUSIONS

Findings highlight strong intrinsic and extrinsic motivation among visitors, especially females, younger individuals, and frequent park users. Motivation significantly varies by gender, age, and visitation frequency. These insights can inform targeted park programming to enhance visitor engagement and support active, meaningful recreational use.

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Investigating Coaching Style and Athlete Satisfaction in a Malaysian Football Academy

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Keywords: Coaching style, Athlete satisfaction, Football academy, Training and instruction

I. INTRODUCTION

Understanding how coaching styles affect athlete satisfaction is vital for optimizing player development and performance. This study explores the coaching approaches practiced in Sungai Merab Football Academy and evaluates how these influence athletes' satisfaction levels [1]. By examining the relationship between coaching style and satisfaction, this research aims to inform more effective, athlete-cantered coaching practices within youth football academies.

II. METHODS

Data were collected using an online questionnaire distributed via Google Forms to players from the Sungai Merab Football Team, aged under 16 years old and above. The instrument measured coaching style and athlete satisfaction. Descriptive statistics (mean and standard deviation) and Pearson correlation analysis were used to identify patterns and examine the relationship between coaching style and athlete satisfaction.

III. RESULTS AND DISCUSSION

A. Coaching Style

The most preferred coaching style was Training and Instruction ($M = 4.37$, $SD = 0.52$), followed by Positive Feedback ($M = 4.04$, $SD = 0.73$) and Social Support ($M = 3.98$, $SD = 0.62$). Democratic Behavior scored ($M = 3.80$, $SD = 0.82$). Autocratic behaviour scored lowest ($M = 3.10$, $SD = 1.04$). These results indicate that athletes favour instructional and supportive coaching approaches, suggesting a diverse but performance-oriented coaching environment in Sungai Merab Football Academy.

TABLE I
COACHING STYLE

Variables	Mean	Standard Deviation
Training and Instruction	4.37	0.52
Positive Feedback	4.04	0.73
Social Support	3.98	0.62
Democratic Behavior	3.80	0.82
Autocratic Behavior	3.10	1.04

B. Athlete Satisfaction

Players showed a high overall satisfaction level ($M = 5.79$, $SD = 0.81$), with no standout dissatisfaction areas. However, age-related trends were observed, implying that satisfaction may vary with developmental stage. This indicates that while coaching generally meets expectations, age-specific needs and perceptions of coaching effectiveness should be more closely considered.

TABLE II
ATHLETE SATISFACTION

	Mean	Standard Deviation
Athlete Satisfaction	5.79	0.81

C. Relationship Between Coaching Style and Athlete Satisfaction

A moderate positive relationship was found between Coaching Style and Athlete Satisfaction ($r = 0.46$, $p < 0.001$). Training and Instruction style had the strongest association. This implies that clear, structured coaching enhances player satisfaction. The statistically significant result confirms that coaching style plays a meaningful role in shaping athlete experience.

TABLE III
RELATIONSHIP BETWEEN COACHING STYLE AND ATHLETE SATISFACTION

Athlete Satisfaction	Coaching Style	
	Pearson's R	0.46
	Sig. (2-tailed)	< 0.01
	N	51

IV. CONCLUSIONS

This study confirms that coaching style significantly influences athlete satisfaction in the Sungai Merab Football Academy. Training and Instruction emerged as the most effective style. These findings highlight the importance of adopting structured and supportive coaching methods to foster positive athlete experiences and development in football training environments.

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The Correlation Between Motivation and Burnout Among Runners in Nismilan Runners Club

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Keywords: Community sports clubs, Running motivation, Motivational regulation, Endurance sports, Performance psychology

I. INTRODUCTION

Motivation is key to keeping athletes involved in their sport. However, the link between motivation and burnout is not well studied in community running groups. This study looks at the types of motivation affecting members of the Nismilan Runners Club. It also measures their burnout levels and explores the connection between these two aspects. The goal is to shed light on the mental strength and well-being of recreational runners.

II. METHODS

This is quantitative research, non-experimental study using a descriptive design with validated questionnaires, the Sport Motivation Scale-II (SMS-II) and Athlete Burnout Questionnaire, distributed online through Google Form. Participants from the Nismilan Runners Club filled out the structured surveys. Descriptive statistics assessed motivation types and burnout levels. Pearson correlation analysis examined the relationship between motivation and burnout.

III. RESULTS AND DISCUSSION

A. Motivation

Findings show that Identified Regulation ($M = 5.24$) and Integrated Regulation ($M = 5.21$) were the most common motivation types among runners. Amotivation was reported the lowest ($M = 3.09$). Intrinsic motivation types were consistently higher, indicating strong self-driven goals among participants.

TABLE I
DESCRIPTIVE ANALYSIS OF MOTIVATION

	Mean	SD	Rank
Identified Regulation	5.24	1.25	1
Integrated Regulation	5.21	1.33	2
Introjected Regulation	5.07	1.13	3
Intrinsic Regulation	5.04	1.17	4
External Regulation	5.01	1.71	5
Non-Regulation / Amotivation	3.09	0.97	6

B. Burnout

Burnouts indicated were low. Reduced Accomplishment had a mean score of ($M = 2.28$), which was slightly higher than Sport Devaluation at ($M = 2.20$) and Exhaustion at ($M = 2.12$). This suggests that, while burnout is present, its intensity is moderate. This may be due to strong intrinsic motivation and community support within the club.

TABLE II
DESCRIPTIVE ANALYSIS OF BURNOUT

	Mean	SD	Rank
Reduced Accomplishment	2.28	0.78	1
Sport Devaluation	2.20	0.87	2
Exhaustion	2.12	0.89	3

C. Motivation and Burnout

A strong negative correlation was found between motivation and burnout, $r = -0.651$, $p < 0.001$. This means that higher motivation, especially intrinsic motivation, greatly reduces the risk of burnout. These results support Self-Determination Theory and confirm that motivation plays a protective role in maintaining athletes' psychological well-being.

TABLE III
RELATIONSHIP BETWEEN MOTIVATION AND BURNOUT

Burnout	Motivation	
	Pearson's R	-0.65
	Sig. (2-tailed)	<0.01
	N	173

IV. CONCLUSIONS

This study confirms a strong inverse relationship between motivation and burnout among runners. As intrinsic motivation was at its peak, burnout levels remained moderate. Findings emphasize the strong impact of motivation on athlete wellness and the need to cultivate self-driven motivational elements in community-based sports programs.

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Exploring Mental Toughness and Hiking Participation Among Hikers at Gunung Datuk Eco Forest Park

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Keywords: Mental toughness, Adventure hiking, Motivation, Gender differences, Participation frequency

I. INTRODUCTION

Mental toughness (MT) plays a vital role in endurance-based recreation such as adventure hiking. However, limited research has explored MT among hikers in natural forest settings. This study examines MT levels, its contributing factors, gender-based differences, and its relationship with hiking frequency among hikers at Gunung Datuk Eco Forest Park, aiming to bridge gaps in psychological resilience studies within outdoor recreational contexts.

II. METHODS

Data were collected via an online questionnaire using the Adventure-Based Mental Toughness Inventory (ABMTI). A total of 157 hikers participated, selected using the Krejcie and Morgan formula for a population of 200, with an added 20% buffer to ensure validity. One outlier was removed after normality testing. Participants were drawn from attendees of the Gunung Datuk ASEAN Summit Attack 2025 event.

III. RESULTS AND DISCUSSION

A. Level of Mental Toughness

Hikers at Gunung Datuk Eco Forest Park demonstrated a high level of mental toughness ($M = 4.25$, $SD = 0.58$), with motivation emerging as the strongest dimension. This elevated motivation likely reflects hikers' personal goals, such as achieving fitness, overcoming challenges, and enjoying scenic experiences promoted on social platforms.

B. Factors of Mental Toughness

Motivation was the most dominant factor influencing mental toughness ($M = 4.36$, $SD = 0.62$). Its prominence may be attributed to hikers' intrinsic and extrinsic goals, especially the appeal of nature exploration and social media-driven aspirations.

C. Gender Differences in Mental Toughness

No significant gender differences in mental toughness were found ($p = 0.799$), although males showed slightly higher scores. The similarity suggests that adventure hiking equally cultivates psychological resilience across genders, possibly due to shared environmental and physical challenges.

TABLE I
GENDER DIFFERENCES IN MENTAL TOUGHNESS

Variable	Group	N	$\bar{X}$	t	df	p
Mental Toughness	Female	78	4.2390	-0.255	155	0.799
	Male	79	4.2625			

*Note. p -value < 0.01

D. Mental Toughness-Hiking Frequency Relationship

A moderate positive relationship ($r = 0.324$, $p = 0.001$) was found between mental toughness and hiking frequency. This suggests that frequent hikers develop higher resilience, potentially due to repeated exposure to physical and mental demands during outdoor hiking.

TABLE II
MENTAL TOUGHNESS-HIKING FREQUENCY RELATIONSHIP

Mental Toughness	Hiking Frequency	
	Correlation Coefficient	0.324
	Sig. (2-tailed)	0.001
	N	157

*Note. p -value < 0.01 level (2-tailed)

IV. CONCLUSIONS

Hikers at Gunung Datuk Eco Forest Park exhibit very high mental toughness, especially in motivation. No gender differences were found, but frequent hiking correlates moderately with toughness. These findings highlight adventure hiking as a meaningful context for building resilience through motivation and repeated physical-mental engagement.

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Relationship of Motivation and Marathon Runners Satisfaction Among Ampang Run Club

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Keywords: Runner motivation, Athlete satisfaction, Endurance sport psychology, Recreational running, Club participation behavior

I. INTRODUCTION

This study explores the relationship between motivation and satisfaction among marathon runners in the Ampang Run Club. By identifying motivational factors and evaluating satisfaction levels, the research aims to reveal how psychological drivers influence overall runner contentment. Understanding these connections can help inform club strategies to enhance member experiences and retention.

II. METHODS

Data were collected using an online Google Form distributed to 260 Ampang Run Club members through a quantitative, non-experimental survey approach. Participants were selected using voluntary response sampling. Descriptive statistics were applied to identify key motivational factors and satisfaction levels, while Pearson correlation analysis was used to examine the relationship between motivation and satisfaction.

III. RESULTS AND DISCUSSION

A. Motivation

Physical health was the strongest motivational factor ($M = 5.22$), followed by psychological motives and achievement. Social motives ranked lowest. The data indicate both intrinsic and extrinsic motivations influenced participation. Notably, motivational patterns varied across age and gender, revealing more diverse motivational drivers among younger and female runners.

TABLE I
MOTIVATION

	Mean	SD	Rank
Physical Health	5.22	1.55	1
Psychological Motives	5.00	1.58	2
Achievement	4.93	1.59	3
Social Motives	4.77	1.64	4

B. Athlete Satisfaction

The overall satisfaction level was high ($M = 5.03$). Runners expressed the greatest satisfaction with the coach's play choices during competitions. Despite differences in

motivation, no significant variations in satisfaction were observed across demographic groups, suggesting consistent positive experiences among members regardless of background.

TABLE II
ATHLETE SATISFACTION

Variables	Mean	SD
Athlete Satisfaction	5.03	1.51

C. Motivation and Athlete Satisfaction

There was a strong, statistically significant correlation between motivation and satisfaction ($r = 0.94$, $p < 0.005$). This suggests motivation is a key determinant of satisfaction, energizing behavior and generating positive emotional outcomes that enhance overall running experiences and commitment.

TABLE III
RELATIONSHIP MOTIVATIONA AND ATHLETE SATISFACTION

Athlete Satisfaction	Motivation	
	Pearson's R	0.94
	P- value	< 0.05
	N	260

IV. CONCLUSIONS

Motivation significantly influences satisfaction among Ampang Run Club runners, with physical health and psychological motives being primary drivers. High satisfaction levels suggest effective engagement strategies. The strong correlation between motivation and satisfaction highlights the need for tailored programs that enhance intrinsic and extrinsic motivations to sustain long-term participation.

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The Impact of Facility Quality and Customer Satisfaction at Arena Sukan Kuala Lumpur

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Keywords: Facility quality, Customer satisfaction, Sports facility management, SERVQUAL, Kuala Lumpur

I. INTRODUCTION

Facility quality plays a vital role in enhancing customer satisfaction in the sports industry [1]. This study investigates key facility quality factors and evaluates customer satisfaction levels at Arena Sukan Kuala Lumpur [2]. By analyzing the relationship between facility quality and satisfaction, the research seeks to provide actionable insights for facility management and service improvement in sports venues.

II. METHODS

This study used a quantitative approach with an online questionnaire distributed via Google Forms to Arena Sukan Kuala Lumpur customers. A convenience sampling method yielded 182 valid responses over two months [5]. Descriptive statistics, Pearson correlation, and linear regression analyses were performed using JAMOV to identify key facility quality factors, measure customer satisfaction, and examine their relationship and impact.

III. RESULTS AND DISCUSSION

A. Facility Quality

Empathy was the most valued facility quality factor, followed closely by tangibles, responsiveness, and assurance. Reliability was rated slightly lower. This suggests that customers appreciate caring service and quality facilities. Management should focus on maintaining empathetic interactions and enhancing physical facilities to meet customer expectations at Arena Sukan Kuala Lumpur. Using the SERVQUAL method to evaluate the services [3].

TABLE I
FACILITY QUALITY

	Mean	SD
Tangibles	3.82	1.25
Reliability	3.77	1.20
Responsiveness	3.82	1.24
Assurance	3.82	1.25
Empathy	3.83	1.23

B. Level of Customer Satisfaction

Customer satisfaction was found to be moderate, with a mean score of 3.03. While customers are generally satisfied, areas like equipment condition and space organization require improvement. The low standard deviation indicates consistency across responses, suggesting that most users share

similar satisfaction levels and concerns regarding the facility. Using the CSQ8-scale [4].

TABLE II
LEVEL OF CUSTOMER SATISFACTION

	Mean	SD
Customer Satisfaction	3.03	0.819

C. Examine the Relationship Between Facility Quality and Customer Satisfaction

Pearson correlation analysis revealed a very strong, statistically significant positive relationship between facility quality and customer satisfaction ($r = 0.978, p < 0.001$). This finding confirms that improving facility quality directly enhances customer satisfaction, emphasizing the importance of continuous investment in facility quality for customer retention and loyalty at Arena Sukan Kuala Lumpur.

TABLE II
RELATIONSHIP BETWEEN FACILITY QUALITY AND CUSTOMER SATISFACTION

Customer Satisfaction		
Facility Quality	Pearson's r	0.978
	df	209
	p-value	<0.001

D. Examine Whether Facility Quality has a Significant Effect on Customer Satisfaction

Linear regression results demonstrated that facility quality significantly affects customer satisfaction, explaining 95.7% of its variance ($R^2 = 0.957$). This indicates that facility quality is a dominant factor influencing customer satisfaction, highlighting the need for Arena Sukan Kuala Lumpur to prioritize facility improvements to sustain and boost satisfaction levels.

TABLE I
LINEAR REGRESSION

Model	R	R ²
1	0.978	0.957

IV. CONCLUSIONS

This study confirmed that facility quality strongly influences customer satisfaction at Arena Sukan Kuala Lumpur. Empathy and well-maintained facilities are highly valued by users. Continuous improvements in facility quality are essential for enhancing customer satisfaction and sustaining competitive advantage in the sports facility industry.

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Analysing Mental Toughness Level Across Demographic Factors Among Gunung Angsi Hikers

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Keywords: Mental toughness, Demographic factors, Hiking, Outdoor recreation, Adventure-based

I. INTRODUCTION

This study explores mental toughness among hikers at Gunung Angsi by examining its differences among gender, marital status, and occupation. Unlike previous research focused on athletes [1][2], and employees [3], this study addresses gaps in outdoor recreation contexts. Using the AbMTI tool, it evaluates psychological resilience across diverse demographic profiles, aiming to enhance performance strategies and support systems in outdoor activities.

II. METHODS

This quantitative study employed convenience sampling to recruit 240 hikers at Gunung Angsi. Data were collected using the validated Adventure-based Mental Toughness Inventory (AbMTI), which measures seven mental toughness dimensions [4]. Descriptive statistics were computed, while inferential analysis of Independent t-test and ANOVA were conducted using JAMOV software to assess differences in mental toughness across gender, marital status, and occupation.

III. RESULTS AND DISCUSSION

A. Demographic Factors

The sample consisted of 240 hikers, nearly equally split between males (49.6%) and females (50.4%). The most represented age group was 18–27 years old (29.6%). The most common occupation was employed individuals (40.0%), and the majority were single (42.9%). Most hikers have 7-9 years' experience in hiking (27.9%) and hikes 1-2 times a month (37.5%). This indicates a predominantly young, working, and unmarried hiking population, with experienced but rarely hikes.

B. Mental Toughness

The overall mean mental toughness score was 3.83, reflecting a high level of psychological resilience among hikers. Among the seven AbMTI domains, Control had the highest mean scores (3.86), while Coping Skills recorded the lowest (3.80), suggesting most hikers excel in regulating emotions, energy, and attitudes under pressure but may need support in managing stress effectively.

C. Gender Difference in Mental Toughness

Female hikers ($M = 3.87$) had a slightly higher mental toughness mean than male ($M = 3.80$), but the difference was

not statistically significant ($t(238) = -0.581, p = 0.562$). These findings suggest that gender does not significantly influence mental toughness in adventure-based activities ($p > 0.05$).

TABLE I
MENTAL TOUGHNESS DIFFERENCE ON GENDER

	Group	N	Mean	t	df	p
Mental Toughness	Male	119	3.80	-0.581	238	0.562
	Female	121	3.87			

D. Marital Status Difference in Mental Toughness

Single individuals had the highest mean mental toughness ($M = 4.06$), while the lowest was widow ($M = 3.42$). A significant difference was found between single and divorcees, and between single and widows ($p < 0.05$). This suggests that marital status does affect mental toughness in adventure-based activities.

TABLE II
MENTAL TOUGHNESS DIFFERENCE ON MARITAL STATUS

		Single	Married	Divorcee	Widow
Single	Mean	—	0.267	0.531	0.641
	difference p-value	—	0.230	0.014	0.014
Married	Mean	—	—	0.265	0.374
	difference p-value	—	—	0.504	0.312
Divorcee	Mean	—	—	—	0.110
	difference p-value	—	—	—	0.966
Widow	Mean	—	—	—	—
	difference p-value	—	—	—	—

E. Occupation Difference in Mental Toughness

Occupation showed significant effects: unemployed individuals scored lowest ($M = 2.82$), while retirees scored highest ($M = 4.11$). The findings showed a significant difference with unemployed exhibiting lower mental toughness compared to other groups ($p < 0.05$). Employment status may influence an individual's capacity to manage psychological resilience in adventure-based activities.

TABLE III
MENTAL TOUGHNESS DIFFERENCE ON OCCUPATION

		Student	Employed	Un- employed	Self- employed	Retiree
Student	Mean difference p-value	— —	-0.329 0.199	0.885 0.002	-0.3952 0.132	-0.4119 0.099
Employed	Mean difference p-value		— —	1.214 < .001	-0.0666 0.989	-0.0833 0.973
Un- employed	Mean difference p-value			— —	-1.2803 < .001	-1.2970 < .001
Self- employed	Mean difference p-value				— —	-0.0167 1.000
Retiree	Mean difference p-value					— —

IV. CONCLUSIONS

This study highlights that while gender does not significantly influence hikers' mental toughness, marital status and occupation plays a key role. Student, employed, self-employed, and retired individuals show greater resilience than the unemployed. These insights can inform tailored support programs for enhancing psychological readiness in outdoor recreation settings.

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Examining Motivations to Participate in Hiking Activity Among Hiker at Gunung Datuk Negeri Sembilan

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Keywords: Hiking motivation, Intrinsic factors, Participation frequency, Gender differences

I. INTRODUCTION

Hiking participation in Malaysia has increased, yet little is known about the motivations driving hikers, particularly at specific locations like Gunung Datuk. This study explores motivational factors, participation frequency, and gender differences among hikers, aiming to understand how motivation relates to hiking frequency. The findings can inform outdoor recreation planning and promote healthier, active lifestyles through targeted strategies.

II. METHODS

Data was collected through an online Google Form distributed to hikers at Gunung Datuk. A total of 130 participants completed a structured questionnaire measuring hiking motivation and participation frequency. The instrument utilized a Likert scale to quantify motivational factors and frequency levels. Respondents were selected using convenience sampling, targeting individuals actively participating in hiking activities at the study location.

III. RESULTS AND DISCUSSION

A. Factors Influencing Hiking Motivation

Hikers at Gunung Datuk were primarily driven by intrinsic motivation, followed by extrinsic motivation and amotivation. Intrinsic factors such as enjoyment and challenge scored highest, confirming internal drivers as key. No unexpected findings were reported, reinforcing existing theories about self-driven motivations in outdoor recreation contexts.

B. Frequency of Hiking Participation

Hikers at Gunung Datuk were primarily driven by intrinsic motivation, followed by extrinsic motivation and amotivation. Intrinsic factors such as enjoyment and challenge scored highest, confirming internal drivers as key. No unexpected findings were reported, reinforcing existing theories about self-driven motivations in outdoor recreation contexts.

C. Gender Differences in Motivation

No significant motivational differences were found between male and female hikers. However, female hikers showed slightly higher overall motivation scores, particularly for health-related reasons. These insights may inform gender-sensitive strategies to promote hiking participation more effectively.

TABLE I
GENDER DIFFERENCES IN MOTIVATION

Variables	Group	N	Mean (SD)	t	df	p
Intrinsic Motivation	Male	60	4.59 (.666)	0.500	128	0.618
	Female	70	4.54 (.589)			
Extrinsic Motivation	Male	60	4.51 (.752)	2.087	128	0.039
	Female	70	4.22 (.821)			
Amotivation	Male	60	4.14 (1.438)	1.376	128	0.171
	Female	70	3.80 (1.355)			

D. Relationship Between Motivation and Participation Frequency

A weak but positive correlation existed between participation frequency and motivation. Intrinsic motivation was most strongly linked to frequent hiking. Low-frequency participants did not exhibit distinct motivational profiles, indicating that other variables may influence less frequent participation.

TABLE II
RELATIONSHIP BETWEEN MOTIVATION AND PARTICIPATION FREQUENCY

Frequency of participation activity per month		
Intrinsic Motivation	Pearson Correlation	0.013**
	Significant (2-tailed)	<0.001
	N	130
Extrinsic Motivation	Pearson Correlation	0.004**
	Significant (2-tailed)	<0.001
	N	130
Motivation	Pearson Correlation	0.001**
	Significant (2-tailed)	<0.001
	N	130

IV. CONCLUSIONS

Intrinsic motivation plays a key role in hiking participation at Gunung Datuk, with moderate frequency patterns and slight gender-based variations. A weak positive relationship exists between motivation and hiking frequency. These findings can support targeted strategies to promote recreational hiking and foster active lifestyles across demographic groups.

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The Relationship Between Physical Activity and Body Image Across Ages at Taman Tasik Titiwangsa Kuala Lumpur

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Keywords: Physical activity, Body image, Age differences, Urban recreation, Malaysian adults

I. INTRODUCTION

Body image and physical activity are interlinked but influenced by age-specific motivations and societal pressures. This study explores the relationship between physical activity and body image across different age groups at Taman Tasik Titiwangsa, Kuala Lumpur [1]. By addressing a lack of Malaysian-based, age-sensitive, and recreational-contextual research, this study aims to deepen understanding of how varying perceptions of body image relate to levels of physical activity in everyday public spaces.

II. METHODS

This study involved 377 participants aged 18 and above, selected through convenience sampling at Taman Tasik Titiwangsa, Kuala Lumpur. Physical activity was measured using the Godin Leisure-Time Exercise Questionnaire, while body image was assessed using the Body Image–Acceptance and Action Questionnaire. Data were collected throughout May 2025 during on-site interactions with adult park visitors who voluntarily agreed to participate in the study.

III. RESULTS AND DISCUSSION

A. Physical Activity Levels Across Age Groups

To determine physical activity levels across age groups, ANOVA analysis was conducted. Results showed no significant differences ($p = 0.564$), suggesting uniform engagement across all ages. Contrary to expectations, older adults were as active as younger ones, indicating that factors beyond age like environment or motivation may shape physical activity in urban parks.

TABLE I
PHYSICAL ACTIVITY LEVELS ACROSS AGE GROUP

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10.808	41	.264	0.949	0.564
Within Groups	93.035	335	0.278		
Total	103.843	376			

B. Body Image Perceptions Across Age Groups

To assess variations in body image across age groups, ANOVA revealed no significant differences ($p = 0.636$). Body image perceptions appeared stable across all adult ages. This

consistency challenges assumptions that younger individuals possess more positive body image and suggests widespread societal or cultural influences affecting body image across generations.

TABLE II
BODY IMAGE PERCEPTION ACROSS AGE GROUPS

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	17.834	41	0.435	0.907	0.636
Within Groups	160.613	335	0.479		
Total	178.446	376			

C. Relationship Between Physical Activity and Body Image

To examine the relationship between physical activity and body image, Pearson correlation showed a weak but significant positive association ($r = 0.125$, $p = 0.015$). While increased activity was linked to better body image, the small effect size implies that additional psychological or social variables also play key roles in shaping body perception.

TABLE III
RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND BODY PERCEPTION

	Body Image	
	Pearson Correlation	0.125*
	r	
	Sig. (2-tailed)	0.015
Physical Activity	N	377

* Correlation is significant at the 0.05 level (2-tailed).

D. Interaction Effects of Physical Activity Level and Age on Body Image

To analyse body image differences across physical activity levels and age, a two-way ANOVA revealed no significant effects ($p = 0.051$). Although marginal, the result hints at a possible trend. Without post hoc data, no clear group differences were identified, suggesting body image may not differ substantially by activity level or age group.

TABLE IV
INTERACTION EFFECT OF PHYSICAL ACTIVITY AND AGE ON BODY IMAGE

	Sum of Squares	df	Mean Square	F	Sig.
Regression	2.826	2	1.413	3.009	0.051 ^b
Residual	175.620	374	0.470		
Total	178.446	376			

IV. CONCLUSIONS

This study found no significant age-based differences in physical activity or body image among adults at Taman Tasik Titiwangsa. However, a weak positive correlation between the two suggests physical activity slightly enhances body image. Broader psychosocial influences may shape these outcomes more strongly than age or activity level alone.

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The Relationship Between Volunteer Motivation and Satisfaction Among University Students

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Keywords: Volunteer motivation, satisfaction, KPTM

I. INTRODUCTION

Volunteering is crucial for fostering social responsibility and assisting students in developing as individuals. A large number of university students do not actively participate in voluntary work [1]. This study focuses on examining a significant relationship between volunteer motivation and satisfaction, and to examine a significant difference between volunteer motivation among university students in term gender.

II. METHODS

A quantitative cross-sectional design with probability sampling and random sampling was used using a structured questionnaire distributed via Google Forms to students (BS101) at Kolej Poly-Tech Mara Bangi. The Volunteer Function Inventory (VFI) has six domains which are values, understanding, enhancement, career, protective, and social. To find trends and examine the relationship between volunteer motivation and satisfaction, Pearson correlation, and Independent T-Test analysis were employed.

III. RESULTS AND DISCUSSION

A. Volunteer Motivation

With a value of ($M = 4.92$, $SD = 1.77$), the table shows that the values component has the highest mean of all the volunteer motivation factors for sports students (BS101) of Kolej Poly-Tech Mara Bangi. Meanwhile, Social ($M = 4.77$, $SD = 1.73$) the lowest of all volunteer motivation factors for sports students (BS101) of Kolej Poly-Tech Mara Bangi. Motivation is a key construct when trying to understand an individual's decision to be a volunteer, thus a better understanding of the volunteer's motivation and characteristics will allow for better decision making [2].

B. Satisfaction

The table provided the descriptive statistic for satisfaction among university students with a value of ($M = 4.84$, $SD = 1.65$). So, the level of satisfaction among university students is high. The satisfaction of student volunteers was inferred based on how strongly they agreed with items aligned to each motivational dimension, as satisfaction is closely tied to the fulfillment of volunteer expectations and motivational functions [3].

C. Relationship Between Volunteer Motivation and Satisfaction

The results of the analysis showed that the two variables had a strong, positive, and statistically significant association ($r = 0.988$, $p < 0.001$, $df = 372$). Based on the result, the null hypothesis is rejected. the factor correlation is equal to or greater than 1, there is a severe problem of discriminant validity [2]. This suggestion is that Institutions are therefore encouraged to create volunteer programs that are suited to the interests of the students for instance, by providing chances for career growth, social awareness, and self-improvement. Programs that address students' main driving forces might boost their level of satisfaction and promote ongoing involvement.

D. Difference Between Volunteer Motivation in Terms of Gender

The independent samples t-test was conducted to compare volunteer motivation between male and female sports students (BS101) of Kolej Poly-Tech Mara Bangi. The result showed a reject hypothesis because of a significant difference, $t(370) = 2.34$, $p = 0.020$, indicating that female students ($M = 5.03$, $SD = 1.53$) reported higher motivation levels compared to male students compared to male students ($M = 4.62$, $SD = 1.78$). According to this study's findings, motivational differences for volunteering do exist between volunteer and non-volunteer students, female and male students, and students pursuing a service-oriented major and students pursuing a non-service-oriented major [4]. Volunteer activities should be customised to the interests of different genders because female students demonstrated higher levels of motivation. Emphasise social and value-based activities for women. Emphasise career-related and skill-building possibilities for men. This strategy can encourage balanced involvement and increase both groups' level of engagement.

TABLE I
VOLUNTEER MOTIVATION

Variables	Mean	Standard Deviation
Values	4.92	1.77
Career	4.91	1.63
Protective	4.84	1.62
Understanding	4.82	1.72
Enhancement	4.81	1.64
Social	4.77	1.73

TABLE II
SATISFACTION

	Mean	Standard Deviation
Satisfaction	4.84	1.65

TABLE III
RELATIONSHIP BETWEEN VOLUNTEER MOTIVATION AND SATISFACTION

Volunteer Motivation	Mental Toughness	
	Pearson's R	0.988
	Sig. (2-tailed)	<0.01
	N	372

TABLE IV
DIFFERENCE BETWEEN VOLUNTEER MOTIVATION IN TERMS GENDER

	Gender	N	t	df	Sig. (2-tailed)
Volunteer	Male	170	2.34	370	0.020
Motivation	Female	202			

IV. CONCLUSIONS

The results show that volunteer satisfaction and motivation are strongly correlated. Furthermore, happiness with motivation was the most significant factor affecting student volunteers, whereas contentment with volunteer tasks was the least significant factor. Overall, the analysis of the information gathered from the respondents produced the results of those study objectives. For future researchers, it is recommended to explore other demographic factors such as academic background, volunteering frequency, or cultural influences that may further shape volunteer motivation and satisfaction across different student populations.

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The Effect of Emotional Intelligence on Stress Management Among University Staff Involved in SUPSAT

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Keywords: Emotional intelligence, Stress management, University staff, Gender differences, SUPSAT

I. INTRODUCTION

Emotional Intelligence (EI) is increasingly recognized as a vital psychological factor in managing workplace stress [1][2] particularly within physically demanding and socially intense environments such as sports. This study examines the role of emotional intelligence in stress management among university staff who participated in the Kejohanan Sukan Antara Staf Pusat Sukan (SUPSAT). It also investigates gender differences in both emotional intelligence and stress management levels [3]. Understanding this relationship can inform institutional strategies for well-being support and performance optimization.

II. METHODS

This study adopted a quantitative, non-experimental research design using survey methodology. A total of 268 university staff members from various institutions who participated in SUPSAT were selected using non-probability convenience sampling. Data were collected using a structured online questionnaire that consisted of three sections: demographic information, emotional intelligence (using the Wang and Law Emotional Intelligence Scale) [4], and stress management (using the Perceived Stress Scale) [5]. Descriptive statistics (mean, standard deviation), linear regression, and independent t-tests were conducted using JAMOVI software to analyze the data and identify gender differences.

III. RESULTS AND DISCUSSION

A. Emotional Intelligence Among University Staff

Table I shows the descriptive analysis revealed that, among the four emotional intelligence domains, self-awareness scored the highest ($M = 3.85$, $SD = 1.22$), followed by social awareness ($M = 3.77$), self-management ($M = 3.76$), and relationship management ($M = 3.74$). These findings indicate that university staff are generally confident in recognizing their own emotions, though may face challenges in interpersonal relationship regulation, particularly under stressful conditions like SUPSAT.

TABLE I
EMOTIONAL INTELLIGENCE AMONG UNIVERSITY STAFF

	Mean	Sd	Rank
Self- Awareness	3.85	1.22	1
Social- Awareness	3.77	1.19	2
Self- Management	3.76	1.17	3
Relationship Management	3.74	1.18	4

B. Stress Management Among University Staff

Table II shows the average stress management score among university staff. The mean score was 2.74 with a standard deviation of 0.427, which means staff had a moderate ability to manage stress. This result suggests that although staff can handle stress to some level, they may still struggle during busy or demanding events like SUPSAT. More support or training in managing stress could help improve their overall well-being [6].

TABLE II
STRESS MANAGEMENT AMONG UNIVERSITY STAFF

	Mean	Sd
Stress Management	2.74	0.427

C. Effect of Emotional Intelligence on Stress Management

Table III presents the findings of a linear regression analysis conducted to examine the influence of emotional intelligence on stress management among university staff involved in SUPSAT. The analysis revealed a significant negative relationship between emotional intelligence and stress management. The model produced an R value of 0.718, indicating a strong correlation between the two variables. The R^2 value was 0.516, suggesting that emotional intelligence explains approximately 51.6% of the variance in stress management. These findings imply that higher emotional intelligence is associated with better stress management, highlighting its crucial role in coping with pressure during SUPSAT participation.

TABLE III
EFFECT OF EMOTIONAL INTELLIGENCE ON STRESS MANAGEMENT

Model	R	R ²
1	0.718	0.516

D. Significance of Gender Differences on Emotional Intelligence and Stress Management

Table IV indicates that male respondents scored higher in emotional intelligence ($M = 4.03$, $SD = 0.950$) compared to females ($M = 3.50$, $SD = 1.322$), suggesting a greater emotional awareness and regulation among men. However, in terms of stress management, females scored slightly higher ($M = 2.78$, $SD = 0.479$) than males ($M = 2.70$, $SD = 0.372$), indicating a marginally better ability to cope with stress. These differences, however, were not statistically significant.

TABLE IV
SIGNIFICANCE OF GENDER DIFFERENCES ON EMOTIONAL INTELLIGENCE AND STRESS MANAGEMENT

Variable	Group	N	Mean	Sd
Emotional Intelligence	Male	143	4.03	0.950
	Female	125	3.50	1.322
Stress Management	Male	143	2.70	0.372
	Female	125	2.78	0.479

IV. CONCLUSIONS

This study confirms that higher emotional intelligence is strongly associated with better stress management among university staff engaged in sports events like SUPSAT. Self-awareness appears to be a critical domain of EI that supports emotional regulation in high-stress environments. The study emphasizes the importance of implementing EI development programs within university structures to enhance staff well-being and productivity, regardless of gender.

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The Relationship Between Infrastructure Quality and Tourist Satisfaction at Tasik Villa International Resort Port Dickson

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Keywords: Infrastructure quality, Tourist satisfaction, Resort tourism, Gender differences, Port Dickson

I. INTRODUCTION

Infrastructure quality plays a critical role in shaping tourist experiences and satisfaction. This study explores the connection between infrastructure quality and tourist satisfaction at Tasik Villa International Resort, Port Dickson [1]. Despite the area's tourism potential, limited infrastructure development remains a barrier. By examining key infrastructure factors and demographic influences, this research aims to enhance understanding of service delivery and visitor satisfaction in resort-based tourism contexts.

II. METHODS

This quantitative descriptive study utilized primary data collected via Google Form questionnaires. A total of 406 tourists at Tasik Villa International Resort, selected through simple random sampling, participated. Data was analyzed using Jamovi software. Descriptive statistics (frequency and percentage) assessed demographics, infrastructure factors, and satisfaction levels. Pearson correlation tested the relationship between infrastructure and satisfaction, while independent t-tests examined gender-based differences.

III. RESULTS AND DISCUSSION

A. Infrastructure Quality

Tourists evaluated infrastructure across accommodation, accessibility, and amenities. Amenities scored highest ($M = 3.83$), followed by accommodation ($M = 3.82$) and accessibility ($M = 3.79$). Overall impressions were positive, with moderate variability ($SD = 1.20$), suggesting consistency in experiences but some variation in perceptions of infrastructure quality among visitors to the resort.

TABLE I
DESCRIPTIVE STATISTIC OF INFRASTRUCTURE QUALITY

Infrastructure quality	Mean	SD	Rank
Amenities	3.83	1.20	1
Accommodation	3.82	1.20	2
Accessibility	3.79	1.21	3

B. Tourist Satisfaction

Tourist satisfaction averaged 3.85 ($SD = 1.21$), reflecting moderate to high contentment. The higher satisfaction score relative to individual infrastructure elements indicates that

while infrastructure is influential, other factors such as service quality or ambiance may contribute meaningfully to visitor satisfaction. The spread of responses suggests general positivity with individual variances.

TABLE II
DESCRIPTIVE STATISTIC OF TOURIST SATISFACTION

	Mean	Level
Tourist satisfaction	3.85	Satisfied

C. Correlation Analysis

Pearson correlation analysis revealed a strong positive relationship ($r = 0.974$, $p < 0.001$) between infrastructure quality and tourist satisfaction. This statistically significant result implies that better infrastructure directly enhances visitor experiences. The strength of this relationship highlights infrastructure as a critical determinant of satisfaction at Tasik Villa International Resort.

TABLE III
RELATIONSHIP BETWEEN INFRASTRUCTURE QUALITY AND TOURIST SATISFACTION

Tourist Satisfaction		
Infrastructure Quality	Pearson's Correlation	0.974
	p-value	<0.001
	N	406

D. Gender Differences

Independent t-tests showed female tourists rated both infrastructure quality and satisfaction significantly higher than males. These gender-based differences were statistically significant ($p < 0.001$), indicating that perceptions vary across demographics. The findings suggest resort managers should consider gender-specific expectations when planning service improvements and infrastructure development strategies.

TABLE IV
GENDER DIFFERENCES ON INFRASTRUCTURE QUALITY AND TOURIST
SATISFACTION

Variables	Group	N	Mean (SD)	t	df	p
Infrastructure quality	Male	155	3.46 (1.16)	4.86	404	<0.001
	Female	251	4.04(1.15)			
Tourist satisfaction	Male	155	3.58(1.30)	3.55	404	<0.001
	Female	251	4.01(1.12)			

IV. CONCLUSIONS

This study confirms that infrastructure quality significantly influences tourist satisfaction at Tasik Villa International Resort [2]. Amenities, accommodation, and accessibility all contribute, with gender differences indicating varied perceptions. Strengthening infrastructure while addressing diverse visitor expectations can enhance satisfaction and sustain tourism competitiveness in Port Dickson's resort destinations.

ACKNOWLEDGEMENTS

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Physical Activity Level Among Jerantut Pahang Community

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Keywords: Physical activity, IPAQ-SF, Community health, Gender differences, Jerantut Pahang

I. INTRODUCTION

This study investigates physical activity levels among the Jerantut, Pahang community, focusing on overall participation, activity duration, and gender-based differences. Recognizing the rising concern over sedentary lifestyles in rural populations, this research seeks to provide localized data to inform community health interventions and promote active living in underserved areas.

II. METHODS

This quantitative, non-experimental study used a self-administered online survey, including the IPAQ-Short Form, to assess physical activity levels. A total of 380 participants from Jerantut, Pahang were selected using convenience sampling. The questionnaire, distributed from April to June 2025, captured demographic data and physical activity metrics including walking, moderate, and vigorous activities.

III. RESULTS AND DISCUSSION

A. Physical Activity Level

Most participants (53.4%) reported high physical activity levels, with 34.7% moderate and 11.8% low. This suggests a generally active community, consistent with IPAQ guidelines, though a small sedentary segment exists. These findings offer a positive outlook on rural activity patterns in Jerantut, with most residents exceeding minimum health recommendations.

B. Average Duration Time

Respondents engaged most frequently in walking (4.80 days/week), followed by moderate (3.60 days) and vigorous activity (2.88 days). Average session durations were 77.61, 92.38, and 83.73 minutes respectively. Despite active engagement, average sitting time was high (317.84 minutes/day), indicating notable sedentary behavior. Total mean MET-min/week was 4621.90, reflecting diverse but health-conscious activity patterns.

C. Gender Differences

Gender differences were statistically significant, with females comprising 68.9% of the low activity group and males dominating the high activity category. A Chi-square test confirmed the association ($p = 0.020$), emphasizing the influence of gender on physical activity patterns among Jerantut residents.

TABLE I
PHYSICAL ACTIVITY LEVEL AMONG JERANTUT COMMUNITY

	N	%
Low	45	11.8%
Moderate	132	34.7%
High	203	53.4%

TABLE II
AVERAGE DURATION SPENDS ON ACTIVITY AMONG JERANTUT COMMUNITY

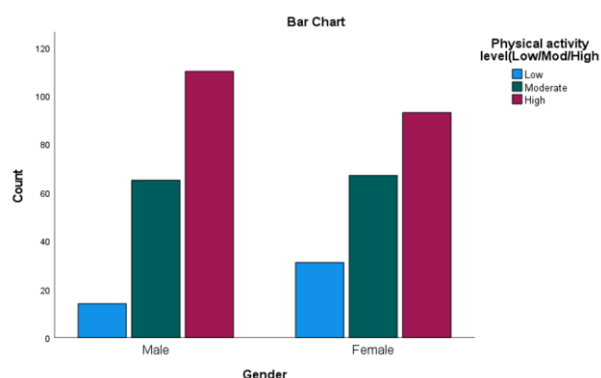
	N	Mean	Std. Deviation
Days of vigorous activity	380	2.88	2.088
Minutes of vigorous activity	380	83.73	78.391
Days of moderate activity	380	3.60	1.976
Minutes of moderate activity	380	92.38	62.874
Days walked	380	4.80	1.915
Minutes per walked	380	77.61	96.482
Minutes sitting per day	380	317.84	177.995
Total MET-min/week	380	4621.897	5080.0706
Valid N (listwise)	380		

TABLE III
PHYSICAL ACTIVITY LEVEL BETWEEN GENDER AMONG JERANTUT COMMUNITY

		Low	Moderate	High	Total
Male	Count	14	65	110	189
	% within Physical activity level	31.1%	49.2%	54.2%	49.7%
Female	Count	31	67	93	191
	% within Physical activity level	68.9%	50.8%	45.8%	50.3%
Total	Count	45	132	203	380
	% within Physical activity level	100.0%	100.0%	100.0%	100.0%

TABLE IV
CHI-SQUARE

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	7.866 ^a	2	0.020
Likelihood Ratio	8.030	2	0.018
Linear-by-Linear Association	6.638	1	0.010
N of Valid Cases	380		



IV. CONCLUSIONS

The study reveals that most Jerantut residents are physically active, though significant sedentary time remains. Gender, age, and job status influence activity levels, with males and students being more active. These insights can support targeted public health strategies to encourage physical activity across all demographic segments.

ACKNOWLEDGEMENTS

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The Effect of Coaching Behaviour Style on Players' Performance Among Negeri Sembilan Football Club

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Keywords: Coaching behaviour style, Players' performance, Negeri Sembilan Football Club, Coaching Behaviour Scale for Sport (CBS-S), Sport Performance Perceptions Scale (SPPS)

I. INTRODUCTION

This study investigates how different coaching behaviour styles impact football players' performance in Negeri Sembilan Football Club. Despite the crucial role of coaching, limited attention has been given to how coaching approaches influence athletes' success [1]. Addressing this gap, the research explores prevailing coaching styles, evaluates player performance levels, and examines their relationship to promote more effective coaching practices [5].

II. METHODS

Data were collected through structured questionnaires comprising three sections. The sample included 97 players from Negeri Sembilan Football Club. Descriptive statistics were applied to analyze coaching style practices and player performance levels. Pearson correlation analysis was used to examine the relationship between coaching style and player performance.

III. RESULTS AND DISCUSSION

A. Objective 1

Players most experienced a coaching style emphasizing Personal Rapport ($M = 4.14$), while Negative Personal Rapport was least observed ($M = 1.39$). Players clearly preferred supportive coaching behaviours. These findings confirm that positive interpersonal relationships are a dominant feature of coaching in Negeri Sembilan Football Club, without any unexpected behavioural trends.

TABLE I
THE RELATIONSHIP BETWEEN COACHING BEHAVIOUR STYLES

	Mean	SD	Rank
Personal Rapport	4.14	0.336	1
Physical Training and Planning	4.12	0.333	2
Technical Skills	4.09	0.347	3
Mental Preparation	4.08	0.390	4
Competition Strategies	4.07	0.333	5
Goal Setting	3.87	0.566	6
Negative Personal Rapport	1.39	0.491	7

B. Objective 2

Player performance levels were high across the board, with a mean score of 4.43, suggesting consistently strong output. No significant variation was observed across teams, and players displayed average levels of strengths and weaknesses. These results reflect a stable and well-developed performance profile among club members.

TABLE II
PLAYERS' PERFORMANCE

	Mean	SD
Players' Performance	4.43	0.107

C. Objective 3

A moderate, significant positive correlation ($r = .349$, $p < 0.001$) was found between coaching style and player performance. Personal Rapport coaching behaviours were most strongly linked to better performance. In contrast, Negative Personal Rapport styles were associated with poorer outcomes, emphasizing the importance of supportive, respectful coaching in player development.

TABLE III
RELATIONSHIP BETWEEN COACHING STYLE AND PLAYERS' PERFORMANCE IN NEGERI SEMBILAN FOOTBALL CLUB (NSFC)

	R	P	N
Coaching Behaviour Style	0.349	<0.001	97
Players' Performance	0.349	<0.001	97

IV. CONCLUSIONS

Positive coaching styles, particularly Personal Rapport, are common in Negeri Sembilan Football Club and correlate with higher player performance. The study confirms that constructive coach-athlete relationships significantly influence outcomes, underscoring the need to reinforce positive behavioural strategies in football coaching.

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Exploring Leadership Behaviors and Their Influence on Team Cohesion in Majlis Bandaraya Seremban Sports Teams

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Keywords: Athlete leadership, Team cohesion, Formal and informal leadership, Sports psychology, Group dynamics

I. INTRODUCTION

Understanding how athletes' leadership behaviors influence team cohesion is critical for enhancing team performance in sports settings. This study explores key leadership behaviors among athletes at Majlis Bandaraya Seremban and examines their relationship with team cohesion in both formal and informal team structures. It seeks to reveal athletes' perceptions and the behavioral dynamics that contribute to group harmony and collective unity in sports environments [1].

II. METHODS

This study employed a survey design involving 297 athlete workers from Majlis Bandaraya Seremban. Data were collected using structured questionnaires focused on leadership behaviors and team cohesion. Responses were analyzed quantitatively to identify patterns and relationships within both formal and informal team structures. The approach enabled the assessment of perceived leadership dynamics and their impact on group cohesion in various sporting contexts [2].

III. RESULTS AND DISCUSSION

A. Key Leadership Behaviours

Athletes consistently identified social support and positive feedback as the most impactful leadership behaviors. These behaviors were uniformly present across teams and were perceived as crucial to promoting a cohesive team environment. Participants expressed high satisfaction with how these behaviors fostered unity, morale, and mutual encouragement within their respective sports teams.

TABLE I
KEY LEADER BEHAVIOURS

	Mean	SD	Rank
Social Support & Positive Feedback	3.52	0.403	1
Democratic Behavior	3.49	0.443	2
Instructional Behavior	3.38	0.495	3
Autocratic Behavior	3.31	0.676	4

B. Measure Athletes' Perceptions

Athletes consistently identified social support and positive feedback as the most impactful leadership behaviors. These behaviors were uniformly present across teams and were

perceived as crucial to promoting a cohesive team environment. Participants expressed high satisfaction with how these behaviors fostered unity, morale, and mutual encouragement within their respective sports teams [3].

TABLE II
ATHLETE'S PERCEPTION

	Mean	SD
Cohesion	3.58	0.548

C. Athletes' Leadership Behaviors and Team Cohesion

A positive correlation was observed between leadership behaviors and team cohesion scores. Formal leaders were reported to have a more substantial influence on cohesion than informal leaders. Participants highlighted that leadership style significantly affects group unity, suggesting that structured leadership strategies can be instrumental in enhancing overall team cohesion.

TABLE III
ATHLETES' LEADERSHIP BEHAVIORS AND TEAM COHESION

Assessment	r	p	n
Athlete's Leadership Behavior	0.239	<0.001	297
Cohesion	0.239	<0.001	297

IV. CONCLUSIONS

Athletes' leadership behaviors, particularly social support and positive feedback, strongly influence team cohesion. Cohesion levels were moderate to high across teams, regardless of leadership structure. Formal leaders had a greater impact on unity, emphasizing the importance of leadership style in fostering communication, trust, and collective team identity.

ACKNOWLEDGEMENTS

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The Relationship Between Perceived Physical Literacy and Obesity Awareness Among UiTM Seremban Students

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Keywords: Physical literacy, Obesity awareness, University students

I. INTRODUCTION

Obesity among youth remains a global health concern. This study explores the relationship between perceived physical literacy and obesity awareness among UiTM Seremban 3 students. By evaluating students' physical literacy levels and obesity awareness, the research aims to understand their correlation and how they vary with BMI. Findings may inform targeted interventions for promoting healthier lifestyles within university settings.

II. METHODS

This study involved 123 UiTM Seremban 3 students selected using simple random sampling. Data were collected using the Perceived Physical Literacy Instrument (PPLI) and the Obesity Awareness and Insight Scale (OASIS). Participants' BMI was also recorded. Pearson correlation analysis was applied to examine the relationship between perceived physical literacy, obesity awareness, and BMI differences.

III. RESULTS AND DISCUSSION

A. Physical Literacy Levels

Students showed consistently high physical literacy, with item means ranging from 4.24 to 4.53. The highest rated item was awareness of sports-related health benefits ($M = 4.53$, $SD = 0.618$). No significant differences emerged by gender or program. Findings suggest strong appreciation for physical activity, with positive attitudes, confidence, and coping skills evident across the sample.

TABLE I
THE ITEMS OF PERCEIVED PHYSICAL LITERACY INSTRUMENT (PPLI)

	Mean	SD
I have a positive attitude and interest in sports.	4.36	0.748
I appreciate myself or others doing sports.	4.48	0.592
I am aware of the benefits of sports related to health.	4.53	0.618
I am physically fit, in accordance with my age	4.30	0.746
I possess self-management skills for fitness.	4.24	0.793
I possess self-evaluation skills for health.	4.29	0.744
I have strong social skills.	4.28	0.771
I am confident in wild/natural survival.	4.24	0.879
I am capable in handling problems and difficulties	4.37	0.716

B. Obesity Awareness

Obesity awareness was mixed. Students rated their ability to maintain current lifestyles highest ($M = 7.43$, $SD = 2.06$), while low agreement appeared for having excess body fat ($M = 3.77$, $SD = 2.76$). Despite understanding obesity risks ($M = 3.91$), personal recognition was limited. No significant demographic effects were found ($p = 0.989$)

TABLE II
THE ITEMS OF OBESITY AWARENESS AND INSIGHT SCALE (OASIS)

	Mean	SD
My experiences are due to being overweight or obese.	3.88	2.75
My experiences are due to other reasons than my weight regardless of what other people think (e.g. doctors, family, friends, etc.)	3.90	2.64
I have an excessive amount of body fat.	3.77	2.76
I am at a healthy weight.	7.33	2.28
I am overweight or have obesity (i.e. Body Mass Index greater than 25 = overweight; Body Mass Index greater than 30 = obese).	3.94	3.08
I need to make or maintain healthy life style changes to improve my diet and increase the amount I exercise.	5.46	3.17
I can safely carry on my current lifestyle (i.e. eating and exercising as I currently do).	7.43	2.06
I need weight loss treatment.	4.01	3.21
My weight has led or can lead to negative health consequences (e.g. high cholesterol, hypertension, diabetes, heart disease, depression, etc.).	3.91	3.11

C. Relationship Between PL and OA

A significant moderate correlation was found between physical literacy and obesity awareness ($r = 0.351$, $p < 0.001$, $df = 121$). This suggests students with stronger physical literacy tend to be more aware of obesity-related issues. While the relationship is not strong, it supports the idea that health knowledge and physical competence are interlinked.

TABLE III
RELATIONSHIP BETWEEN PHYSICAL LITERACY LEVELS AND OBESITY AWARENESS

PPLI Total Scores		
Obesity Awareness	(Pearson's r)	0.351
Total	df	121
	p-value	<0.001

D. Body Mass Index and Physical Literacy

Levene's test showed no significant differences in perceived physical literacy ($p = 0.989$) or obesity awareness ($p = 0.989$) across BMI groups. This indicates BMI is not a determining factor in either construct. Instead, cognitive, social, or educational variables may shape awareness and literacy more than physiological status among these university students.

TABLE IV
BODY MASS INDEX AND PHYSICAL LITERACY

	F	df1	df2	p
Obesity Awareness Total	0.0417	3	119	0.989

IV. CONCLUSIONS

The study reveals a moderate link between physical literacy and obesity awareness among UiTM Seremban 3 students. Despite no significant differences by BMI, higher physical literacy aligns with better obesity awareness. These insights support targeted health education strategies to strengthen students' knowledge and behaviors related to obesity prevention.

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The Relationship Between Physical Activity Levels and Academic Performance Among Students at UiTM Seremban 3

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Keywords: Physical activity, Academic performance

I. INTRODUCTION

This study investigates the relationship between physical activity and academic performance among students at UiTM Seremban 3, including gender-based differences [1]. Despite global interest in student wellness, limited evidence exists within this local context. By examining activity levels, academic outcomes, and gender variation, the study aims to inform institutional strategies for enhancing student well-being and performance.

II. METHODS

A cross-sectional design was employed with self-reported data from students at UiTM Seremban 3 via online questionnaires. The International Physical Activity Questionnaire (IPAQ) assessed physical activity levels, while the Academic Performance Scale (APS) measured academic outcomes. Data were analyzed using the Chi-square test to examine relationships between variables, including gender differences.

III. RESULTS AND DISCUSSION

A. Physical Activity Levels

Most students at UiTM Seremban 3 reported being physically active. Specifically, 41.4% were in the high activity category, 33.3% in moderate, and only 25.2% in low. This suggests that the majority maintain adequate physical activity levels, which may reflect an active student lifestyle or successful campus health promotion efforts.

TABLE I
PHYSICAL ACTIVITY LEVELS

Physical Activity	Counts	% of Total	Cumulative %
High	46	41.4%	41.4%
Moderate	37	33.3%	74.8%
Low	28	25.2%	100.0%

B. Academic Performance

Academic performance was generally high among the participants, with 47.7% achieving excellent results and 44.1% reporting good performance. Only 8.1% had moderate academic outcomes. These findings indicate strong overall academic achievement, possibly influenced by effective academic support systems or student motivation within UiTM Seremban 3.

TABLE II
ACADEMIC PERFORMANCE

Academic Performance	Counts	% of Total	Cumulative %
Excellent Performance	53	47.7%	47.7%
Good Performance	49	44.1%	91.9%
Moderate Performance	9	8.1%	100.0%

C. Relationship Between PA And AP

The chi-square test showed no statistically significant relationship between physical activity levels and academic performance ($p = 0.124$). Although students with higher activity levels tended to perform better academically, the association lacked statistical strength. This implies other factors may play a more critical role in academic outcomes.

TABLE III
RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND ACADEMIC PERFORMANCE

	Value	df	p
χ^2	7.23	4	0.124
N	111		

D. Gender Differences

Gender differences in physical activity were statistically significant ($p = 0.048$). More male students reported high physical activity, while female students more often fell into moderate or low categories. These differences suggest gender-specific factors influence activity habits and should be considered in future health promotion programs.

TABLE IV
GENDER DIFFERENCES

	Value	df	p
χ^2	6.08	2	0.048
N	111		

IV. CONCLUSIONS

While most students demonstrated both high physical activity levels and strong academic performance, no significant relationship was found between the two. However, gender differences in activity levels were statistically significant. These findings highlight the need for tailored health initiatives and further exploration of factors affecting student success.

ACKNOWLEDGEMENTS

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Impact of Parental Support Towards Motivation of Young Footballers in Jerantut Pahang

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Keywords: Parental support, Task-oriented motivation, Ego-oriented motivation, Youth football, Jerantut

I. INTRODUCTION

Football is one of the most popular youth sports in Malaysia, with strong participation supported by national initiatives. Despite its prominence, attrition rates remain a concern, with up to 30% of youth athletes discontinuing participation by the age of 16 [1]. Contributing factors include insufficient parental encouragement and societal emphasis on academic success. Understanding how parental support influences motivation is essential to sustaining youth engagement in sports. This study applies Self-Determination Theory (SDT) and Achievement Goal Theory (AGT) to examine how different types and levels of parental support affect task- and ego-oriented motivation among young footballers in Jerantut, Pahang, a rural region often underrepresented in sports research.

II. METHODS

A quantitative cross-sectional study was conducted involving 379 young footballers from five football clubs in Jerantut. Participants aged 12–18 years completed validated instruments, the Parental Involvement in Sport Questionnaire (PISQ) by [2] and the Task and Ego Orientation in Sport Questionnaire (TEOSQ) by [3]. Data were analyzed using descriptive statistics, Pearson correlation, and ANOVA to identify relationships between parental support (active involvement, praise and understanding, directive behavior) and motivational orientation (task vs. ego). Inclusion criteria required at least one year of football involvement and parental consent.

III. RESULTS AND DISCUSSION

A. Descriptive Table

Descriptive findings revealed high levels of parental support, shown in Table I, active involvement ($M = 4.23$, $SD = 0.764$) and praise ($M = 4.2$, $SD = 0.833$).

TABLE I
DESCRIPTIVE ANALYSIS OF THE MAIN PARENTAL SUPPORT PROVIDED TO YOUNG FOOTBALLERS IN JERANTUT.

Variables	Mean	Std. Deviation (SD)
Active Involvement	4.23	0.764
Praise & Understanding	4.2	0.833
Direct Behaviour	4.18	0.925

B. Pearson Correlation Table

Pearson correlation shown in Table III a strong positive relationship between active parental involvement and task-oriented motivation ($r = 0.624$, $p < 0.001$)

TABLE II
CORRELATION COEFFICIENT RANGE QUALITATIVE EVALUATION (CALLEGARI-JACQUES 2009)

Level	p-value
Weak	<0.30
Regular	<0.60
Strong	<0.90
Very strong	≥ 0.90

TABLE III
CORRELATION BETWEEN PARENTAL ACTIVE INVOLVEMENT AND TASK ORIENTED MOTIVATION AMONG FOOTBALLERS IN JERANTUT PAHANG

Active involvement		
Taskoriented	Pearson Correlation	0.624
	p	<0.001
	df	377
	N	379

C. ANOVA Table

ANOVA results indicated significant differences in motivation based on levels of parental support ($p < 0.001$). result shown in Table IV $F(1,139) = 74.8$, for Ego orientation and $F(1,143) = 59.6$. Table V shows that students with high parental support reported higher mean ego orientation scores ($M = 23.3$, $SD = 2.40$) than those with low support ($M = 19.1$, $SD = 4.95$). For task orientation, the high parental support group scored a mean of ($M = 32.7$, $SD = 3.36$), while the low support group scored ($M = 27.8$, $SD = 6.50$).

TABLE IV
WELCH'S ANOVA RESULT FOR MOTIVATION DIFFERENCES BY
PARENTAL SUPPORT

	F	df1	df2	p-value
Ego Oriented	74.8	1	139	<0.001
Task Oriented	59.6	1	143	<0.001

TABLE V
DESCRIPTIVES OF MOTIVATION BY PARENTAL SUPPORT LEVEL

	Parental Level	N	Mean	SD	SE
Ego Orientation	High	263	23.3	2.40	0.148
	Low	116	19.1	4.95	0.460
Task Orientation	High	263	32.7	3.36	0.207
	Low	116	27.8	6.50	0.604

The findings align with Self-Determination Theory (SDT) and Achievement Goal Theory (AGT). [1] confirmed that supportive environments help sustain task-oriented motivation, while [4] emphasized that praise focused on effort improves intrinsic motivation. In contrast, [5] warned that parental pressure or neglect can lead to ego-oriented goals or disengagement. [6] added that consistent, positive parental involvement enhances athletes' emotional regulation and persistence. Encouraging task-oriented support may help promote long-term engagement, resilience, and well-being in young athletes.

IV. CONCLUSIONS

This study concludes the important role of balanced and supportive parental involvement in encouraging sustainable, task-oriented motivation among young footballers in rural Malaysia. The findings suggest that key stakeholders including parents, coaches, and grassroots sport organizations should implement reinforcement-based strategies and promote collaborative engagement to enhance youth motivation and well-being. Future interventions should incorporate parental education programs and structured support guidelines within youth sports initiatives to encourage long-term athlete development and continued participation.

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The Correlation Between Knowledge, Attitudes and Practices (KAP) Among FSR Students at UiTM Seremban 3

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Keywords: Knowledge, Attitudes, Practices, KAP, Sunscreen usage, FSR

I. INTRODUCTION

Knowledge, attitudes and the practices (KAP) of using sunscreen, many people understand the importance of using sunscreen to protect their skin from harmful UV radiation which shows the knowledge of using sunscreen is increasing, yet many still apply it incorrectly or inconsistently. The aim of this study is to explore the correlation between knowledge, attitudes, and practices (KAP) on sunscreen usage among FSR students at UiTM Seremban 3.

II. METHODS

Data were collected via an online questionnaire using a set of Likert Scale (5) from Strongly Disagree to Strongly Agree and Multiple Choices questions. A total of 383 FSR students participated, selected using the Krejcie and Morgan formula for a population of 1,322, with an added 20% buffer to ensure validity. The participants consisted of Diploma and Degree level FSR students at UiTM Seremban 3.

III. RESULTS AND DISCUSSION

A. Level of Knowledge, Attitudes and Practices (KAP) on Sunscreen Usage

FSR students demonstrated moderate levels of knowledge, attitudes, and practices (KAP) was ($M = 4.02$) and sunscreen usage ($M = 10.09$). These findings highlight the need for targeted educational efforts to enhance students' understanding and attitudes towards sunscreen application, ultimately promoting more consistent and effective sun protection practices.

B. Relationship Between Knowledge, Attitudes and Practices (KAP) on Sunscreen Usage

There is a very strong and positive correlation between knowledge and attitudes ($r = 0.950$, $p < 0.001$). This indicates that as respondents' knowledge increases, their attitudes also become more positive. The statistically significant result ($p < 0.001$) confirms that this relationship is not due to chance. The correlation between knowledge and practices is also very strong and positive ($r = 0.926$, $p < 0.001$), suggesting that higher levels of knowledge among respondents are associated with more effective or consistent practices. This implies that knowledge plays a significant role in shaping practical behaviors.

Similarly, a very strong and positive correlation was found between attitudes and practices ($r = 0.944$, $p < 0.001$). This

means that more positive attitudes are strongly linked to better or more frequent practices, emphasizing the role of mindset in behavior implementation. The correlation results reveal that all three variables, Knowledge, Attitudes, and Practices are strongly interrelated with statistically significant, positive linear relationships. These findings underscore the importance of promoting both knowledge and positive attitudes as they significantly influence practical behavior among FSR students at UiTM Seremban 3.

TABLE I
RELATIONSHIP BETWEEN KNOWLEDGE, ATTITUDES AND PRACTICES (KAP)
ON SUNSCREEN USAGE

		KNOWLEDGE	ATTITUDES	PRACTICES
KNOWLEDGE	Pearson's r	—		
	df	—		
	p-value	—		
ATTITUDES	Pearson's r	0.950	—	
	df	381	—	
	p-value	<.001	—	
PRACTICES	Pearson's r	0.926	0.944	—
	df	381	381	—
	p-value	<.001	<.001	—

C. Differences Between Gender on the Knowledge, Attitudes and Practices (KAP) on Sunscreen Usage

The MANOVA test revealed no significant gender differences in knowledge, attitudes, and practices related to sunscreen usage among FSR students at UiTM Seremban 3. While females reported marginally higher attitudes and practices, and males slightly higher knowledge, these variations did not reach statistical significance. Despite the lack of notable gender disparities, the overall mean scores suggest moderate levels of knowledge and practices across both groups.

TABLE II
DIFFERENCES BETWEEN GENDER ON KNOWLEDGE, ATTITUDES AND
PRACTICES (KAP) ON SUNSCREEN USAGE

	Group	N	Mean	Median	SD	SE	F	df	df2	p
Knowledge	Female / Perempuan	175	3.95	4.50	1.13	0.09	2.74	1	381	0.099
	Male / Lelaki	208	3.97	4.33	1.03	0.07	2.74	1	381	0.099
Attitudes	Female / Perempuan	175	3.73	4.13	0.94	0.07	0.48	1	381	0.489
	Male / Lelaki	208	3.65	4.00	0.87	0.06	0.48	1	381	0.489
Practices	Female / Perempuan	175	3.94	4.33	1.01	0.08	0.04	1	381	0.842
	Male / Lelaki	208	3.79	4.33	0.95	0.07	0.04	1	381	0.842

IV. CONCLUSIONS

The findings demonstrate that enhancing knowledge and addressing negative attitudes are key priorities to improve sunscreen usage among FSR students. Unlike many prior studies conducted in Western contexts which found that females tend to engage more frequently in sunscreen use, the present study found no statistically significant difference in sunscreen usage between male and female students [1].

This suggests that among FSR students at UITM Seremban 3, gender may not be a salient factor influencing sunscreen-related knowledge, attitudes, or practices. This result may reflect homogeneity in health education, shared social norms, or similar exposure to sun safety campaigns within the university environment. [2] have shown inconsistent or no significant gender differences when adjusting for other factors like education, cultural norms, or acculturation.

The result adds to the evidence that gender differences are not universal and can be context dependent. It highlights the importance of considering cultural, institutional, and educational factors when studying sunscreen practices.

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The Relationship of Volunteer Satisfaction on Retention Among University Students

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Keywords: Volunteer, Satisfaction, Retention, University students

I. INTRODUCTION

Particularly for young people in higher education, volunteering is a potent means of fostering social development, personal growth, and community service. Volunteer satisfaction and continuance intention are important factors contributing to the sustainability of volunteerism in sport events [1]. This study focuses on the relationship of volunteer satisfaction on retention among university students. Given the importance of volunteers to the success and seamless operation of significant events, it is critical to comprehend how volunteer satisfaction affects their decision to stay involved.

II. METHODS

A quantitative method with non-probability purposive sampling was used. A non-experimental design was applied to observe relationships without manipulating variables. The Volunteer Satisfaction Survey (VSS) [4] and Organizational Commitment Questionnaire (OCQ) [5] were utilized via Google Forms and distributed to the respondents. The instruments assessed volunteer satisfaction and retention. To find trends and examine the relationship between volunteer satisfaction and retention, inferential statistics (Pearson correlation) analysis was employed.

III. RESULTS AND DISCUSSION

A. Volunteer Satisfaction

According to the findings, satisfaction with specific motivation had the highest mean score ($M = 5.45$, $SD = 1.28$). This implies that when students' volunteer activity and their personal objectives, values, or interests coincide, they typically feel extremely motivated. The mean score for satisfaction with volunteering tasks was the lowest ($M = 5.41$, $SD = 1.26$). The overall satisfaction level was high. Joshi et al. (2015) do not specify cut-offs, however the mean is within the widely recognized "high" range (5.00–7.00) according to the equal-interval interpretation of Likert-scale data [3]. This suggests a need to change the way tasks are designed and delivered to better suit students' objectives and enhance their volunteer experience in general.

B. Retention

The results revealed that the mean score for retention among university students was ($M = 5.29$, $SD = 1.23$) [3] do not provide specific cut-offs, although the equal-interval interpretation of Likert-scale data supports that the mean falls within the commonly accepted "high" range (5.00–7.00) [3].

This relatively high mean suggests that, overall, students have a favourable attitude toward continuing their volunteer work. Additionally, although many students are likely to continue volunteering, individual viewpoints and experiences may still differ, potentially affecting their long-term commitment.

TABLE I
VOLUNTEER SATISFACTION

Variables	Mean	Standard Deviation
Satisfaction with Specific Motivation	5.45	1.28
Satisfaction with Organizational Management	5.44	1.28
Satisfaction with Volunteering Tasks	5.41	1.26

TABLE II
RETENTION

	Mean	Standard Deviation
Retention	5.29	1.23

TABLE III
VOLUNTEER SATISFACTION AND RETENTION

Volunteer Satisfaction	Retention	
	Pearson's R	0.915
	Sig. (2-tailed)	< 0.01
	N	167

C. Relationship Between Volunteer Satisfaction and Retention

The results of the analysis showed that the two variables had a strong, positive, and statistically significant association ($r = 0.915$, $p < 0.001$, $df = 165$). According to Cohen (1988), a correlation coefficient above 0.50 is considered large (strong to very strong) [2]. The two variables have a very strong linear relationship, as indicated by this incredibly high correlation value, which suggests that students are more likely to continue volunteering over time as their pleasure with their volunteer experiences rises.

IV. CONCLUSIONS

The study found that the most influential factor for students was satisfaction with specific motivations, while satisfaction with volunteering tasks was the least important. These findings are significant for organizations aiming to improve volunteer retention, for students seeking meaningful engagement, and for future researchers exploring volunteer behavior. Volunteer programs should focus on motivation-based strategies and further examine how task design might improve overall satisfaction and long-term engagement.

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Social Media Engagement on Outdoor Recreation Motivation Among Visitor at Temuan Hills Negeri Sembilan

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Keywords: Social media, Outdoor recreation, Motivation

I. INTRODUCTION

This study explored how social media engagement influences outdoor recreation motivation among visitors at Temuan Hills, Negeri Sembilan. It identifies key engagement and motivation factors, examines gender-based differences, and assesses their interrelationship. The findings aimed to enrich understanding of digital media's role in nature-based tourism decisions, especially within localized Malaysian contexts experiencing increased recreational demand [1].

II. METHODS

This study employed a quantitative research method using a Google Form survey administered to 31 visitors at Temuan Hills, Negeri Sembilan. Data were analyzed using descriptive statistics and inferential statistics, including independent t-tests and Pearson correlation analysis, to evaluate gender-based differences and relationships between social media engagement and outdoor recreation motivation.

III. RESULTS AND DISCUSSION

A. Social Media Engagement Factors

Consumption with a mean score of 4.52 ($SD = 0.663$) emerged as the most prevalent engagement behavior, with visitors primarily using Instagram and TikTok to view outdoor content. Watching videos and viewing photos of natural settings sparked emotional and motivational responses.

B. Outdoor Recreation Motivation Factors

Social interaction with groups was the leading motivational factor, indicating that recreational outings at Temuan Hills are highly driven by companionship and shared experience. This supports the role of community and bonding in outdoor activities. The natural, accessible setting of Temuan Hills encourages socializing, making it an appealing destination for group-based recreation.

C. Gender Differences in Engagement

Female participants reported higher overall engagement with outdoor content on social media. While behavioural patterns such as posting and sharing were observed, no statistically significant gender differences were found. This suggests that although females might engage more frequently, both genders display relatively similar patterns of interaction with outdoor-related content with $t = -0.538$, $df = 29$, $p = 0.152$.

D. Engagement–Motivation Relationship

A significant positive correlation was found between social media engagement and outdoor recreation motivation. Consumption, particularly viewing visual content, showed a positive correlation. These findings indicate that passive media exposure not only informs but also inspires recreational intentions, demonstrating social media's role in shaping visitor motivation at Temuan Hills.

TABLE I
ENGAGEMENT – MOTIVATION RELATIONSHIP

Variables		Outdoor Recreation Motivation
Consuming	Pearson Correlation	0.456
	Significant (2-tailed)	0.010
	N	31
Contributing	Pearson Correlation	0.366
	Significant (2-tailed)	0.043
	N	31
Creating	Pearson Correlation	0.386
	Significant (2-tailed)	0.032
	N	31

IV. CONCLUSIONS

Social media engagement, especially content consumption, significantly influences outdoor recreation motivation among Temuan Hills visitors. Group-based social interaction emerged as a key motivator. Despite gender differences in engagement levels, patterns were similar. These insights highlight social media's role in fostering nature engagement and enhancing collective recreational experiences.

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