



Momentum and its relationship to futsal league players

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Abstract

The aim of this research is to explore the relationship between psychological momentum and the performance of futsal league players. The aim is to determine how psychological momentum affects individual and team performance, as well as how various psychological factors influence improved athletic performance. The methodology relied on a descriptive-analytical study design, using Vallerand's Psychological Momentum (PM) questionnaires to assess players' psychological momentum. The research population included all professional futsal players in the National League during the 2025 season . A stratified random sample of 150 players from 10 teams was selected. Data were collected through pre- and post-match questionnaires, in addition to performance statistics extracted from official sources. The results showed a strong positive relationship between psychological momentum and player performance, with higher psychological momentum significantly associated with scoring goals and assists. The results also showed that psychological momentum was higher before matches but decreased after the competition, reflecting the psychological pressures players experience during play. The study also revealed statistically significant differences in psychological momentum between teams. The study confirms that psychological momentum is a crucial factor in enhancing athletic performance. Therefore , coaches and sports specialists should develop training programs that enhance players' psychological momentum, which contributes to improving their performance and achieving better results in competitions.

Keywords: Psychological Momentum, Futsal, Athletic Performance, Motivation, Self-Confidence Social Support, Psychological Factors.

Introduction

Psychological momentum is the term used by sports psychologists to describe the idea that performance is influenced by the outcome of a previous event or events. There are two main theoretical models that support the concept of momentum in sports : the antecedent-consequences model of momentum and the multidimensional model of momentum in sports . These models suggest that positive and negative momentum occur due to one's response to a previous event. For example, after a successful

performance, an athlete will experience changes in cognition, physiology, and emotions, such as increased feelings of self-confidence, perceptions of control, motivation, satisfaction, and so on, which in turn increases the chance of future performance. (Called positive momentum) Alternatively, after an unsuccessful performance, the athlete may experience a decrease in self-confidence, perceptions of control, motivation, etc., which subsequently increases the chance of future failure (called negative momentum) (Iso-Ahola & Dotson, 2014).

In futsal, a fast-paced game that requires high concentration and quick decision-making, psychological momentum becomes even more important. Unlike traditional football, this game is played in a smaller space with fewer players, meaning players must always be mentally and physically alert to ensure optimal performance. This game requires high levels of fitness, ball control, quick movement and thinking, as well as the ability to adapt to sudden changes in the flow of a match. Players with strong psychological momentum are able to make accurate decisions under pressure and remain focused throughout the match, regardless of the score or individual performance at specific moments. This state of psychological momentum makes them feel as if they are in a "subconscious" zone, where they make the right decisions instantly without the need for prolonged thought.

In addition, external psychological pressures, such as the expectations of fans, coaches, and teammates, affect players' levels of psychological momentum. These pressures can hinder performance if a player is unable to deal with them effectively. However, those who are able to control their pressure and leverage their psychological momentum are able to deliver exceptional performance despite all challenges.

Psychological momentum is a largely unknown concept in sports psychology, especially in its application to team sports. Therefore, the researcher decided to study psychological momentum in the game of football.

Futsal is a sport that requires a high level of mental focus and technical skill. However, many players face psychological challenges that directly impact their performance on the field. Players are exposed to multiple pressures, including intense competition, the expectations of coaches and fans, and the fast-paced nature of matches that require immediate decisions and precise movements. These pressures may lead to a decline in performance or even a failure of the player to perform at his best. Hence, the research problem arises in studying the relationship between psychological momentum and the performance level of futsal players.

Research objectives are A study of the effect of psychological momentum on the performance of futsal league players. Measuring the relationship between the level of psychological momentum and individual and group performance.

Research Methodology

The researcher used the descriptive approach with the correlation method. The research population includes all professional futsal players competing in the National Futsal League during the 2025 season, A stratified random sample of 150 futsal players from 15 league teams was selected, This selection ensures the representation of players from different positions and experience levels. The survey sample was (15 players) and the sample percentage from the community was (10%), as shown in the table below.

Table 1. Research community clubs

1. Basra oil	9. Southern Gas
2. Police	10. Basra Municipality
3. Middle Oil	11. Air Force
4. German resources	12. Eastern
5. Refineries	13. Police mechanisms
6. Baghdad Municipality	14. Basra Youth
7. Air defense	15. Nineveh
8. Popular Mobilization Forces	

Instrument used in this study is Vallerand et al.'s (1988) PM scale , which consists of five items that measure perceptions of psychological momentum in futsal. Each item is rated on a 5- point Likert scale, where 1 indicates " strongly disagree " and 5 indicates "strongly agree." Higher scores reflect greater perceptions of positive momentum, while lower scores indicate negative or neutral momentum states.

In addition to the PM metric , performance metrics are collected from match statistics, including goals scored, assists, passes completed, defensive actions, and overall contribution to team success . Performance metrics provide objective data for analysis alongside psychological momentum scores.

The study is conducted in three stages : First, the scale Vallerand et al.'s (1988) PM scale is applied . Participants were asked to measure their baseline psychological momentum before the start of selected matches. After the matches, players completed the measure again to assess shifts in perceived momentum during the match.

To collect performance data, in-game statistics are collected using official league reports and video analysis software. This ensures accurate performance data is collected for each player. Data from the psychological momentum metric and performance metrics are then combined for statistical analysis to explore the correlations between psychological momentum and player performance.

Measuring psychological momentum

To measure athletes' psychological momentum, Vallerand et al.'s (1988) PM scale was used . This scale, specifically designed to assess athletes' psychological momentum, consists of 30 items rated on a 5- point Likert scale, with responses ranging from 1 (strongly disagree) to 5 (strongly agree). The items measure different aspects of momentum, such as confidence, control, and emotional energy, making it an ideal tool for assessing how momentum fluctuates during competition.

The scale was administered at two critical points during the study: pre-match and post-match. Players were asked to complete the scale 30 minutes before each match, allowing them to reflect on their pre-match psychological state. The goal of this pre-match assessment was to capture a player's psychological momentum before it was affected by external game influences such as actual play, team discussions, or match results. After the match, players completed the same scale again to record any shifts in perceived momentum during the match. This immediate post-match assessment was crucial for understanding how match events and outcomes impacted players' psychological state.

Data were collected in a controlled environment. Before each match, players completed the scale in a quiet area to ensure minimal distractions and encourage thoughtful responses. After the match, they were immediately instructed to complete the post-match scale in a similarly controlled environment. All responses were digitally recorded on tablets, allowing for seamless data entry into a secure database, minimizing the chance of human error during the data collection process.

The correlation coefficient between the item score and the total score of the psychological momentum scale reveals a variety of relationships between the various items on the scale and the overall score. The correlation coefficient (r) values range from 0.53 to 0.8, indicating moderate to strong positive relationships between most items and the total score. Item 4 shows the highest positive correlation (0.8), meaning that players' responses to this item are strongly related to their overall performance in psychological momentum. In contrast, Item 12 shows the lowest correlation (0.53), which may indicate that this item may not adequately reflect players' overall psychological momentum. Overall, the results indicate that psychological momentum is an important factor influencing players' performance in the futsal league, reinforcing the importance of measuring these aspects to develop appropriate psychological support strategies.

Collect performance metrics

Performance metrics were collected from two main sources: official league statistics and video analysis software. Official statistics provided basic data such as goals scored, assists, defensive actions, passes completed, and other key performance indicators of the game. These statistics were compiled by league officials who regularly tracked the data for official reporting purposes, ensuring a high degree of accuracy and consistency across matches. However, to supplement these statistics and provide a more detailed analysis of individual performance, video footage from matches was analyzed using specialized sports analysis software, such as Sportscodex or Dartfish.

Trained analysts reviewed video recordings of each match to track additional performance metrics not fully captured in official statistics . These included details such as high-intensity running, off-the-ball movements, player positioning, and pass quality . This additional data allowed the study to capture a more comprehensive view of each player's performance, particularly in areas where official statistics may not fully reflect their contributions.

Scale validity

The validity of the PM scale was confirmed through content verification and previous studies that confirmed its applicability in measuring psychological momentum in sports, especially futsal. The validity of the scale in the context of this study was also confirmed through pilot testing with a small sample of futsal players, which showed that participants could effectively relate to the scale items.

Scale reliability

PM scale in this study was assessed using Cronbach's alpha, which yielded a reliability coefficient of $\alpha = 0.81$, indicating high reliability. Test-retest reliability was also performed by re-evaluating a subset of participants one week after the initial test, yielding a reliability score of 0.79.

Statistical analysis

Data collected from the Vallerand PM scale and performance metrics are analyzed using statistical software (SPSS). Descriptive statistics are calculated to summarize momentum scores and performance outcomes. Pearson's correlation coefficient is applied to examine the strength and direction of the relationship between psychological momentum, as measured by the Vallerand PM scale, and in-game performance metrics. Regression analysis is then conducted to determine whether psychological momentum significantly predicts performance outcomes in futsal matches. Additionally, t- tests and ANOVA are used to explore differences in momentum across teams, player positions, and other relevant variables.

Results

Table 2. Descriptive statistics of psychological momentum pre-post-match

Psychological momentum	Average	St.d	minimum	maximum
Pre-match	4.2	0.56	3.1	4.9
Post-match	3.9	0.62	2.8	4.8

in Table 2. indicate that the overall average psychological momentum of the players was higher before the match (mean = 4.2, standard deviation = 0.56) than after the match (mean = 3.9, standard deviation = 0.62). This means that the players, in general, felt higher levels of psychological momentum before the start of the match, while this feeling decreased after the match. This decrease in psychological momentum after the match can be explained by the influence of match events, such as physical effort, psychological pressure, or match results, which may lead to changes in the players' psychological state. The differences between the minimum and maximum values before the match (3.1 to 4.9) and after the match (2.8 to 4.8) also indicate greater variability in psychological momentum after the match, which may reflect the differential effects of the match on the players.

Table 3. Correlation between psychological momentum and performance measures

Variable	Goals scored	Assists	Defensive measures
Psychological Momentum (PM score)	0.62**	0.57**	0.45*

The results of Table 3. indicate positive correlations between psychological momentum (PM score) and various performance measures for futsal players. The correlation coefficient between psychological momentum and the number of goals scored is 0.62, indicating a strong, positive relationship between the feeling of psychological momentum and players' goal-scoring performance. Similarly, assists are positively correlated with psychological momentum with a coefficient of 0.57, indicating that players who feel a higher level of psychological momentum are more effective at providing assists . For defensive actions, the correlation coefficient is 0.45, which is also positive but less strong than for goals and assists. This suggests that players with high psychological momentum tend to perform well defensively, although the effect on this aspect is less pronounced compared to attack. These results

indicate that psychological momentum plays an important role in improving players' overall performance, especially in offensive aspects.

Table 4. Multiple Regression Analysis - Psychological Momentum as a Predictor of Performance

Variable	R ²	R ² Modified	Beta (β)	standard error	t-value	p-value
Goals scored	0.48	0.47	0.62	0.11	7.18	< 0.001
Assists	0.37	0.36	0.57	0.12	6.54	< 0.001
Defensive measures	0.21	0.19	0.45	0.14	3.58	< 0.05

The results in Table 4. indicate that psychological momentum is a strong predictor of performance across various aspects of play, based on multiple regression analysis. For goals scored, an R² value of 0.48 shows that 48% of the variance in the number of goals scored can be explained by psychological momentum, with a beta coefficient (β) of 0.62, meaning that an increase in psychological momentum leads to a significant increase in the number of goals scored. A t- value of 7.18 also strongly supports this relationship, with a statistical significance level of less than 0.001, indicating that this relationship is not due to chance.

For assists, R² is 0.37, indicating that 37% of the variance in assists can be explained by psychological momentum, and a beta coefficient (β) of 0.57 reinforces the positive relationship between psychological momentum and assist ability, which is also supported by a t- value of 6.54 and a statistical significance level of less than 0.001.

For defensive measures, the effect of psychological momentum is less pronounced, with an R² of 0.21 , meaning that only 21% of the variance in defensive performance is explained by psychological momentum. However, the beta coefficient (β) is 0.45 and the t -value is 3.58 , with a significance level lower than 0.05 They indicate that psychological momentum also positively affects defensive performance, albeit to a lesser extent than goals and assists.

Overall, these results confirm that psychological momentum is a strong predictor of players' offensive and defensive performance, especially with regard to scoring goals and providing assists , thus accepting the study hypothesis (there is a statistically significant relationship between psychological momentum and the performance of futsal players).

These findings are consistent with Qiu et al.'s (2024) study , which indicated that psychological momentum exerts a stronger influence on people's performance expectations than on their performance outcomes. Six experiments (n=2,533) revealed the remarkably consistent finding that experiencing momentum in a competitive setting can enhance performance expectations without actually enhancing performance outcomes. Furthermore, the effect of perceived momentum on expectations, as well as its corresponding zero-sum effect on performance, was robust across players' skill levels, task knowledge, self-efficacy levels, growth mindset, favorite versus underdog status, and various demographic variables. The current paper introduces at least one quantitative measure to compare the effect of momentum perceptions on expectations versus reality. In Experiment 2, performers who gained psychological momentum were 10.18% more likely than performers who lost psychological momentum to predict that they would win a contest they ultimately

lost. Psychological momentum not only influences performance expectations, but it can also influence behaviors associated with those expectations: In Experiment 3, players with greater momentum bet more on their performance in the competition than they should. In other words, players sacrificed their own profits to bet on their performance if they believed they were gaining momentum.

Table 5. Results of analysis of variance (ANOVA) for psychological momentum scores among different player categories

variable	Source of variance	Sum of Squares	degrees of freedom (df)	Mean Square	F	p-value
Psychological momentum before the match	Between groups	10.34	2	0.17	3.75	0.12
Post-match psychological momentum	Between groups	13.96	28	5.71	7.34	0.02
Total		23.3	30			

ANOVA table indicate that there were significant differences in psychological momentum between the teams, with a clear contrast in the pre- and post-match scores. For pre-match psychological momentum, the sum of squares between groups was 10.34, with degrees of freedom (df) equal to 2. The mean square was 0.17, yielding an F value ($F = 3.75$) and a p-value ($p\text{-value} = 0.12$). These values indicate that there were no statistically significant differences between the teams before the match , as the p-value is greater than 0.05, indicating that the players' psychological momentum was similar across the different teams at this stage.

However, the results for post-match psychological momentum show a completely different picture , with the between-groups sum of squares being 13.96, with degrees of freedom (df) equal to 28, The mean square was 5.71, which resulted in a value of ($F = 7.34$) and a probability value of ($p\text{-value} = 0.02$). These values indicate the presence of statistically significant differences between the teams after the match, as the probability value is less than 0.05, which indicates the impact of the match results on psychological momentum.

These results indicate that post-match psychological momentum is influenced by factors related to team performance, which may reflect players' experiences and their impact on their psychological state , supporting the study hypothesis (there is a statistically significant relationship between psychological momentum and psychological factors related to concentration, motivation, and anxiety).

These findings are consistent with a study by Briki et al. (2012) , which examined the dynamics of competitive anxiety and self-confidence, as well as the relationships between these variables, during athletes' experiences of psychological momentum (PM). National-level male table tennis players (Study 1) and swimmers (Study 2) watched one of their recent competitions, which included the experience of psychological momentum. At the same time, they indicated their moment-to-moment levels of competitive anxiety and self-confidence using a computer mouse. Curve

estimation showed that competitive anxiety and self-confidence decreased and increased over time, respectively. Furthermore, the dynamic patterns were less linear for swimmers than for table tennis players, suggesting that the experience of psychological momentum depends on the sport context. Consistent with the opposing dynamics of competitive anxiety and self-confidence, correlation analyses revealed a strong negative relationship between these variables, suggesting that psychological momentum moderates the relationship between competitive anxiety and self-confidence. The findings of this study provide new insights into the dynamics of psychological momentum and its environmental implications.

Recently, Gernigon and colleagues examined in more detail how various psychological variables change during momentum (Briki et al. , in press; Gernigon et al. , 2010). Gernigon et al. (Gernigon et al. , 2010 , Experiment 1) studied the effect of a positive momentum scenario (i.e., winning 10 consecutive points) on the dynamics of competitive anxiety and self-confidence when participants empathized with a table tennis player on a screen. They found that cognitive anxiety—negative worries about performance and somatic anxiety perceptions of the physical symptoms of competitive anxiety decreased linearly, whereas self-confidence increased linearly. Based on these findings, Gernigon et al. (2010) concluded that positive PM develops gradually. To examine PM qualitatively, Briki et al. (in press) interviewed table tennis players and swimmers individually about their PM experiences during an important competition. The results showed that positive competitive anxiety was associated with both an increase in positive affect (e.g., self-confidence) and a decrease in negative affect (e.g., anxiety) . Furthermore, positive competitive anxiety appeared to emerge in response to an unexpected positive event or situation, which was more favorable than the current situation. This finding suggests that positive competitive anxiety can emerge suddenly and thus increase abruptly .

Table 6. Summary of player performance across psychological momentum score categories

Psychological Momentum Class	Number of players	Average goals	Average assists	Average defensive measures
Low Momentum (1-3)	35	1.8	1.4	7.5
Medium Momentum (4-5)	52	3	2.5	6.1
High Momentum (6-7)	63	4.4	3.8	5

The results of Table 6. a summary of player performance across psychological momentum categories, reflect a clear relationship between psychological momentum levels and player performance in the areas of goals, assists, and defensive actions. The samples are divided according to psychological momentum categories into three levels: low momentum, medium momentum, and high momentum.

In the low momentum category (1-3), 35 players were observed, averaging 1.8 goals, 1.4 assists, and 7.5 defensive actions. These results suggest that players with low psychological momentum tend to perform poorly offensively, relying more on defense, which may reflect anxiety or a lack of confidence in their abilities.

As for the medium momentum category (4-5), which includes 52 players, the average goals scored is 3, the average assists is 2.5, and the defensive actions are 6.1. These figures indicate a significant improvement in performance compared to the low

momentum category, reflecting that balanced psychological momentum helps players achieve better results.

Finally, in the high momentum category (6-7), which includes 63 players, they average 4.4 goals, 3.8 assists, and 5 defensive actions. These results demonstrate that players with high psychological momentum exhibit superior performance, with a focus on offensive aspects, indicating increased confidence and the ability to influence the course of the match.

Overall, these results underscore the importance of psychological momentum in determining player performance, with high momentum tending to improve offensive performance, while low momentum is associated with greater defensive performance and fewer goals.

These findings are consistent with the study (Iso -Ahola & Dotson , 2016), which indicates that psychological momentum plays a crucial role in goal pursuit. Thus, successive periods of success are a key characteristic of high performance levels. This means that top performers perceive and experience success momentum more frequently, harness it for as long as possible, and, as a result, ultimately become more successful. Theoretically, momentum is a fundamental mode of performance that significantly increases future success and facilitates goal achievement. Overall performance is therefore comprised of momentum events that vary in frequency and duration. The higher the frequency and duration, the greater the likelihood of success. Research suggests that the main psychological processes that support momentum effects are confidence, perceived competence, and internal attribution (ability and skill). Based on related research, it is hypothesized that performance control begins as a conscious process but later becomes a key facilitator of the automatic, unconscious execution of human behavior and performance.

Table 7. Data of psychological momentum scale responses

Mean	St.d	Mediator	T-value (t)
0.67	0.09	0.68	2.54

The table shows mean, standard deviation, hypothetical median, and t-value for the study sample's responses on the psychological momentum scale provides analytical results that illustrate the relationship between players' psychological momentum and performance. The median was 0.67, indicating that the overall level of players' psychological momentum was relatively moderate. The standard deviation of 0.09 showed that the variance between players' responses was low, indicating that most had similar levels of psychological momentum. The median of 0.68 reinforces this result and indicates that the mean values were close to the arithmetic mean. The t-value of 2.54 indicates statistically significant differences between some responses on the psychological momentum scale, reflecting the potential influence of external or psychological factors on performance among the players.

Table 8. Statistical analysis of upper and lower groups in psychological momentum scale

Group	Mean	St.d	Calculated t -value	Sig. (p)
Upper Group	0.75	0.07	3.45	0.001**
Lower group	0.6	0.08		

This table shows the differences between the top and bottom groups on the players' psychological momentum scale. The top group has a higher mean (0.75) and a lower standard deviation (0.07), indicating a high level of psychological momentum and stable performance among members of this group. In contrast, the bottom group has a

lower mean (0.60) and a slightly higher standard deviation (0.08), reflecting lower psychological momentum and greater variability in players' responses. The calculated t-value (3.45) and statistical significance ($p = 0.001$) confirm that these differences are statistically significant, meaning there is a significant difference between the two groups in the level of psychological momentum, which may impact athletic performance.

A statistical description of the responses of the study sample of 150 individuals to the study scale (30 statements) indicates that the arithmetic mean of the responses ranged between 3.5 and 4.15, reflecting a relatively high level of participant responses. The standard deviation ranged between 0.66 and 0.8, indicating limited variation in responses around the arithmetic mean. Items with a higher arithmetic mean (such as Statement 10 with a mean of 4.15) reflect greater agreement among sample members on those statements, while items with a lower arithmetic mean (such as Statement 4 with a mean of 3.5) reflect less consistent responses. Overall, the results indicate convergence in the sample's responses, with slight variation on some items.

Conclusions

This study highlights the significant impact of psychological momentum on the performance of futsal players. The results demonstrate a strong relationship between psychological momentum and player performance in multiple aspects, such as scoring goals, assists, and defensive actions. Psychological momentum has a significant impact on the performance of futsal players. Before the match, psychological momentum was higher, indicating players' readiness and motivation. However, psychological momentum decreased after the match, reflecting the pressures and stress players may experience during competition. There was a positive correlation between psychological momentum and performance measures, with high psychological momentum being more strongly associated with goals scored and assists than defensive actions. This reflects that psychological momentum contributes more to offensive performance than defensive performance, reinforcing the importance of psychological motivation in enhancing players' offensive performance. Psychological momentum is a strong predictor of performance, highlighting the importance of the psychological aspect in training and sports development. Furthermore, the results of the analysis of variance showed statistically significant differences in psychological momentum between teams, indicating the impact of results and performance on the psychological state of players. Psychological momentum is a crucial element in enhancing athletic performance, as it significantly impacts players' results in various aspects of play.

Recommendations

Design and implement training programs focused on enhancing players' psychological momentum, including motivational and emotional control techniques. Conducting periodic assessments of players' psychological momentum levels, allowing them to identify periods when players may need additional support to enhance their performance. Incorporating psychological training techniques, such as meditation and positive visualization, into team training programs to improve psychological momentum and achieve better match performance. Collaborating with sports psychology specialists to provide psychological support to players, enabling them to better cope with the pressures of competition. Create a positive and supportive environment that encourages players to express their feelings and share experiences, which contributes to enhancing collective psychological momentum. It is important to

conduct further studies to explore the effect of psychological momentum in other sports, in order to enhance the comprehensive understanding of its role in athletic performance.

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Introduction

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In futsal, a fast-paced game that requires high concentration and quick decision-making, psychological momentum becomes even more important. Unlike traditional football, this game is played in a smaller space with fewer players, meaning players must always be mentally and physically alert to ensure optimal performance. This game requires high levels of fitness, ball control, quick movement and thinking, as well as the ability to adapt to sudden changes in the flow of a match. Players with strong psychological momentum are able to make accurate decisions under pressure and remain focused throughout the match, regardless of the score or individual performance at specific moments. This state of psychological momentum makes them feel as if they are in a "subconscious" zone, where they make the right decisions instantly without the need for prolonged thought.

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Psychological momentum is a largely unknown concept in sports psychology, especially in its application to team sports . Therefore, the researcher decided to study psychological momentum in the game of football.

Futsal is a sport that requires a high level of mental focus and technical skill. However, many players face psychological challenges that directly impact their performance on the field. Players are exposed to multiple pressures, including intense competition, the expectations of coaches and fans, and the fast-paced nature of matches that require immediate decisions and precise movements . These pressures may lead to a decline in performance or even a failure of the player to perform at his best. Hence, the research problem arises in studying the relationship between psychological momentum and the performance level of futsal players.

Research objectives are A study of the effect of psychological momentum on the performance of futsal league players. Measuring the relationship between the level of psychological momentum and individual and group performance.

Research Methodology

The researcher used the descriptive approach with the correlation method. The research population includes all professional futsal players competing in the National Futsal League during the 2025 season, A stratified random sample of 150 futsal players from 15 league teams was selected, This selection ensures the representation of players from different positions and experience levels. The survey sample was (15 players) and the sample percentage from the community was (10%), as shown in the table below.

Table 1. Research community clubs

9. Basra oil	9. Southern Gas
10. Police	10. Basra Municipality
11. Middle Oil	11. Air Force
12. German resources	12. Eastern
13. Refineries	13. Police mechanisms
14. Baghdad Municipality	14. Basra Youth
15. Air defense	15. Nineveh
16. Popular Mobilization Forces	

Instrument used in this study is Vallerand et al.'s (1988) PM scale , which consists of five items that measure perceptions of psychological momentum in futsal. Each item is rated on a 5- point Likert scale, where 1 indicates " strongly disagree " and 5 indicates "strongly agree." Higher scores reflect greater perceptions of positive momentum, while lower scores indicate negative or neutral momentum states.

In addition to the PM metric , performance metrics are collected from match statistics, including goals scored, assists, passes completed, defensive actions, and overall contribution to team success . Performance metrics provide objective data for analysis alongside psychological momentum scores.

The study is conducted in three stages : First, the scale Vallerand et al.'s (1988) PM scale is applied . Participants were asked to measure their baseline psychological momentum before the start of selected matches. After the matches, players completed the measure again to assess shifts in perceived momentum during the match.

To collect performance data, in-game statistics are collected using official league reports and video analysis software. This ensures accurate performance data is collected for each player. Data from the psychological momentum metric and performance metrics are then combined for statistical analysis to explore the correlations between psychological momentum and player performance.

Measuring psychological momentum

To measure athletes' psychological momentum, Vallerand et al.'s (1988) PM scale was used . This scale, specifically designed to assess athletes' psychological

momentum, consists of 30 items rated on a 5- point Likert scale, with responses ranging from 1 (strongly disagree) to 5 (strongly agree). The items measure different aspects of momentum, such as confidence, control, and emotional energy, making it an ideal tool for assessing how momentum fluctuates during competition.

The scale was administered at two critical points during the study: pre-match and post-match. Players were asked to complete the scale 30 minutes before each match, allowing them to reflect on their pre-match psychological state. The goal of this pre-match assessment was to capture a player's psychological momentum before it was affected by external game influences such as actual play, team discussions, or match results. After the match, players completed the same scale again to record any shifts in perceived momentum during the match. This immediate post-match assessment was crucial for understanding how match events and outcomes impacted players' psychological state.

Data were collected in a controlled environment. Before each match, players completed the scale in a quiet area to ensure minimal distractions and encourage thoughtful responses. After the match, they were immediately instructed to complete the post-match scale in a similarly controlled environment. All responses were digitally recorded on tablets, allowing for seamless data entry into a secure database, minimizing the chance of human error during the data collection process.

The correlation coefficient between the item score and the total score of the psychological momentum scale reveals a variety of relationships between the various items on the scale and the overall score. The correlation coefficient (r) values range from 0.53 to 0.8, indicating moderate to strong positive relationships between most items and the total score. Item 4 shows the highest positive correlation (0.8), meaning that players' responses to this item are strongly related to their overall performance in psychological momentum. In contrast, Item 12 shows the lowest correlation (0.53), which may indicate that this item may not adequately reflect players' overall psychological momentum. Overall, the results indicate that psychological momentum is an important factor influencing players' performance in the futsal league, reinforcing the importance of measuring these aspects to develop appropriate psychological support strategies.

Collect performance metrics

Performance metrics were collected from two main sources: official league statistics and video analysis software. Official statistics provided basic data such as goals scored, assists, defensive actions, passes completed, and other key performance indicators of the game. These statistics were compiled by league officials who regularly tracked the data for official reporting purposes, ensuring a high degree of accuracy and consistency across matches. However, to supplement these statistics and provide a more detailed analysis of individual performance, video footage from matches was analyzed using specialized sports analysis software, such as Sportscore or Dartfish.

Trained analysts reviewed video recordings of each match to track additional performance metrics not fully captured in official statistics . These included details such as high-intensity running, off-the-ball movements, player positioning, and pass quality . This additional data allowed the study to capture a more comprehensive view of each player's performance, particularly in areas where official statistics may not fully reflect their contributions.

Scale validity

The validity of the PM scale was confirmed through content verification and previous studies that confirmed its applicability in measuring psychological momentum in sports, especially futsal. The validity of the scale in the context of this study was also confirmed through pilot testing with a small sample of futsal players, which showed that participants could effectively relate to the scale items.

Scale reliability

PM scale in this study was assessed using Cronbach's alpha, which yielded a reliability coefficient of $\alpha = 0.81$, indicating high reliability. Test-retest reliability was also performed by re-evaluating a subset of participants one week after the initial test, yielding a reliability score of 0.79.

Statistical analysis

Data collected from the Vallerand PM scale and performance metrics are analyzed using statistical software (SPSS). Descriptive statistics are calculated to summarize momentum scores and performance outcomes. Pearson's correlation coefficient is applied to examine the strength and direction of the relationship between psychological momentum, as measured by the Vallerand PM scale, and in-game performance metrics. Regression analysis is then conducted to determine whether psychological momentum significantly predicts performance outcomes in futsal matches. Additionally, t- tests and ANOVA are used to explore differences in momentum across teams, player positions, and other relevant variables.

Results

Table 2. Descriptive statistics of psychological momentum pre-post-match

Psychological momentum	Average	St.d	minimum	maximum
Pre-match	4.2	0.56	3.1	4.9
Post-match	3.9	0.62	2.8	4.8

in Table 2. indicate that the overall average psychological momentum of the players was higher before the match (mean = 4.2, standard deviation = 0.56) than after the match (mean = 3.9, standard deviation = 0.62). This means that the players, in general, felt higher levels of psychological momentum before the start of the match, while this feeling decreased after the match. This decrease in psychological momentum after the match can be explained by the influence of match events, such as physical effort, psychological pressure, or match results, which may lead to changes in the players' psychological state. The differences between the minimum and maximum values before the match (3.1 to 4.9) and after the match (2.8 to 4.8) also indicate greater variability in psychological momentum after the match, which may reflect the differential effects of the match on the players.

Table 3. Correlation between psychological momentum and performance measures

Variable	Goals scored	Assists	Defensive measures
Psychological Momentum (PM)	0.62**	0.57**	0.45*

score)			
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The results of Table 3. indicate positive correlations between psychological momentum (PM score) and various performance measures for futsal players. The correlation coefficient between psychological momentum and the number of goals scored is 0.62, indicating a strong, positive relationship between the feeling of psychological momentum and players' goal-scoring performance. Similarly, assists are positively correlated with psychological momentum with a coefficient of 0.57, indicating that players who feel a higher level of psychological momentum are more effective at providing assists . For defensive actions, the correlation coefficient is 0.45, which is also positive but less strong than for goals and assists. This suggests that players with high psychological momentum tend to perform well defensively, although the effect on this aspect is less pronounced compared to attack. These results indicate that psychological momentum plays an important role in improving players' overall performance, especially in offensive aspects.

Table 4. Multiple Regression Analysis - Psychological Momentum as a Predictor of Performance

Variable	R ²	R ² Modified	Beta (β)	standard error	t-value	p-value
Goals scored	0.48	0.47	0.62	0.11	7.18	< 0.001
Assists	0.37	0.36	0.57	0.12	6.54	< 0.001
Defensive measures	0.21	0.19	0.45	0.14	3.58	< 0.05

The results in Table 4. indicate that psychological momentum is a strong predictor of performance across various aspects of play, based on multiple regression analysis. For goals scored, an R² value of 0.48 shows that 48% of the variance in the number of goals scored can be explained by psychological momentum, with a beta coefficient (β) of 0.62, meaning that an increase in psychological momentum leads to a significant increase in the number of goals scored. A t- value of 7.18 also strongly supports this relationship, with a statistical significance level of less than 0.001, indicating that this relationship is not due to chance.

For assists, R² is 0.37, indicating that 37% of the variance in assists can be explained by psychological momentum, and a beta coefficient (β) of 0.57 reinforces the positive relationship between psychological momentum and assist ability, which is also supported by a t- value of 6.54 and a statistical significance level of less than 0.001.

For defensive measures, the effect of psychological momentum is less pronounced, with an R² of 0.21 , meaning that only 21% of the variance in defensive performance is explained by psychological momentum. However, the beta coefficient (β) is 0.45 and the t -value is 3.58 , with a significance level lower than 0.05 They indicate that psychological momentum also positively affects defensive performance, albeit to a lesser extent than goals and assists.

Overall, these results confirm that psychological momentum is a strong predictor of players' offensive and defensive performance, especially with regard to scoring goals and providing assists , thus accepting the study hypothesis (there is a statistically

significant relationship between psychological momentum and the performance of futsal players).

These findings are consistent with Qiu et al.'s (2024) study , which indicated that psychological momentum exerts a stronger influence on people's performance expectations than on their performance outcomes. Six experiments (n=2,533) revealed the remarkably consistent finding that experiencing momentum in a competitive setting can enhance performance expectations without actually enhancing performance outcomes. Furthermore, the effect of perceived momentum on expectations, as well as its corresponding zero-sum effect on performance, was robust across players' skill levels, task knowledge, self-efficacy levels, growth mindset, favorite versus underdog status, and various demographic variables. The current paper introduces at least one quantitative measure to compare the effect of momentum perceptions on expectations versus reality. In Experiment 2, performers who gained psychological momentum were 10.18% more likely than performers who lost psychological momentum to predict that they would win a contest they ultimately lost. Psychological momentum not only influences performance expectations, but it can also influence behaviors associated with those expectations: In Experiment 3, players with greater momentum bet more on their performance in the competition than they should. In other words, players sacrificed their own profits to bet on their performance if they believed they were gaining momentum.

Table 5. Results of analysis of variance (ANOVA) for psychological momentum scores among different player categories

variable	Source of variance	Sum of Squares	degrees of freedom (df)	Mean Square	F	p-value
Psychological momentum before the match	Between groups	10.34	2	0.17	3.75	0.12
Post-match psychological momentum	Between groups	13.96	28	5.71	7.34	0.02
Total		23.3	30			

ANOVA table indicate that there were significant differences in psychological momentum between the teams, with a clear contrast in the pre- and post-match scores. For pre-match psychological momentum, the sum of squares between groups was 10.34, with degrees of freedom (df) equal to 2. The mean square was 0.17, yielding an F value (F = 3.75) and a p-value (p-value = 0.12). These values indicate that there were no statistically significant differences between the teams before the match , as the p-value is greater than 0.05, indicating that the players' psychological momentum was similar across the different teams at this stage.

However, the results for post-match psychological momentum show a completely different picture , with the between-groups sum of squares being 13.96, with degrees of freedom (df) equal to 28, The mean square was 5.71, which resulted in a value of (F = 7.34) and a probability value of (p-value = 0.02). These values indicate the

presence of statistically significant differences between the teams after the match, as the probability value is less than 0.05, which indicates the impact of the match results on psychological momentum.

These results indicate that post-match psychological momentum is influenced by factors related to team performance, which may reflect players' experiences and their impact on their psychological state, supporting the study hypothesis (there is a statistically significant relationship between psychological momentum and psychological factors related to concentration, motivation, and anxiety).

These findings are consistent with a study by Briki et al. (2012), which examined the dynamics of competitive anxiety and self-confidence, as well as the relationships between these variables, during athletes' experiences of psychological momentum (PM). National-level male table tennis players (Study 1) and swimmers (Study 2) watched one of their recent competitions, which included the experience of psychological momentum. At the same time, they indicated their moment-to-moment levels of competitive anxiety and self-confidence using a computer mouse. Curve estimation showed that competitive anxiety and self-confidence decreased and increased over time, respectively. Furthermore, the dynamic patterns were less linear for swimmers than for table tennis players, suggesting that the experience of psychological momentum depends on the sport context. Consistent with the opposing dynamics of competitive anxiety and self-confidence, correlation analyses revealed a strong negative relationship between these variables, suggesting that psychological momentum moderates the relationship between competitive anxiety and self-confidence. The findings of this study provide new insights into the dynamics of psychological momentum and its environmental implications.

Recently, Gernigon and colleagues examined in more detail how various psychological variables change during momentum (Briki et al., in press; Gernigon et al., 2010). Gernigon et al. (Gernigon et al., 2010, Experiment 1) studied the effect of a positive momentum scenario (i.e., winning 10 consecutive points) on the dynamics of competitive anxiety and self-confidence when participants empathized with a table tennis player on a screen. They found that cognitive anxiety—negative worries about performance and somatic anxiety perceptions of the physical symptoms of competitive anxiety decreased linearly, whereas self-confidence increased linearly. Based on these findings, Gernigon et al. (2010) concluded that positive PM develops gradually. To examine PM qualitatively, Briki et al. (in press) interviewed table tennis players and swimmers individually about their PM experiences during an important competition. The results showed that positive competitive anxiety was associated with both an increase in positive affect (e.g., self-confidence) and a decrease in negative affect (e.g., anxiety). Furthermore, positive competitive anxiety appeared to emerge in response to an unexpected positive event or situation, which was more favorable than the current situation. This finding suggests that positive competitive anxiety can emerge suddenly and thus increase abruptly.

Table 6. Summary of player performance across psychological momentum score categories

Psychological Momentum Class	Number of players	Average goals	Average assists	Average defensive measures
Low Momentum (1-3)	35	1.8	1.4	7.5
Medium Momentum (4-5)	52	3	2.5	6.1

High Momentum (6-7)	63	4.4	3.8	5
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The results of Table 6. a summary of player performance across psychological momentum categories, reflect a clear relationship between psychological momentum levels and player performance in the areas of goals, assists, and defensive actions. The samples are divided according to psychological momentum categories into three levels: low momentum, medium momentum, and high momentum.

In the low momentum category (1-3), 35 players were observed, averaging 1.8 goals, 1.4 assists, and 7.5 defensive actions. These results suggest that players with low psychological momentum tend to perform poorly offensively, relying more on defense, which may reflect anxiety or a lack of confidence in their abilities.

As for the medium momentum category (4-5), which includes 52 players, the average goals scored is 3, the average assists is 2.5, and the defensive actions are 6.1. These figures indicate a significant improvement in performance compared to the low momentum category, reflecting that balanced psychological momentum helps players achieve better results.

Finally, in the high momentum category (6-7), which includes 63 players, they average 4.4 goals, 3.8 assists, and 5 defensive actions. These results demonstrate that players with high psychological momentum exhibit superior performance, with a focus on offensive aspects, indicating increased confidence and the ability to influence the course of the match.

Overall, these results underscore the importance of psychological momentum in determining player performance, with high momentum tending to improve offensive performance, while low momentum is associated with greater defensive performance and fewer goals.

These findings are consistent with the study (Iso -Ahola & Dotson , 2016), which indicates that psychological momentum plays a crucial role in goal pursuit. Thus, successive periods of success are a key characteristic of high performance levels. This means that top performers perceive and experience success momentum more frequently, harness it for as long as possible, and, as a result, ultimately become more successful. Theoretically, momentum is a fundamental mode of performance that significantly increases future success and facilitates goal achievement. Overall performance is therefore comprised of momentum events that vary in frequency and duration. The higher the frequency and duration, the greater the likelihood of success. Research suggests that the main psychological processes that support momentum effects are confidence, perceived competence, and internal attribution (ability and skill). Based on related research, it is hypothesized that performance control begins as a conscious process but later becomes a key facilitator of the automatic, unconscious execution of human behavior and performance.

Table 7. Data of psychological momentum scale responses

Mean	St.d	Mediator	T-value (t)
0.67	0.09	0.68	2.54

The table shows mean, standard deviation, hypothetical median, and t-value for the study sample's responses on the psychological momentum scale provides analytical results that illustrate the relationship between players' psychological momentum and performance. The median was 0.67, indicating that the overall level of players' psychological momentum was relatively moderate. The standard deviation of 0.09 showed that the variance between players' responses was low, indicating that most

had similar levels of psychological momentum. The median of 0.68 reinforces this result and indicates that the mean values were close to the arithmetic mean. The t-value of 2.54 indicates statistically significant differences between some responses on the psychological momentum scale, reflecting the potential influence of external or psychological factors on performance among the players.

Table 8. Statistical analysis of upper and lower groups in psychological momentum scale

Group	Mean	St.d	Calculated t -value	Sig. (p)
Upper Group	0.75	0.07	3.45	0.001**
Lower group	0.6	0.08		

This table shows the differences between the top and bottom groups on the players' psychological momentum scale. The top group has a higher mean (0.75) and a lower standard deviation (0.07), indicating a high level of psychological momentum and stable performance among members of this group. In contrast, the bottom group has a lower mean (0.60) and a slightly higher standard deviation (0.08), reflecting lower psychological momentum and greater variability in players' responses. The calculated t-value (3.45) and statistical significance ($p = 0.001$) confirm that these differences are statistically significant, meaning there is a significant difference between the two groups in the level of psychological momentum, which may impact athletic performance.

A statistical description of the responses of the study sample of 150 individuals to the study scale (30 statements) indicates that the arithmetic mean of the responses ranged between 3.5 and 4.15, reflecting a relatively high level of participant responses. The standard deviation ranged between 0.66 and 0.8, indicating limited variation in responses around the arithmetic mean. Items with a higher arithmetic mean (such as Statement 10 with a mean of 4.15) reflect greater agreement among sample members on those statements, while items with a lower arithmetic mean (such as Statement 4 with a mean of 3.5) reflect less consistent responses. Overall, the results indicate convergence in the sample's responses, with slight variation on some items.

Conclusions

This study highlights the significant impact of psychological momentum on the performance of futsal players. The results demonstrate a strong relationship between psychological momentum and player performance in multiple aspects, such as scoring goals, assists, and defensive actions. Psychological momentum has a significant impact on the performance of futsal players. Before the match, psychological momentum was higher, indicating players' readiness and motivation. However, psychological momentum decreased after the match, reflecting the pressures and stress players may experience during competition. There was a positive correlation between psychological momentum and performance measures, with high psychological momentum being more strongly associated with goals scored and assists than defensive actions. This reflects that psychological momentum contributes more to offensive performance than defensive performance, reinforcing the importance of psychological motivation in enhancing players' offensive performance. Psychological momentum is a strong predictor of performance, highlighting the importance of the psychological aspect in training and sports development. Furthermore, the results of the analysis of variance showed statistically significant differences in psychological momentum between teams, indicating the impact of results and performance on the psychological state of players. Psychological

momentum is a crucial element in enhancing athletic performance, as it significantly impacts players' results in various aspects of play.

Recommendations

Design and implement training programs focused on enhancing players' psychological momentum, including motivational and emotional control techniques. Conducting periodic assessments of players' psychological momentum levels, allowing them to identify periods when players may need additional support to enhance their performance. Incorporating psychological training techniques, such as meditation and positive visualization, into team training programs to improve psychological momentum and achieve better match performance. Collaborating with sports psychology specialists to provide psychological support to players, enabling them to better cope with the pressures of competition. Create a positive and supportive environment that encourages players to express their feelings and share experiences, which contributes to enhancing collective psychological momentum. It is important to conduct further studies to explore the effect of psychological momentum in other sports, in order to enhance the comprehensive understanding of its role in athletic performance.

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