



# JOURNAL OF SOCIAL SCIENCES DEVELOPMENT

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ENHANCING PLAYER PERFORMANCE THROUGH LADDER TRAINING: THE  
MEDIATING ROLE OF COACHING BEHAVIOR

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KEYWORDS	ABSTRACT
Ladder Training, Coaching Behavior, Player Performance, Players, Higher Educational Institutions, Punjab, Pakistan	The ladder training has emerged as a decisive component in enhancing the players' performance, mainly in sports requiring agility, coordination and speed. This study surveys the role of ladder training in improving players' performance, with mediating effect of coaching behavior. Thus, given the growing competitiveness in sports, understanding these relationships can offer valued insights in adjusting training practices. The quantitative survey was conducted among the football players in higher education institutions. The data was collected over structured questionnaires using the 5-point Likert scale for measuring ladder training effectiveness, coaching behavior, and performance outcomes. The study used different statistical procedures to analyze the direct and indirect relationships among these variables. The results show that ladder training significantly boosts players' performance and coaching behavior mediates relationship, as active coaching increases ladder training benefits over motivation, guidance and structured feedback covering the diverse aspect of performance and abilities of players to realize desired outcomes to chase hypothesized relationships by extracting certain recommendations to policy-makers and future researchers about the issues under considerations.
ARTICLE HISTORY	 2024 Journal of Social Sciences Development
Date of Submission: 17-11-2024	
Date of Acceptance: 20-12-2024	
Date of Publication: 22-12-2024	
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Email:	muhammad.ishaq@uog.edu.pk
DOI	<a href="https://doi.org/10.53664/JSSD/03-04-2024-07-60-70">https://doi.org/10.53664/JSSD/03-04-2024-07-60-70</a>

INTRODUCTION

The ladder training is recognized for its effectiveness in improving speed, agility, coordination and athletic performance as studies show that agility ladder drills boost neuromuscular coordination, leading to better balance, reaction time and measure efficiency (Vidhi & Dave, 2024). The strong coaching strategies like providing the inspiration, constructive feedback and training structured

routines, donate to improved psychological readiness and skill acquisitions (Hyun & Cruz, 2016). Besides, the ladder drills improve acceleration and speed, as essential for high-performance sports. The research suggests that autonomy and supportive-driven coaching boosts the engagement and adherence to training regimens, thereby increasing benefits of ladder training (Robin & Raj, 2019). The coaching behavior plays vital role in shaping players' motivation and performance. The studies highlight that agility-based training, like ladder drills, fosters resilience by indorsing confidence, flexibility and mental toughness (Fletcher & Sarkar, 2012). The interface amid these factors backs to greater athletic performance, mainly in competitive sports fosters not only physical agility but mental resilience (Afonso, Costa, Camões, Silva, Lima & Clemente, 2020). Thus, ladder training serves as active tool for refining players' performance, but its impact is exploited when mediated by coaching behavior.

The ladder training is the widely used agility-based exercise regimen that enhances the athletes' speed, coordination, balance, and physical performance as controlled nature of ladder training allows to develop higher motor skills, leading to improve on-field performance, athletic efficiency and injury prevention (Pardana, Maulang & Gondo, 2020). This form of training involves rapid footwork drills performed on an agility ladder, that improves reaction time, direction, and explosive movements as crucial elements in sports (Prakash, Sadvika, Chakravarthi & Kumar, 2021). The reinforcement techniques, motivational plans, and ability to offer organized guidance from coaches can significantly influence the athletes' skill development and engagement, plays crucial role in maximizing effectiveness of ladder training, fosters environment that boosts discipline, learning, and adaptability, making training more impactful (Hodge & Lonsdale, 2011). The ladder training, when accompanied by coaching positive behavior, can enhance players' emotional resilience by instilling discipline, boosting confidence and refining stress management. It helps in leading better reaction time in sports boosts balance and coordination thereby improving movement efficiency and develops explosive power, crucial factor in competitive performance (Padrón, Martínez, Pérez, Costa & Rey, 2021).

The research suggests that agility training improves the motor learning and movement efficiency, leading toward better sports performance across disciplines. The coaching behavior plays crucial role in moderating impact of ladder training on player performance (Amorose & Butcher, 2007). A positive coaching climate boosts athlete commitment, reinforcing effectiveness of ladder drills, coaches who stress mental robustness and strategic training help the athlete apply ladder training outcomes in rivalry as real coaching influences athlete engagement, skill acquisition and mental readiness (Isoard, Guillet & Lemyre, 2012). The coaches bargain structured criticism, adjusting the benefits of ladder training to athletes' ability to cope with pressure, while maintaining crowning performance for success (Rynne, Mallett & Rabjohns, 2016). The repetitive drills under competitive environments improve emotional regulation, crucial for high-pressure game situations as success in agility-based drills builds confidence, reinforcing resilience in competitive situations (Pramod & Divya, 2019). The ladder training alone improves physical attributes, its impact is significantly enhanced when coupled with effective coaching strategies and psychological resilience-building, leading to greater players' performance in sports (Pawar & Borkar, 2018), yields greater benefits towards the success.

### Objectives & Hypotheses

1. To examine association among ladder training, coaching behavior and players' performance (Correlation-H1).
2. To examine mediating role of coaching behavior in relationship amid ladder training and players' performance (Mediation-H2).

### LITERATURE REVIEW

The existing literature on the role of ladder training in enhancing players' performance, considering the mediating effects of coaching behavior, is comparatively limited. Still, the related studies offer valuable insights into how agility training, coaching styles, and mental toughness mutually impact the players' performance (Smurti & Borkar, 2018). While studies on ladder training direct impact are unusual, agility training, in general, has been linked with enhanced player performance. The ladder training, a form of agility exercise, is designed to improve player coordination, speed, and footwork (Pratheep & Kumaret, 2019). The effectiveness of training programs, including agility drills like ladder training, is influenced significantly by coaching behavior. It stresses importance of uniting general preparation exercises, like agility drills, to develop basic skills (Vallimurugan, Gowtham, Kumaran & Pavithra, 2022). This suggests that coaches who provide clear guidance and support can enhance the players' purpose and performance. The coaches can play pivotal role in developing resilience by helping players to manage emotions and develop coping real policies (Cassidy, Jones & Potrac, 2008). Thus, combining physical training with mental skills development is vital for inclusive player development to overcome adverse situations efficiently and to develop training approaches.

The ladder training is a crucial agility drill that enhances coordination, speed and footwork, while studies on ladder training and coaching behavior provides insights that these factors are important in exploiting the player development, improves balance, quickness, reaction time, and movement efficiency, that are crucial for on-field performance in sports like football (Pramod & Divya, 2019). However, its effectiveness is partially significant over coaching behavior that enables the impact of agility training on players performance. The enhanced footwork and agility enable players to evade opponents, make faster decisions, and sustain body control during the gameplay (Vealey, Armstrong, Comar & Greenleaf, 1998). The coaches influence that how effectively ladder training translates into performance developments over motivation, instruction, and structured feedback as studies show that agility-focused drills, including ladder training, bestow better injury prevention and athletic habituation (Côté & Gilbert, 2009). Conversely, the poor coaching behaviors may discourage player growth and reduce training effectiveness. A supportive coach enhances players' consistency, self-confidence, and discipline, making them probable to push their limits in training (Smith, 2020), as mentally hard-hitting athletes are likely to have greater long-term motivation & ultimate performance.

The effective coaching behavior ensures that ladder training is implemented properly, keeping players focused, motivated, and committed to perfection while resilience is athlete's ability to cope with setbacks, overcome challenges, and sustain inspiration in pressure (Hodge & Lonsdale, 2011). The coaches play significant role in developing the psychological resilience in player by fostering

growth mindset and training positive culture as training environments that build resilience to allow athletes to use agility training tool for mental and physical growth (Rynne, Mallett & Rabjohns, 2016). Thus, inspiring players to embrace challenges, focus on the effort, develop stronger mental approach to training along with supportive coaching fosters resilience towards better motivations and performance outcomes (Fletcher & Sarkar, 2012). The ladder training provides the physical benefits but is most effective when the coaching behavior and resilience are optimized and when players trust their coach, they are receptive more to feedback, less afraid of making the mistakes (Vallimurugan, Gowtham, Kumaran & Pavithra, 2022). The coaching behavior acts as enabler, ensuring that training is structured, engaging, goal-oriented and resilience that ensures sustain the performance under pressure (Isoard, Guillet & Lemyre, 2012). These elements thus work together to boost mental toughness, performance, and adaptability in competitive sports to improve balance and coordination.

For ladder training to boost player performance, it must be integrated with the effective resilience-building techniques and coaching strategies as enhanced motor control resulting in better skill execution and fluid measure transitions (Pawar & Borkar, 2018). So, enhancing engagement and motivation through positive reinforcement and strategic feedback, fostering tactical and technical understanding, helping players to apply agility skills in the real game situations (Hollembeak & Amorose, 2005). Challenging athletes through high-intensity drills, forcing them adapt to fatigue and stress, building mental toughness can fosters confidence in handling the game competitive challenges (Vidhi & Dave, 2024). The ladder training alone enhances the physical attributes, but when combined with the effective coaching and emotive resilience-building, it results in greater performance, intellectual adaptability, and viable success (Robin & Raj, 2019). The ladder training, form of agility exercise, is designed and emphasizes the importance of designing and implementing plans for consistent performance in pressure, highlighting the need for resilience alongside physical training (Pardana et al., 2020). The athletes with higher psychological resilience are better able to engage completely in ladder training, apply skills in the competitive settings, and maintain under pressure performance.

The ladder training is the form of agility training that improves athletic performance. It is used in sports to expand players' reaction time, measure efficiency, and endurance, improves coordination, allowing players to change direction quickly (Padrón, Martínez, Pérez, Costa & Rey, 2021). It helps in the rapid deceleration and acceleration movements, as it is essential in competitive sports as high-intensity ladder drills improve heart rate, ensuring players to sustain energy during games (Ninig, 2019). It is beneficial for the sports like basketball, soccer, and tennis, where quick lateral movements are crucial, and crucial for sports precision movements like gymnastics, martial arts boosts concentration, focus, and confidence as athletes develop better control over their movements (Robin & Louis, 2019). It strengthens the brain-muscle connection, leading to faster reaction times, refining power and stability in movements that further improves movement and reaction time across competition (Pramod & Divya, 2019). It rises explosiveness and speed in sprinting events as ladder training is used in agility, speed training method that involves performing various footwork drills using agility ladder placed on ground, helps stability and body control (Vallimurugan et al.,

2022), reducing risk of injuries and rallies footwork for defensive and dribbling positioning that are required for success.

The ladder training created from footwork traditional drills used in track-and-field training and martial arts is usually incorporated into the training regimens across the multiple sports, including basketball, soccer, and football, to improve control and movement efficiency (Syarulniza, Aziz & Lim, 2015). In drive research suggests that consistent ladder training improves the players' ability to change direction rapidly, which is crucial for sports that require agility and explosive movements (Kusnanik & Rattray, 2017). The ladder training is widely recognized for its ability to boost key physical attributes like agility, speed, coordination and footwork, which are essential to a player's performance, mainly in football (Kumar & Kumar, 2020). Understanding how these components relate to one another is crucial for maximizing training outcomes and fostering long-term player growth, improve agility, empowering faster directional changes and reaction times (Vidhi & Dave, 2024). The repetitive foot movements in the ladder drills improve the balance and coordination, essential for the rapid movements or when challenged by opponents. This directly enhances player ability to move across the field, react to the opposition, and maintain possession under the pressure as effective coaching includes providing positive reinforcement and useful feedback that builds players' self-confidence.

### RESEARCH METHODOLOGY

The objective of study is to investigate the role of ladder training in enhancing players' performance with mediating roles of coaching behavior. This research design pays to understanding that how ladder training, when combined with coaching behavior, boosts players' performance in sports (Saunders, Thornhill & Lewis, 2007). The research is conducted by using quantitative design with basics of longitudinal analysis. This design allows researcher to examine affiliation amid variables by conducting research on particular issues in certain context for desired consequences (Zikmund, Babin, Carrid & Griffin, 2010). The purpose of research strategy is to comprehend the role of ladder training in attractive players' performance, focusing on mediating role of resilience and coaching behavior (Chawla & Sondhi, 2011). The quantitative approach ensured through survey defines the ways which defines how objectives are aimed to be chased through different approaches towards applications toward the desired outcomes to reach desired leading conclusion (Saunders, Thornhill & Lewis, 2007).

The target population for the study consists of football players from higher institutions in Punjab, Pakistan. These players are typically part of university-level football teams and participate in the football training sessions, that may include physical training methods likewise the ladder training aimed at enlightening their performance. The population comprised 1284 students who are football players from selected universities while sampling is determined over sampling formula (Yamane, 1967). and sample of 305 was selected. Thus, 305 questionnaires were distributed wherein 288 were recollected and used for analysis. The current research study used both secondary and primary sources and analyzed through different procedures as per the nature and requirements of study. The scales were adopted from the previous studies by using the 5-point Likert measure. This ensures transparency, and ethical treatment of participants and remain confidential and thus anonymized.



Similarly, the mediation process provides the details accurate regarding the additional statistical information in study.

## RESULTS OF STUDY

The results of current study have been produced in this section in order to prove the details about the research outcomes regarding the hypothesized relationships amid variables that were assumed through different hypotheses in order to reach the anticipated conclusion as required for making suitable and required decisions about the hypotheses of study concerning acceptance and rejection in current study.

Table 1 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Ladder Training	288	1.30	4.80	3.1513	.78551
Coaching Behaviour	288	1.80	4.60	3.1782	.79213
Players' Performance	288	1.70	4.70	3.3878	.61425
Valid N (listwise)	288				

The descriptive statistics provides the details about research variables in terms of sample, mean, minimum and maximum response rates and SD to provide all-inclusive details about the research variables. The results in study regarding descriptive showed that all the variables have significant values within threshold parameters to help in determining the desired descriptions in terms of the required restrictions.

H1: There is significant association amid ladder training, coaching behavior, player performance (correlation analysis).

Table 2 Correlations Analysis

		[1]	[2]	[3]
Ladder Training [1]	Pearson Correlation	1	.427**	.631**
	Sig. (2-tailed)		.000	.000
	N	288	288	288
Coaching Behaviour [2]	Pearson Correlation	.427**	1	.380**
	Sig. (2-tailed)	.000		.000
	N	288	288	288
Players' Performance [3]	Pearson Correlation	.631**	.380**	1
	Sig. (2-tailed)	.000	.000	
	N	288	288	288

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

The results of correlation procedure while determining the association amid research variables in terms of strength and direction in relationships amid predicting, mediating and criterion variables of current study as hypothesized from the theoretical framework of the present research study. The results of correlation confirmed the existence of association among the variables as all predictors and significantly associated with criterion variables (players' performance), like ladder training (R

= .631 & P-value = .000), coaching behaviour ( $R = .380$  & P-value = .000), hypothesis is accepted from results of correlation.

H2: There is significant mediating role of coaching behavior in the relationship between ladder training and players' performance (Mediation Analysis).

### First Mediation Steps (a)

Table 3 Mediation Analysis (Model Summary)

R	R-square	MSE	F	df1	df2	p
.4269	.1823	.5149	76.5653	1.0000	286.0000	.0000

Table 4 Mediation Analysis (Coefficient)

Model	Coefficient	se	t	p	LLCI	ULCI
Constant	1.8214	.1459	12.4823	.0000	1.5342	2.1087
Ladder Training	.4305	.0492	8.7502	.0000	.3337	.5274

Predicting Variable: Ladder Training

Criterion Variable: Coaching Behavior

### Second & Third Mediation Steps (b & c)

Table 5 Mediation Analysis (Model Summary)

R	R-square	MSE	F	df1	df2	p
.6426	.4129	.2231	112.4876	2.0000	285.0000	.0000

Table 6 Mediation Analysis (Coefficient)

Model	Coefficient	se	t	p	LLCI	ULCI
Constant	1.6421	.1307	12.5626	.0000	1.3848	1.8994
Coaching Behavior	.1050	.0420	2.5024	.0129	.0224	.1876
Ladder Training	.4481	.0401	11.1790	.0000	.3692	.5270

Predicting Variable: Ladder Training & Coaching Behavior

Criterion Variable: Players' Performance

### Fourth Mediation Step (c)

Table 7 Mediation Analysis (Model Summary)

R	R-square	MSE	F	df1	df2	p
.6308	.3979	.2280	203.8046	1.0000	286.0000	.0000

Table 8 Mediation Analysis (Coefficient)

Model	Coefficient	se	t	p	LLCI	ULCI
Constant	1.8334	.1153	15.9035	.0000	1.6065	2.0603
Ladder Training	.4933	.0346	14.2760	.0000	.4253	.5613

Independent Variable: Ladder Training

Dependent Variable: Players' Performance

The mediation procedure was used to examine the mediating role of coaching behavior in linking between ladder training and players' performance by using four different paths of mediation while determining the direct and indirect relationships. The first mediation path revealed that there is 18.23% change in coaching behaviour is due to ladder training with significant impact ( $\beta = .4305$  &  $P\text{-values} = .000$ ). The second and third paths revealed that there is 41.29% change in player performance is due to ladder training ( $\beta = .4481$  &  $P\text{-values} = .000$ ), and coaching behavior ( $\beta = .1050$  &  $P\text{-values} = .000$ ). The fourth path revealed that there is 39.795 change in the players' performance is due to ladder training which consequently confirmed that the coaching behaviour mediated the links amid ladder training and players' performance due to decrease in coefficient values from (.4933) to (.4481) while determining direct and indirect relationship and hypothesis is partially accepted.

## DISCUSSIONS

The coaching behavior that encourages focused effort, mentality, and positive habits has a direct impact on players' performance, especially, using drills like ladder training to recognize individual needs of players and tailor drills to overcome their weaknesses and capitalize on strengths (Rynne, Mallett & Rabjohns, 2016). In context of ladder training, actual drill and makes mistake, resilience enables them to persevere and continue working toward improvement to remain calm in pressure (Robin & Louis, 2019). The ladder training is not only physical exercise but mental challenge as players with mental toughness can perform well, enduring physical and emotional challenges, such as fatigue, or external pressure (Syarulniza, Aziz & Lim, 2015). The ability to continue performing the drills effectively, even when tired, helps develop the mental toughness. Thus, this process of overcoming failure and striving for perfection in perseverance, and regulation, are key components of psychological resilience (Kumar & Kumar, 2020). The repetition involved in ladder training teaches players to stay focused and persistent, even when faced with the challenge of mastering a skill or technique (Vidhi & Dave, 2024). By promoting a growth mindset to push through difficult training moments, it helps build psychological resilience, which can improve their ability handle adversity in competition.

A coach who offers consistent support, encouragement, and positive reinforcement help players develop greater sureness self-belief, two key aspects of resilience. The relationship amid coaching behavior and resilience is pivotal for fostering the mentally tough helps players feel contented handling setbacks and refining over time (Hollembeak & Amorose, 2005). The coaching behavior directly influences the development of resilience, in turn improves players' performance, mainly in challenging training to bounce back from the mistakes and persist through challenging training sessions (Côté & Gilbert, 2009). This approach inspires players to be resilient in the face of failure, enhancing both their mental strength and performance, coaches who stress effort over outcome and foster a growth mindset help players see challenges as opportunities for improvement rather than setbacks (Isoard, Guillet & Lemyre, 2012). The coaches are instrumental in improving effectiveness of ladder training by providing the clear instructions, demonstrating drills, offering constructive feedback, and adjusting the difficulty level to suit individual players' needs (Hyun & Cruz, 2016). The guidance and emotional support provided by coaches are crucial in developing the players'



resilience as effective coaching influences performance by focusing not only on physical skills but, motivation, and confidence.

The effective ladder training enhances key physical skills, but it also provides an opportunity to develop mental resilience crucial for athletes. The links amid ladder training, players' performance, coaching behavior and resilience are interdependent (Robin & Louis, 2019). The coaches play essential role by designing the training that builds physical capabilities psychological toughness, ensuring that players can perform at highest level under pressure (Rynne, Mallett & Rabjohns, 2016). The coaches' guidance, motivation, and instructional approach influence efficiency of ladder training. The psychological resilience plays key role in helping athletes sustain motivation, handle setbacks, and stay committed to their training goals (Hyun & Cruz, 2016). The proper execution of ladder training under structured coaching can help minimize movement inefficiencies and injuries, ensuring long-term benefits for athletes across various sports (Pramod & Divya, 2019). The coaches boost players' morale by reinforcing positive outcomes and providing useful feedback. A helpful coaching style fosters self-confidence, hopeful athletes to push limits, coaches' meticulous errors in prevent injuries (Vidhi & Dave, 2024). The study findings serve as foundation for future research on sports psychology, performance enrichment, inspiring interdisciplinary studies in sports science and behavioral psychology

### CONCLUSION

This research aimed to examine the role of ladder training in striking players' performance, via mediating effects of coaching behavior. The findings provide evidence that ladder training impacts on players' performance across various metrics, with the notable augmentation in direction, agility, and ability. Besides, study revealed that coaching behavior contributes to exploiting assistances of ladder training, particularly over motivation, individualized feedback, thereby fostering positive learning environment. The study emphasizes the value of holistic coaching approach that addresses both physical and psychological aspects of athlete developments. It underlines standing of mixing psychological training with physical skill developments. While ladder drills improve the players' physical agility, their factual potential is realized when supported by effective coaching strategies and strong psychological resilience. This research has important practical implications for sports training programs as coaches are inspired to integrate psychological resilience training alongside the physical drills to foster well-rounded athletes that can not only excel physically but cope also with mental demands of competitive sports, findings confirm that ladder training openly enhances the players' performance.

### Recommendations

1. The research may focus on to assess how training and resilience coaching behavior effect not only immediate performance gains but long-term athletic development, mental toughness, and career longevity.
2. Understanding how combination of these factors influences performance across diverse groups may help coaches to design the skill-specific interventions that maximize the player developments and outcomes.

3. The research could investigate that how cultural factors (individual vs. team-oriented sports, different national or training styles) influence integration of ladder training, coaching, and psychological resilience.

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