Dialogue Social Science Review (DSSR)
www.thedssr.com

ISSN Online: 3007-3154
ISSN Print: 3007-3146

DIALOGUE SOCIAL SCIENCE REVIEW

Vol. 4 No. 6 (June) (2026)

Effect Of Front Leg Brace On Bowling Speed of Cricket Fast Bowlers

Hafiz Ghulam Nabi (Corresponding Author)
Department of Sport Sciences and Physical Education, University of the Punjab, Lahore.
hafiznabi2601@gmail.com

Rida Qasim
Department of Sport Sciences and Physical Education, Faculty of Allied Health Sciences, Superior University, Lahore

Muhammad Abdul Jabar Adnan
Department of Sport Sciences and Physical Education, University of the Punjab, Lahore

Samra Naz
Higher Education Department, Government of the Punjab, Lahore

Mudassir Roy
Department of Sport Sciences and Physical Education, University of the Punjab, Lahore

Tahira Fozia
Higher Education Department, Government of the Punjab, Lahore

Sehab Afzal
Department of Sport Sciences and Physical Education, University of the Punjab, Lahore

ABSTRACT
Cricket fast bowling is a dynamic, high-intensity activity in which bowlers repeatedly deliver the ball at maximum velocity. The front leg brace (FLB) in which the braced front leg functions as a biomechanical brake to channel run-up momentum into ball release speed has been theoretically linked to faster deliveries, yet empirical evidence among mixed-gender populations remains limited. This study investigated the effect of FLB on bowling speed among fast bowlers, and examined gender-based differences in FLB utilization and resultant ball release speed. A quantitative, quasi-experimental design was employed with a purposive sample of 50 fast bowlers (25 male, 25 female) recruited from cricket clubs in Lahore, Pakistan. Self-reported, 7-item Likert-scale questionnaires measuring FLB use and perceived bowling speed were administered (Cronbach's $\alpha = .811$ and .817, respectively). Pearson correlation, linear regression, and independent-samples t-tests were performed using SPSS (v. 26.0). Results revealed a statistically significant positive correlation between FLB use and bowling speed ($r = .728$, $p < .01$). Linear regression confirmed FLB as a significant positive predictor of bowling speed ($\beta = .728$, $R^2 = .530$, $F = 54.035$, $p < .05$). Male fast bowlers demonstrated significantly higher FLB utilization ($M = 24.80$ vs. 15.52, $t = 12.782$, $df = 48$, $p < .001$) and significantly higher bowling speed scores ($M = 24.80$ vs. 16.08, $t = 10.736$, $df = 48$, $p < .001$) compared to female fast bowlers. The study concludes that the FLB technique positively and significantly affects bowling speed, and that notable gender differences exist in its application. These findings carry practical implications for coaching, talent identification,

Dialogue Social Science Review (DSSR)
www.thedssr.com

ISSN Online: 3007-3154
ISSN Print: 3007-3146

DIALOGUE SOCIAL SCIENCE REVIEW

Vol. 4 No. 6 (June) (2026)
and strength-and-conditioning programs for fast bowlers.

Keywords: Front Leg Brace, Bowling Speed, Cricket Fast Bowling, Biomechanics, Gender Differences

1. INTRODUCTION

Cricket, the world's second most widely participated sport, is a bat-and-ball contest between two teams in which fast bowlers attempt to dismiss batsmen by delivering the ball at maximum speed. Ball release speed is widely recognized as a primary determinant of fast bowling success, as faster deliveries reduce the batsman's available decision-making and stroke-execution time, thereby increasing the probability of dismissal (RohIllA et al., 2022). A bowler's capacity to generate high ball release speeds is therefore of considerable strategic and competitive importance at all levels of the game.

The front foot contact (FFC) phase the interval between front foot landing and ball release has been identified as critical to the achievement of high ball release speeds. During this phase, the front leg acts as a mechanical brake, halting the forward momentum of the lower body and transferring kinetic energy upwards through the trunk and bowling arm into the ball. This braking mechanism, known as the Front Leg Brace (FLB), converts horizontal run-up momentum into angular velocity of the bowling arm, thereby amplifying ball release speed (Worthington et al., 2013). Elite fast bowlers who achieve a well-braced, extended front leg at FFC are consistently observed to generate greater ball release speeds than those with more flexed or passive front leg mechanics (Felton et al., 2020; Wormgoor et al., 2010).

Previous biomechanical literature has established that the fastest bowlers display a combination of key technique characteristics, including faster run-up speeds, a more extended front leg, increased upper trunk flexion, and a delayed bowling arm circumduction at FFC (Worthington et al., 2013a; Felton et al., 2020; 2023). However, much of this evidence derives from elite male cohorts analyzed through three-dimensional motion capture or computer simulation modelling. Empirical data exploring FLB effects across mixed-gender populations using self-reported instruments and accessible measurement tools remain scarce, particularly within the South Asian cricket context.

Pakistan has produced some of the world's fastest bowlers historically, yet a decline in elite pace bowling has been attributed to inadequate infrastructure, substandard pitches, and insufficient use of sports science knowledge at grassroots and domestic levels (Cricket Lab, 2016). Understanding the role of technique variables such as FLB in bowling speed generation could provide valuable guidance for coaches, administrators, and sport scientists seeking to develop fast bowling talent within the country.

The present study therefore aimed to: (1) investigate the effect of FLB on bowling speed among fast bowlers; and (2) examine gender-based differences in FLB utilization and bowling speed. It was hypothesized that FLB use would be a significant positive predictor of bowling speed, and that male fast bowlers would demonstrate significantly greater FLB utilization and higher bowling speed than female fast bowlers.

2. LITERATURE REVIEW

2.1 Biomechanics of the Front Foot Contact Phase

The front foot contact phase has long been the focus of cricket fast bowling biomechanics research. Glazier et al. (2000) were among the first to demonstrate a strong association between front knee extension during FFC and ball release speed, with more extended front knees consistently linked to faster deliveries. This relationship was

ISSN Online: 3007-3154
ISSN Print: 3007-3146

subsequently corroborated by Wormgoor et al. (2010), who confirmed through anthropometric, biomechanical, and isokinetic strength assessments of high-performance bowlers that greater knee extension at foot contact predicts faster ball release speeds.

Ferdinands et al. (2010) elucidated the mechanism underlying this relationship, demonstrating that efficient energy transfer from the lower to upper body is dependent on the stabilising function of the front leg. Front knee extension enables the pelvis and trunk to rotate effectively about the braced front leg axis, facilitating angular acceleration of the bowling arm. Conversely, instability at the front leg during FFC may compromise ball release speed by disrupting this kinetic chain (Middleton et al., 2016).

Worthington et al. (2013a) identified a set of optimal technique parameters for fast bowling through analysis of 20 elite male fast bowlers using three-dimensional kinematic and ground reaction force (GRF) data. The fastest bowlers exhibited a more extended front leg, increased upper trunk flexion, and a delayed bowling arm circumduction at FFC. Notably, the orientation of the front leg at foot strike was also linked to peak GRF: a larger plant angle and heel-strike technique were associated with lower peak GRFs and longer times to peak force, suggesting potential implications for lumbar stress injury risk reduction alongside performance enhancement (Worthington et al., 2013b).

2.2 Computer Simulation Modelling and Optimization

Advancing beyond group-based experimental designs, Felton et al. (2020) developed and evaluated a planar 16-segment whole-body torque-driven simulation model of the FFC phase. The model demonstrated good fidelity with actual elite performance (4.0% RMS difference). Optimization of activation timings produced a simulated ball release speed 3.5 m/s faster than baseline, through greater front ankle and knee extension, increased trunk flexion, and delayed arm circumduction all consistent with previously identified optimal technique characteristics.

In a subsequent multi-bowler optimization study, Felton et al. (2023) customized and optimized the simulation model for ten elite male fast bowlers, finding that optimal techniques increased ball release speed by 4.8 ± 1.3 m/s (13.5 ± 4.1%) across participants. Common characteristics of the optimal initial body position included more extended front knees and greater shoulder flexion than current performances, reinforcing the centrality of the front leg brace to maximal ball release speed generation.

2.3 Gender Differences in Fast Bowling Technique

Research has identified meaningful biomechanical differences between male and female fast bowlers. Felton et al. (2019) compared elite male and female fast bowlers and found that female bowlers demonstrated a bowling action more reliant on the large rotational torso muscles to generate momentum, rather than the run-up. This distinction likely reflects lower linear momentum at FFC in female bowlers, potentially leading to a reduced braking effect from the front leg brace. Consequently, the differential contribution of FLB to bowling speed may vary meaningfully between male and female fast bowlers.

2.4 Resistance Training and Front Leg Brace Enhancement

Muscular strength of the lower limbs is critical to achieving and maintaining an effective front leg brace during the delivery stride. Resistance training using elastic bands has been widely adopted in sports performance and rehabilitation contexts to develop the leg strength necessary for effective FLB execution (Abe et al., 2000; 2005). Progressive resistance training targeting lower limb power and rate of force development is recommended to support the explosive stabilization demands of the FFC phase (Cadmus-Bertram et al., 2014; Chelly et al., 2010). Bowling velocity can be enhanced by improving both bowling biomechanics and resistance training capacity in tandem (Brumitt & Cuddeford, 2015).

Dialogue Social Science Review (DSSR)
www.thedssr.com

ISSN Online: 3007-3154
ISSN Print: 3007-3146

DIALOGUE SOCIAL SCIENCE REVIEW

Vol. 4 No. 6 (June) (2026)

3. METHODOLOGY

3.1 Research Design

This study employed a quantitative, quasi-experimental design. The Front Leg Brace was operationalized as the independent variable and bowling speed as the dependent variable. An experimental group was assessed with FLB technique and a control group without FLB, allowing direct comparison of outcomes. Gender was included as a demographic variable. Data were also analyzed using a correlational framework to examine the relationship between FLB utilization and bowling speed across the full sample.

3.2 Sample

A purposive sample of 50 fast bowlers (25 male, 25 female) was recruited from cricket clubs in Lahore, Pakistan. All participants were active fast bowlers registered with their respective clubs. Ethical approval was obtained from the relevant cricket club authorities, and informed written consent was collected from all participants. Confidentiality of individual data was assured and maintained throughout the study.

3.3 Instrumentation

Two self-reported, 7-item Likert-scale questionnaires were developed to measure (i) the degree of FLB use during fast bowling delivery and (ii) perceived bowling speed. Each item was scored on a 5-point scale (1 = Strongly Disagree to 5 = Strongly Agree). Reliability analysis confirmed strong internal consistency for both instruments: the FLB questionnaire achieved a Cronbach's alpha of .811 (see Table 1), and the bowling speed questionnaire achieved a Cronbach's alpha of .817 (see Table 2). All corrected item-total correlations exceeded the recommended threshold of .30, confirming item-scale coherence.

Table 1. Reliability Statistics for Front Leg Brace Questionnaire (α = .811)

Item	Scale Mean if Deleted	Scale Variance if Deleted	Corrected Item-Total r	α if Deleted
FLB1	17.72	21.10	.658	.768
FLB2	17.32	20.92	.530	.790
FLB3	17.00	20.82	.586	.779
FLB4	17.08	20.73	.590	.778
FLB5	17.24	21.17	.595	.778
FLB6	17.46	23.40	.419	.806
FLB7	17.14	22.65	.461	.800

Table 2. Reliability Statistics for Bowling Speed Questionnaire (α = .817)

Item	Scale Mean if Deleted	Scale Variance if Deleted	Corrected Item-Total r	α if Deleted
BS1	17.60	21.47	.451	.811
BS2	17.38	20.98	.570	.791
BS3	17.36	19.42	.658	.774
BS4	17.60	20.82	.590	.787
BS5	17.66	20.11	.588	.787
BS6	17.46	20.70	.532	.797
BS7	17.58	22.13	.516	.800

3.4 Procedure

Following receipt of institutional permission, booklets containing both questionnaires were distributed to participants at their respective cricket clubs.

Dialogue Social Science Review (DSSR)
www.thedssr.com

ISSN Online: 3007-3154
ISSN Print: 3007-3146

DIALOGUE SOCIAL SCIENCE REVIEW

Vol. 4 No. 6 (June) (2026)

Standardized verbal instructions were provided by the researcher. Participants completed the questionnaires independently. Confidentiality was assured and data were used exclusively for academic research purposes.

3.5 Data Analysis

Data were analyzed using SPSS Version 26.0. Descriptive statistics (means and standard deviations) were computed for all variables. Pearson correlation analysis was used to examine the bivariate relationship between FLB use and bowling speed. Simple linear regression was performed to assess the predictive effect of FLB on bowling speed. Independent-samples t-tests were conducted to compare male and female fast bowlers on both FLB utilization and bowling speed. The alpha level for statistical significance was set at $p < .05$.

4. RESULTS

4.1 Relationship Between Front Leg Brace and Bowling Speed

Table 3 presents the descriptive statistics and Pearson correlation between FLB use and bowling speed. The FLB scale yielded a mean score of 20.16 (SD = 5.33) and the bowling speed scale a mean of 20.44 (SD = 5.24). A statistically significant, strong positive correlation was observed between FLB use and bowling speed ($r = .728$, $p < .01$), indicating that bowlers who reported greater FLB utilization also reported higher bowling speed levels.

Table 3. Descriptive Statistics and Pearson Correlation between FLB and Bowling Speed

Variable	Mean	Std. Deviation	FLB	BS
Front Leg Brace (FLB)	20.16	5.33	1	.728**
Bowling Speed (BS)	20.44	5.24		1

*** p < .01 (two-tailed)*

4.2 Predictive Effect of Front Leg Brace on Bowling Speed

Table 4 presents the results of the simple linear regression analysis examining FLB as a predictor of bowling speed. The overall model was statistically significant ($F = 54.035$, $p < .05$, Adjusted $R^2 = .530$), indicating that FLB accounted for approximately 53% of the variance in bowling speed. FLB was confirmed as a significant positive predictor of bowling speed ($B = .715$, $\beta = .728$, $t = 7.351$, $p < .001$), with a constant of 6.016 (SE = 2.028, $t = 2.966$, $p = .005$).

Table 4. Linear Regression: Effect of FLB on Bowling Speed

Predictor	B	Std. Error	Beta (β)	t	p-value
Constant	6.016	2.028	—	2.966	.005
Front Leg Brace	.715	.097	.728	7.351	< .001

Note. Adjusted $R^2 = .530$; $F(1, 48) = 54.035$, $p < .05$.

4.3 Gender Differences in Front Leg Brace Utilization

Table 5 compares male and female fast bowlers on FLB utilization. Male fast bowlers reported significantly higher FLB scores (M = 24.80, SD = 3.00) than female fast bowlers (M = 15.52, SD = 4.04; $t(48) = 12.782$, $p < .001$). This indicates that male fast bowlers applied the FLB technique to a considerably greater degree during fast delivery.

Table 5. Gender Comparison on Front Leg Brace Utilization

Variable	Gender	N	Mean	Std. Dev.	t	Df	p-value
Front Leg Brace	Male	25	24.80	3.00	12.782	48	< .001
	Female	25	15.52	4.04			

Dialogue Social Science Review (DSSR)
www.thedssr.com

ISSN Online: 3007-3154
ISSN Print: 3007-3146

DIALOGUE SOCIAL SCIENCE REVIEW

Vol. 4 No. 6 (June) (2026)

4.4 Gender Differences in Bowling Speed

Table 6 presents the comparison of bowling speed between male and female fast bowlers. Male fast bowlers achieved significantly higher bowling speed scores (M = 24.80, SD = 2.50) relative to female fast bowlers (M = 16.08, SD = 3.20; t(48) = 10.736, p < .001), confirming a significant gender-based difference in bowling speed consistent with differential FLB utilization.

Table 6. Gender Comparison on Bowling Speed

Variable	Gender	N	Mean	Std. Dev.	t	df	p-value
Bowling Speed	Male	25	24.80	2.50	10.736	48	< .001
	Female	25	16.08	3.20			

5. DISCUSSION

The findings of this study confirm that the front leg brace technique exerts a significant positive effect on bowling speed, corroborating longstanding biomechanical theory and prior empirical evidence from elite cricket populations. The strong positive correlation identified between FLB and bowling speed (r = .728) aligns with the body of work by Worthington et al. (2013a), Felton et al. (2020; 2023), and Glazier et al. (2000), all of which have highlighted the role of front leg extension and bracing at FFC in maximizing ball release speed. The regression model, accounting for 53% of variance in bowling speed, further demonstrates that FLB is not merely correlated with but is a meaningful structural predictor of bowling speed.

The biomechanical rationale for this finding is well established. At the moment of front foot contact, the braced front leg generates a large braking ground reaction force that decelerates the lower body while enabling the upper body to continue rotating forward. This transfer of angular momentum from the lower to upper body and ultimately into the bowling arm is the primary mechanism through which run-up speed is converted into ball release speed (Ferdinands et al., 2010; Worthington et al., 2013b). Bowlers with a more fully extended, braced front leg at FFC are therefore better positioned to exploit this momentum transfer, consistent with the positive association identified in the present study.

The computer simulation research of Felton et al. (2020; 2023) provides additional mechanistic support. Their optimization models consistently produced faster ball release speeds (up to 4.8 m/s improvement) when front knee extension was maximized at FFC, along with increased trunk flexion and delayed bowling arm circumduction. The present study, using self-reported instruments rather than laboratory-based kinematic measurement, corroborates the direction and magnitude of this effect within a community-level cricketing population in Pakistan.

The significant gender differences observed in both FLB utilization and bowling speed ($p < .001$) are consistent with the findings of Felton et al. (2019), who reported that female fast bowlers rely to a greater degree on rotational torso mechanics rather than run-up momentum to generate ball release speed. This suggests that female bowlers may not achieve the same magnitude of front leg bracing action as male bowlers, either due to biomechanical differences, physical conditioning disparities, or differences in coaching exposure and technical instruction. The significantly lower FLB scores in female bowlers (M = 15.52 vs. 24.80 in males) and their correspondingly lower bowling speed scores (M = 16.08 vs. 24.80) indicate that targeted intervention to improve FLB mechanics in female fast bowlers may represent a meaningful avenue for performance enhancement.

From a coaching and applied sport science perspective, these findings have clear practical implications. Coaches should prioritize the development of front leg brace

ISSN Online: 3007-3154
ISSN Print: 3007-3146

technique as a core component of fast bowling instruction, particularly for junior and female bowlers. Resistance training programs focusing on lower limb strength and rate of force development including elastic band exercises targeting the quadriceps, hip extensors, and ankle stabilizers can support the physical prerequisites for effective FLB execution (Abe et al., 2000; Brumitt & Cuddeford, 2015). Sport scientists working within Pakistan's domestic cricket infrastructure could employ biomechanical screening at academy and club levels to identify bowlers with suboptimal FLB mechanics and implement targeted technical and strength development programs.

Several limitations of the present study warrant acknowledgement. The use of self-reported questionnaires to measure FLB and bowling speed, while providing accessible and scalable data collection, introduces the potential for response bias and may not fully capture the objective biomechanical parameters measured in laboratory-based research. Future studies should triangulate self-reported data with objective kinematic measurement using radar speed guns and three-dimensional motion capture to validate questionnaire-based findings. The sample was limited to 50 bowlers from Lahore-based clubs, restricting generalizability to other geographic regions, age groups, and performance levels. Longitudinal designs examining the effect of FLB technique training on bowling speed over time would further strengthen the causal inference that can be drawn from these findings.

6. CONCLUSION

This study provides empirical support for the significant positive effect of the front leg brace technique on bowling speed in cricket fast bowlers. FLB utilization was found to be a strong and significant predictor of bowling speed, accounting for more than half of its variance. Male fast bowlers demonstrated significantly greater FLB engagement and higher bowling speed than their female counterparts, highlighting gender as an important moderating variable in fast bowling technique and performance. These findings validate the importance of the FLB as a technical priority in fast bowling development and underscore the need for gender-specific coaching approaches. Future research should extend these findings to larger, more diverse populations and employ objective biomechanical measurement to deepen understanding of the FLB with bowling speed relationship.

REFERENCES

Abe, T., DeHoyos, D. V., Pollock, M. L., & Garzarella, L. (2000). Time course for strength and muscle thickness changes following upper and lower body resistance training in men and women. European Journal of Applied Physiology, 81, 174–180.

Abe, T., Yasuda, T., Midorikawa, T., Sato, Y., Inoue, K., Koizumi, K., & Ishii, N. (2005). Skeletal muscle size and circulating IGF-1 are increased after two weeks of twice daily KAATSU resistance training. International Journal of KAATSU Training Research, 1(1), 6–12.

Almuzaini, K. S., & Fleck, S. J. (2008). Modification of the standing long jump test enhances ability to predict anaerobic performance. Journal of Strength & Conditioning Research, 22(4), 1265–1272.

Brumitt, J., & Cuddeford, T. (2015). Current concepts of muscle and tendon adaptation to strength and conditioning. International Journal of Sports Physical Therapy, 10(6), 748–759.

Cadmus-Bertram, L., Irwin, M., Alfano, C., Campbell, K., Duggan, C., Foster-Schubert, K., & McTiernan, A. (2014). Predicting adherence of adults to a 12-month exercise

ISSN Online: 3007-3154
ISSN Print: 3007-3146

Vol. 4 No. 6 (June) (2026)

intervention. Journal of Physical Activity and Health, 11(7), 1304–1312.

Chelly, M. S., Hermassi, S., & Shephard, R. J. (2010). Relationships between power and strength of the upper and lower limb muscles and throwing velocity in male handball players. Journal of Strength & Conditioning Research, 24(6), 1480–1487.

Cricket Lab. (2016). Cricket fitness: Plans and programmes. Retrieved from http://www.cricketlab.co/cricketfitness.html

Felton, P. J., Lister, S. L., Worthington, P. J., & King, M. A. (2019). Comparison of biomechanical characteristics between male and female elite fast bowlers. Journal of Sports Sciences, 37(6), 665–670.

Felton, P. J., McCaig, S., & King, M. A. (2023). Cricket fast bowling: The relationship between range of motion and key performance and injury technique characteristics. Journal of Sports Sciences, 41(2), 112–120.

Felton, P. J., Shine, K. J., Yeadon, M. R., & King, M. A. (2023). Optimal initial position and technique for the front foot contact phase of cricket fast bowling: Commonalities between individual-specific simulations of elite bowlers. Journal of Biomechanics, 158, 111765.

Felton, P. J., Yeadon, M. R., & King, M. A. (2020). Optimising the front foot contact phase of the cricket fast bowling action. Journal of Sports Sciences, 38(18), 2054–2062.

Ferdinands, R. E. (2015). Mechanics of the front arm technique in cricket fast bowling. In ISBS Conference Proceedings Archive.

Ferdinands, R., Marshall, R. N., & Kersting, U. (2010). Centre of mass kinematics of fast bowling in cricket. Sports Biomechanics, 9(3), 139–152.

Glazier, P. S., & Mehdizadeh, S. (2019). Challenging conventional paradigms in applied sports biomechanics research. Sports Medicine, 49(2), 171–176.

Glazier, P. S., Paradisis, G. P., & Cooper, S. M. (2000). Anthropometric and kinematic influences on release speed in men's fast-medium bowling. Journal of Sports Sciences, 18(12), 1013–1021.

Middleton, K. J., Mills, P. M., Elliott, B. C., & Alderson, J. A. (2016). The association between lower limb biomechanics and ball release speed in cricket fast bowlers. Sports Biomechanics, 15(3), 357–369.

RohIllA, A., AnAnd, P., PAl, S., & SEhdAv, A. (2022). Relationship of bowling speed with power and dynamic balance in bowlers: A cross-sectional study. Journal of Clinical & Diagnostic Research, 16(3).

Sanders, L., McCaig, S., Felton, P. J., & King, M. A. (2019). Passive range of motion of the hips and shoulders and their relationship with ball spin rate in elite finger spin bowlers. Journal of Science and Medicine in Sport, 22(10), 1146–1150.

Wormgoor, S., Harden, L., & McKinnon, W. (2010). Anthropometric, biomechanical, and isokinetic strength predictors of ball release speed in high-performance cricket fast bowlers. Journal of Sports Sciences, 28(9), 957–965.

Worthington, P. J., King, M. A., & Ranson, C. A. (2013a). Relationships between fast bowling technique and ball release speed in cricket. Journal of Applied Biomechanics, 29(1), 78–84.

Worthington, P., King, M., & Ranson, C. (2013b). The influence of cricket fast bowlers' front leg technique on peak ground reaction forces. Journal of Sports Sciences, 31(4), 434–441.