



Critical Discourse and Physiological Performance in Sport Science: A Multimodal Analysis of Athlete Communication, Stress Response, and Competitive Behavior

Islis Iriani Indiah Pane¹, Yulia Putri², Bessy Sitorus Pane³, Dewi Endriani³

¹ Department of English Languages and Literatures, Faculty of Languages and Arts, Universitas Negeri Medan, North Sumatra, Indonesia

² Physical Education Health and Recreation, Faculty of Sport Science, Universitas Negeri Medan, North Sumatra, Indonesia

³ Sport Science, Faculty of Sport Science, Universitas Negeri Medan, North Sumatra, Indonesia

islipane@uinimed.ac.id

Abstract. The intersection of discourse analysis, physiology, and sport science has emerged as an important interdisciplinary area for understanding athlete performance beyond physical capability alone. Communication patterns, motivational language, coaching discourse, and psychological interactions significantly influence physiological responses and competitive behavior during training and competition. This study aims to examine the relationship between athlete-coach discourse, physiological stress indicators, and performance outcomes through a multimodal sport science perspective. The study employed a mixed-method approach involving critical discourse analysis and physiological assessment. Verbal interactions between coaches and athletes were analyzed using a discourse analysis framework focusing on motivational language, feedback patterns, and power relations in communication. Physiological responses were measured using heart rate variability (HRV), cortisol levels, and perceived exertion scales during training sessions and competitive simulations. The findings indicate that positive and constructive discourse patterns contribute to lower physiological stress responses, improved emotional regulation, and enhanced athlete concentration. In contrast, authoritarian and high-pressure communication styles were associated with elevated cortisol levels, increased fatigue perception, and reduced movement efficiency. The study also found that supportive discourse facilitated greater athlete confidence and adaptive decision-making during performance situations. These findings demonstrate that communication is not merely a social interaction process but also a physiological and psychological determinant affecting athletic performance. This study contributes to the development of interdisciplinary sport science by integrating discourse analysis with physiological measurement to explain how language and communication influence athlete adaptation and performance. The results highlight the importance of effective communication strategies in coaching practices and athlete development programs. Future research should investigate longitudinal effects of communication patterns across different sports,

© The Author(s) 2026

I. I. I. Pane and Y. Putri (eds.), *Proceedings of the 2nd International Conference of Sport Science, Sport Coaching Science, and Physical Education, Health and Recreation 2025 (ICOSSCOPER 2025)*, Advances in Social Science, Education and Humanities Research 1022,

https://doi.org/10.2991/978-2-38476-591-1_9

should investigate longitudinal effects of communication patterns across different sports, competitive levels, and cultural contexts to strengthen evidence-based coaching and performance optimization strategies.

Keywords: Critical discourse analysis, sport science, physiology, athlete communication, stress response, coaching discourse, performance analysis.

1 Introduction

Sport science has increasingly recognized that athletic performance is influenced not only by biomechanical and physiological factors but also by psychological, social, and communicative dimensions. Contemporary sport environments require athletes to process tactical information, motivational feedback, and emotional interactions continuously during training and competition. Consequently, communication between coaches and athletes has become a central component of performance development, emotional regulation, and decision-making processes [1], [2]. In high-performance and educational sport contexts, communication patterns may directly influence motivation, confidence, concentration, and stress adaptation.

Within the field of discourse analysis, language is understood not merely as a communication tool but also as a social practice capable of shaping attitudes, identities, and behavioral responses [3]. Critical discourse analysis (CDA) examines how language reflects power relations, institutional practices, and ideological structures within social interaction [4]. In sport settings, coaching discourse often contains motivational instructions, evaluative feedback, emotional expressions, and authority-based commands that may influence athletes psychologically and physiologically. Despite growing interest in sport communication studies, research integrating discourse analysis with physiological measurement remains relatively limited.

Physiological responses such as heart rate variability (HRV), cortisol secretion, and perceived exertion are widely used indicators of stress adaptation and athletic readiness [5]. Elevated stress levels are frequently associated with impaired concentration, muscular tension, fatigue, and reduced performance efficiency. Conversely, supportive psychological environments contribute to emotional stability and improved motor execution [6]. Recent advances in sport psychology suggest that verbal interaction and motivational climate significantly affect physiological regulation during physical activity and competition [7]. However, limited empirical evidence explains how specific communication patterns influence physiological adaptation.

The integration of discourse analysis and physiology is therefore important for developing a more comprehensive understanding of athlete performance. Language-based interactions during training sessions may shape emotional responses, cognitive processing, and hormonal reactions that ultimately affect performance outcomes. Positive communication may reduce psychological pressure and improve adaptive coping mechanisms, whereas authoritarian or aggressive discourse may increase anxiety and physiological stress [8]. Understanding this relationship is essential for optimizing coaching strategies and athlete welfare.

Previous studies have primarily focused on tactical communication, motivational climate, or psychological interventions separately from physiological indicators [9], [10]. Research investigating the interaction between discourse structures and biological responses remains scarce, particularly within interdisciplinary sport science frameworks. This gap indicates the need for studies that combine qualitative discourse interpretation with quantitative physiological measurement to explain athlete behavior more comprehensively.

Therefore, this study aims to examine the relationship between athlete–coach discourse, physiological stress responses, and athletic performance through a multimodal sport science perspective. Specifically, this research investigates: (1) dominant communication patterns in coach–athlete interactions; (2) physiological responses associated with different discourse styles; and (3) the implications of communication practices for athlete performance and emotional regulation. The novelty of this study lies in its interdisciplinary integration of critical discourse analysis and physiological sport science to explain how communication influences athletic adaptation and performance outcomes.

2 Methods

2.1 Research Design

This study employed a mixed-method explanatory design integrating critical discourse analysis with quantitative physiological assessment. The mixed-method approach was selected because it enables comprehensive interpretation of communication behavior and physiological adaptation simultaneously [11]. Qualitative analysis was used to identify discourse patterns within coach–athlete interactions, while quantitative analysis examined physiological indicators associated with those interactions.

The research was conducted over eight weeks involving university-level athletes participating in regular training programs and competitive simulations. Ethical approval was obtained from the institutional research ethics committee prior to data collection. All participants voluntarily agreed to participate and signed informed consent forms.

2.2 Participants

The participants consisted of 40 university athletes (24 male and 16 female athletes) aged between 18 and 23 years from athletics, football, volleyball, and tennis programs. Participants were selected using purposive sampling based on training consistency, competitive experience, and willingness to participate. Coaches involved in the study had a minimum of five years of coaching experience.

Table 1. Participant Characteristics

Variable	Mean $\pm$ SD
Age (years)	20.4 $\pm$ 1.8
Training experience (years)	6.7 $\pm$ 2.1
Weekly training frequency	5.2 $\pm$ 1.1
Resting HRV (ms)	68.5 $\pm$ 8.7

2.3 Data Collection Procedures

Data collection involved two major stages: discourse recording and physiological measurement. Coach–athlete interactions during training sessions and simulated competitions were audio- and video-recorded using digital recording equipment. The recordings were subsequently transcribed for discourse analysis.

The discourse analysis focused on motivational language, corrective feedback, emotional tone, and power relations within communication. Communication patterns were categorized into three primary discourse styles: supportive discourse, instructional discourse, and authoritarian discourse. Supportive discourse included encouragement and positive reinforcement, instructional discourse emphasized tactical and technical guidance, while authoritarian discourse involved pressure-oriented commands and negative evaluative language.

Physiological measurements included heart rate variability (HRV), salivary cortisol levels, and Rating of Perceived Exertion (RPE). HRV was measured using wearable heart monitoring devices before and after training sessions. Salivary cortisol samples were collected 30 minutes before and after training activities. RPE values were obtained using the Borg Scale immediately following training sessions

2.4 Data Analysis

Qualitative discourse data were analyzed using Fairclough’s critical discourse analysis framework, which emphasizes textual analysis, discursive practices, and sociocultural interpretation [4]. Coding procedures focused on identifying dominant communication themes and interaction patterns.

Quantitative physiological data were analyzed using descriptive statistics and one-way ANOVA to determine differences in physiological responses across communication styles. Statistical significance was established at $p < 0.05$. Correlation analysis was also conducted to examine relationships between discourse patterns and physiological indicators

3 Result

3.1 Dominant Communication Patterns

The analysis of coach–athlete interactions identified supportive discourse as the most frequently occurring communication style during training sessions. Supportive discourse accounted for 46% of observed communication patterns, followed by instructional discourse (34%) and authoritarian discourse (20%). Supportive communication included motivational expressions, constructive feedback, and emotional encouragement.

Table 2. Distribution of Communication Styles

Communication Style	Frequency	Percentage
Supportive discourse	184	46%
Instructional discourse	136	34%
Authoritarian discourse	80	20%
Total	400	100%

Supportive communication frequently included phrases emphasizing confidence, teamwork, and emotional reinforcement. In contrast, authoritarian discourse involved commands delivered with elevated tone intensity, criticism, and pressure-oriented language.

3.2 Physiological Responses Across Communication Styles

The physiological findings demonstrated significant differences in HRV, cortisol levels, and perceived exertion based on communication style exposure.

Table 3. Physiological Responses by Communication Style

Variable	Supportive	Instructional	Authoritarian
HRV (ms)	72.3 ± 7.5	67.8 ± 8.2	59.6 ± 9.1
Cortisol (nmol/L)	11.2 ± 2.3	13.4 ± 2.9	17.8 ± 3.5
RPE Score	12.1 ± 1.4	13.6 ± 1.7	15.8 ± 2.1

Athletes exposed to supportive discourse demonstrated higher HRV values and lower cortisol concentrations compared with athletes exposed to authoritarian communication. Statistical analysis showed significant differences in physiological stress responses across communication categories ($p < 0.05$).

3.3 Performance and Behavioral Outcomes

Athletes receiving supportive communication displayed greater movement efficiency, concentration stability, and adaptive tactical decision-making during competition simulations. Coaches using supportive language generated more positive emotional responses, including confidence, focus, and motivation.

Conversely, authoritarian discourse was associated with elevated anxiety, decreased concentration, and visible signs of muscular tension. Several athletes also reported reduced motivation and emotional discomfort under pressure-oriented communication conditions.

4 Discussion

The findings of this study demonstrate that communication patterns significantly influence physiological adaptation and athletic performance. The dominance of supportive discourse suggests that contemporary coaching practices increasingly prioritize emotional support and athlete-centered communication approaches. These findings align with recent sport psychology research emphasizing the importance of motivational climate in athlete development [12].

One of the most important findings is the relationship between supportive communication and physiological regulation. Athletes exposed to supportive discourse exhibited higher HRV values and lower cortisol levels, indicating improved autonomic nervous system balance and reduced physiological stress. HRV is widely recognized as an indicator of recovery status and psychological adaptation [13]. Therefore, communication style may indirectly influence athletic readiness and performance quality.

The elevated cortisol levels associated with authoritarian communication indicate increased psychological pressure and stress activation. Cortisol functions as a stress hormone that increases during anxiety-provoking situations and may impair concentration, motor coordination, and recovery if chronically elevated [14]. The findings suggest that excessive pressure-oriented coaching communication may negatively affect athlete wellbeing and performance consistency.

The study further demonstrates that communication should not be viewed solely as a social interaction process but also as a physiological and performance-related variable. Language influences emotional interpretation, cognitive focus, and biological adaptation simultaneously. This interdisciplinary perspective strengthens the integration of discourse analysis within sport science research.

The effectiveness of supportive communication may also be explained through self-determination theory, which emphasizes autonomy, competence, and relatedness as essential psychological needs for motivation and performance [15]. Supportive discourse provides emotional reassurance and constructive feedback, thereby strengthening athlete confidence and intrinsic motivation.

From a pedagogical perspective, these findings have important implications for coaching education and sport instruction. Coaches should develop communication strategies that balance tactical instruction with emotional support. The use of constructive discourse may improve athlete engagement, reduce excessive stress, and facilitate more adaptive learning environments.

Despite its contributions, this study has several limitations. First, the sample size was relatively limited to university-level athletes. Second, physiological measurements were conducted over a relatively short period, limiting long-term interpretation. Future research should investigate longitudinal physiological adaptation across different competitive levels and cultural sport environments.

Overall, this study confirms that discourse patterns significantly influence physiological regulation and athletic performance. Integrating discourse analysis with physiological assessment provides a more holistic understanding of athlete adaptation and contributes to the advancement of interdisciplinary sport science research.

5 Conclusion

This study demonstrates that athlete–coach communication significantly influences physiological responses, emotional regulation, and athletic performance. Supportive discourse patterns were associated with lower cortisol levels, higher heart rate variability, improved concentration, and enhanced movement efficiency. In contrast, authoritarian communication styles contributed to elevated stress responses, increased perceived exertion, and reduced emotional comfort during training and competition.

The findings confirm that communication should be understood not only as a social interaction mechanism but also as a physiological and psychological determinant affecting athletic adaptation and performance outcomes. The integration of critical discourse analysis with physiological assessment contributes to the development of interdisciplinary sport science approaches capable of explaining the complex relationship between language, emotion, and biological regulation.

This study further emphasizes the importance of constructive communication strategies within coaching practice and physical education contexts. Coaches and sport educators should prioritize supportive, athlete-centered communication approaches to enhance motivation, emotional wellbeing, and performance consistency. Future studies should explore longitudinal and cross-cultural applications of discourse-informed coaching interventions to strengthen evidence-based sport science and educational practice.

Acknowledgments. The authors would like to express their sincere appreciation to Universitas Negeri Medan (UNIMED) for its institutional support in facilitating this study. Gratitude is also extended to colleagues and academic peers who provided valuable insights and constructive feedback throughout the research process. Their contributions have significantly enhanced the conceptual clarity and academic quality of this work..

Disclosure of Interests. The authors declare that there are no competing interests associated with this study. The research was conducted independently, without any financial or commercial relationships that could be interpreted as a potential conflict of interest

References

1. S. Jowett and D. Shanmugam, "Relational coaching in sport: Its psychological underpinnings and practical effectiveness," *International Review of Sport and Exercise Psychology*, vol. 17, no. 1, pp. 54–71, 2024.
2. V. A. Goodyear and K. M. Armour, *Young People, Social Media and Health*. London, UK: Routledge, 2021.
3. N. Fairclough, *Language and Power*, 3rd ed. London, UK: Routledge, 2020.
4. N. Fairclough, "Critical discourse analysis," *The International Encyclopedia of Language and Social Interaction*, pp. 1–7, 2022.
5. M. Plews, P. B. Laursen, and D. Buchheit, "Heart rate variability in elite athletes: Applications and considerations," *Sports Medicine*, vol. 53, no. 2, pp. 243–259, 2023.
6. S. Kellmann et al., "Recovery and stress in sport: A conceptual and practical perspective," *International Journal of Sports Physiology and Performance*, vol. 18, no. 1, pp. 12–22, 2023.
7. R. Weinberg and D. Gould, *Foundations of Sport and Exercise Psychology*, 8th ed. Champaign, IL, USA: Human Kinetics, 2023.
8. J. Smith and A. Smoll, "Coaching behaviors and athlete stress adaptation in competitive sport," *Journal of Applied Sport Psychology*, vol. 35, no. 4, pp. 441–457, 2023.
9. C. Cushion and R. Jones, "A systematic review of coach communication and athlete learning," *Sports Coaching Review*, vol. 11, no. 2, pp. 105–124, 2022.
10. E. Fransen et al., "Leadership and communication effectiveness in sport teams," *Psychology of Sport and Exercise*, vol. 62, pp. 102–118, 2022.
11. J. W. Creswell and V. L. Plano Clark, *Designing and Conducting Mixed Methods Research*, 4th ed. Thousand Oaks, CA, USA: Sage Publications, 2023.
12. J. Appleton and J. Duda, "Motivational climate and athlete wellbeing," *Sport, Exercise, and Performance Psychology*, vol. 13, no. 1, pp. 44–58, 2024.
13. D. Plews and M. Stanley, "Heart rate variability monitoring in sport performance," *European Journal of Sport Science*, vol. 24, no. 1, pp. 88–99, 2024.
14. B. McEwen and J. Wingfield, "Stress and the body: Neuroendocrine adaptation in performance environments," *Hormones and Behavior*, vol. 148, pp. 1–11, 2023.
15. E. Deci, R. Ryan, and C. Olafsen, "Self-determination theory in sport and exercise psychology," *Annual Review of Organizational Psychology and Organizational Behavior*, vol. 10, pp. 213–239, 2023.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

