Volume 5, No. 2, 2026, pp. 822-836

HJSE
Holistic Journal of Sport Education
E-ISSN: 2809-9974
https://journal.uniga.ac.id/index.php/penjas
DOI: 10.52434/penjas.v5i2.44325

ELITE SPORT PEDAGOGICAL MANAGEMENT: TIME MANAGEMENT ANALYSIS BASED ON RECOVERY STRATEGIES AND TRAINING LOAD INDICATORS IN HANDBALL ATHLETES

Irfan Benizar Lesmana[1-ABCDE], Yunyun Yudiana[2-ABCDE], Didik Subhakti Prawira Raharja[3-CDE], Yopi Meirizal[4-CDE]

[1]Program Studi PJKR, FKIP, Universitas Singaperbangsa Karawang, Karawang, Indonesia
[2]Program Studi PJKR, FPOK, Universitas Pendidikan Indonesia, Bandung, Indonesia
[3]Program Studi PPG, Program Pascasarjana, Universitas Majalengka, Majalengka, Indonesia
[4]Program Studi PJKR, STKIP Pasundan, Cimahi, Indonesia

Keywords:
Handball, Recovery Strategy, Training Load, Sport Pedagogical Management

Abstract

This study examines changes in recovery strategies and training load indicators among handball athletes during Mesocycle 2 of PON XX Training Center 2021 and the internalization process of recovery habits within the framework of elite sport pedagogical management. An ex post facto method with quantitative descriptive approach involved 28 athletes (14 males, 14 females). The 100-Point Recovery Checklist Strategy measured nine recovery activities across Micro 5-8, while training load was calculated using sRPE. Results showed female athletes' total Recovery Points (1,227.0-1,371.0) were higher than males (1,076.9-1,303.1) across all microcycles. Deep Tissue Massage (20.7-26.2%) and Compression Garments during sleep (17.8-22.8%) were dominant strategies. In Micro 6, peak load (males 1,892.4 AU; females 1,924.6 AU) was followed by increased recovery (males +226.2; females +101.1). In Micro 7, load decrease (males -375.7; females -271.6) was followed by recovery decrease (males -97.0; females -52.1). A distinct phenomenon occurred in Micro 8: load drastically decreased (males -941.3; females -990.7), male recovery decreased (-103.6) to 1,102.5, while female recovery increased (+95.1) reaching 1,371.0. This pattern indicates male athletes tend to respond proportionally to load changes, while females demonstrate consistency of internalized recovery habits. Findings indicate that daily recovery routine repetition within a structured training environment fosters internalization of recovery habits as personal responsibility. From the perspective of elite sport pedagogical management, these findings reflect how authentic experience and routine consistency serve as a learning vehicle integrating recovery knowledge into athletes' daily behavior. The observed internalization process is part of elite sport pedagogical management, where the training curriculum not only transfers theoretical knowledge but also shapes athletes' habits and autonomy in managing recovery sustainably

Received: April 1, 2026 **Revised:** April 14, 2026 **Accepted:** May 28, 2026 **Published:** June 30, 2026

Author Contributions:
A - Concept formulation and research design; B - Data collection; C - Data analysis and interpretation; D - Manuscript preparation; E - Research funding acquisition.

Correspondence:
Irfan Benizar Lesmana

Email: irfan.benizar@fkip.unsika.ac.id

INTRODUCTION

The development of elite sports demands a coaching approach that is not only oriented toward improving athletes' physical performance but also toward developing integrated managerial and pedagogical competencies (Braunstein-Minkove, 2026). Elite sport coaching systems require comprehensive management, ranging from training program planning and curriculum development to continuous athlete achievement evaluation (Miller & Gregg, 2026). The pedagogical approach in elite sports plays an important role in shaping athletes' understanding of training strategies, recovery, and self-management during coaching programs (Mondt & Evans, 2026).

Handball athlete development is determined not only by the quality of training programs but also by athletes' ability to manage recovery as part of daily activities (García-Sánchez et al., 2025). The repetitive training process places athletes in situations that demand consistent regulation of rest time, sleep, hydration, therapy, and physical readiness (McFarland & Bird, 2014). These experiences shape self-management habits so that recovery develops as part of the training culture, not merely a response after physical activity.

Studies on recovery in athletes indicate that recovery strategies contribute to fatigue reduction, maintenance of physical readiness, and performance sustainability during training periods (Maric et al., 2021). Research on recovery strategies has more frequently used physiological indicators and sports performance as the basis for evaluating effectiveness (Soler-López et al., 2024). Studies on changes in athletes' recovery habits as a result of daily coaching routines have received relatively less attention (Henze et al., 2025).

Previous research has largely explained the relationship between recovery strategies and physiological conditions, training load, or match performance (Lässing et al., 2022). Descriptions of behavioral changes in athletes in building self-care habits during structured training programs have not been widely reported (Duignan et al., 2020). This condition indicates the need for studies that describe how training routines gradually shape athletes' ability to manage recovery (Coyne et al., 2018).

This research focuses on presenting an analysis of changes in handball athletes' recovery strategies based on the development of Recovery Points and training load indicators in each microcycle over one mesocycle. The analysis does not stop at changes in values but describes the process of forming recovery management habits through the daily training routines athletes undergo (Vavassori et al., 2023). This approach provides a perspective that recovery activities are part of the process of forming behavior to maintain physical readiness during elite sports coaching (Nobari et al., 2024).

This research focuses on changes in recovery strategies and training load indicators of handball athletes during the implementation of Mesocycle 2 of the PON XX 2021 Training Center program. These changes were observed based on the

development of recovery activities performed by athletes in each microcycle (Oliveira et al., 2023). The analysis results are used to describe the process of forming self-management habits through training and recovery routines (Cleary et al., 2023).

This study aims to describe changes in recovery strategies and training load indicators of handball athletes during Mesocycle 2 of the PON XX 2021 Training Center program. The analysis is directed to describe changes in athletes' habits in performing recovery activities in each microcycle (Lee et al., 2021). The research results are expected to provide an overview of the process of developing self-management abilities through continuous training and recovery experiences (Gough et al., 2025).

METHOD

This study employed an ex post facto method with a quantitative descriptive approach (Coyne et al., 2021). The research focus was directed toward describing athletes' recovery strategies during the West Java PON XX Training Center program without treatment or hypothesis testing. Descriptive analysis was conducted to compare the characteristics of recovery strategy implementation between male and female athletes (Dai et al., 2025).=

The research population comprised all athletes of the West Java PON XX 2021 Training Center. The sample was selected using purposive sampling technique with the criterion of participating in the entire training and monitoring program during Mesocycle 2, namely Microcycle 5 through Microcycle 8, resulting in 28 athletes, consisting of 14 male and 14 female athletes. Male athletes had an age range of 21.1-30.9 years with a mean of 23.8 ± 2.4 years, while female athletes had an age range of 19.0-25.5 years with a mean of 21.7 ± 2.3 years.

Data collection was conducted during Mesocycle 2, which lasted for four microcycles: Microcycle 5 (February 8-14, 2021), Microcycle 6 (February 15-21, 2021), Microcycle 7 (February 22-28, 2021), and Microcycle 8 (March 1-7, 2021). All athletes underwent a 3:1 periodization pattern, consisting of Monday as active recovery, Tuesday, Thursday, and Saturday with two training sessions (morning and afternoon), and Wednesday, Friday, and Sunday with one training session.

The research instrument used The 100-Point Recovery Checklist Strategy (McFarland & Bird, 2014). The instrument focuses on nine recovery activities with a total target score reaching 100 points per week for each athlete. The activities consisted of Compression Garments after travel exceeding two hours (10 points), Compression Garments during sleep for at least eight hours (15 points), Contrast Shower (5 points), Pool Recovery Session (10 points), Hydration Status (5 points), Athlete Training/Recovery Diary (5 points), Deep Tissue Massage (15 points), Self-Massage using foam roller or tennis ball (15 points), and Nutritional Supplementation before, during, and after training (5 points) (McFarland & Bird, 2014). Each athlete's Recovery Point value was obtained from the sum of all recovery activities performed

each day, then averaged for each microcycle (Abade et al., 2025). The reporting process was conducted every night at 8:00 PM - 9:00 PM before sleep.

Training load indicators were calculated using the session rating of perceived exertion (sRPE) method (Conte et al., 2021). Training load for each session was calculated using the equation Training Load = Training Duration (minutes) × RPE (0-10) (Li et al., 2025). Accumulation of all sessions over seven days produced Weekly Training (Sum). Monotony value was calculated using the formula of average daily training load divided by standard deviation of daily training load, while Strain was calculated using the equation Weekly Training × Monotony (Nobari et al., 2022). These three indicators were used as descriptions of training load characteristics in each microcycle.

Data analysis used descriptive statistics in the form of mean, standard deviation, frequency, percentage, and distribution of Recovery Points for each type of recovery strategy (Sánchez-Otero et al., 2022). Analysis results were presented as descriptive comparisons between male and female athletes and interpretation of recovery management patterns during Mesocycle 2 implementation without hypothesis testing or inferential analysis (Nobari et al., 2021).

RESULT

MICRO 5 ANALYSIS

Tabel 1.
Micro 5 Recovery Strategy and Workload Indicator

Indicator	Mean Men	Men (%)	Mean Women	Women (%)
Recovery Point Strategy				
1. Compression Garments (>2 jam perjalanan)	10,7	1,0	22,6	1,8
2. Compression Garments (tidur 8 jam)	191,9	17,8	254,5	20,7
3. Contrast Shower	42,6	4,0	33,9	2,8
4. Pool Recovery Session	85,3	7,9	79,1	6,5
5. Hydration Status	64,0	5,9	73,5	6,0
6. Athlete Training/Recovery Diary	74,6	6,9	84,8	6,9
7. Massage (Deep Tissue)	255,9	23,8	254,5	20,7
8. Self-Massage (Foam Roller/Tennis Ball)	181,2	16,8	209,2	17,1
9. Nutritional Supplementation	170,6	15,8	214,8	17,5
Total	**1.076,9**	**100,0**	**1.227,0**	**100,0**
Workload				
Total Weekly Training (AU)	1.508,4	-	1.674,4	-
Monotony	1,2	-	1,2	-

Tabel 1.
Micro 5 Recovery Strategy and Workload Indicator

Indicator	Mean Men	Men (%)	Mean Women	Women (%)
Strain	1.770,1	-	2.073,9	-

Based on Table 1, male athletes obtained Recovery Points of 1,076.9 points, while female athletes reached 1,227.0 points. The largest proportions of activity were found in Massage (Deep Tissue) (23.8% males; 20.7% females) and Compression Garments during sleep (17.8% males; 20.7% females). All of these activities were performed in the same daily life pattern during the training camp, from training schedules, rest periods, to activity restrictions outside the team environment. The repetition of these routines provided opportunities for athletes to recognize bodily signals and build habits for determining appropriate recovery forms according to their needs (de Leeuw et al., 2022).

Female athletes' Weekly Training reached 1,674.4 AU, higher than male athletes at 1,508.4 AU, while Strain reached 2,073.9 AU and 1,770.1 AU. This condition was followed by higher accumulated Recovery Points in female athletes. The alignment between increased training load and implementation of recovery activities indicates that athletes began to place sleep, hydration, therapy, and physical condition recording as part of consciously performed daily routines (Gallo et al., 2016). This experience developed through repeated activities that occurred continuously during the training program (Murray et al., 2019).

MICRO 6 ANALYSIS

Tabel 2.
Recovery Strategy and Workload Indicator Micro 6

Indicator	Mean Men	Men (%)	Mean Women	Women (%)
Recovery Point Strategy				
1. Compression Garments (>2 jam)	26,8	2,1	29,9	2,3
2. Compression Garments (tidur 8 jam)	257,4	19,8	283,5	21,4
3. Contrast Shower	69,7	5,4	59,6	4,5
4. Pool Recovery Session	107,3	8,2	89,5	6,7
5. Hydration Status	75,1	5,8	74,6	5,6
6. Athlete Training/Recovery Diary	75,1	5,8	74,6	5,6
7. Massage (Deep Tissue)	321,7	24,7	313,4	23,6
8. Self-Massage (Foam Roller)	193,0	14,8	208,9	15,7
9. Nutritional Supplementation	177,0	13,6	194,0	14,6

Tabel 2.
Recovery Strategy and Workload Indicator Micro 6

Indicator	Mean Men	Men (%)	Mean Women	Women (%)
Total	**1.303,1**	**100,0**	**1.328,0**	**100,0**
Workload				
1. Total Weekly Training (AU)	1.892,4	-	1.924,6	-
2. Monotony	1,1	-	1,3	-
3. Strain	2.065,5	-	2.596,3	-

Based on Table 2, Microcycle 6 showed an increase in accumulated recovery strategies in both groups, with Massage (Deep Tissue) remaining the dominant recovery form in male athletes (24.7%) and female athletes (23.6%), followed by Compression Garments during eight hours of sleep at 19.8% in males and 21.4% in females. Female athletes obtained slightly higher total Recovery Points (1,328.0 points) compared to male athletes (1,303.1 points), mainly through the use of Compression Garments, Self-Massage, and Nutritional Supplementation. Training load indicators showed Total Weekly Training reaching 1,892.4 AU in male athletes and 1,924.6 AU in female athletes, accompanied by Monotony values of 1.1 and 1.3 and Strain of 2,065.5 AU and 2,596.3 AU. This pattern describes the highest training load phase during Mesocycle 2, followed by increased intensity of recovery strategies, especially in female athletes who received greater training pressure.

MICRO 7 ANALYSIS

Tabel 3.
Recovery Strategy and Workload Indicator Micro 7

Indicator	Mean Men	Men (%)	Mean Women	Women (%)
Recovery Point Strategy				
1. Compression Garments (>2 jam)	22,1	1,8	23,6	1,9
2. Compression Garments (tidur 8 jam)	232,4	19,3	283,5	22,2
3. Contrast Shower	55,4	4,6	56,7	4,4
4. Pool Recovery Session	77,4	6,4	94,6	7,4
5. Hydration Status	77,4	6,4	75,7	5,9
6. Athlete Training/Recovery Diary	77,4	6,4	70,9	5,6
7. Massage (Deep Tissue)	315,4	26,2	297,7	23,3
8. Self-Massage (Foam Roller)	188,2	15,6	193,8	15,2
9. Nutritional Supplementation	160,4	13,3	179,5	14,1
Total	**1.206,1**	**100,0**	**1.276,0**	**100,0**
Workload				

Tabel 3.
Recovery Strategy and Workload Indicator Micro 7

Indicator	Mean Men	Men (%)	Mean Women	Women (%)
1. Total Weekly Training (AU)	1.516,7	-	1.653,0	-
2. Monotony	1,3	-	1,4	-
3. Strain	1.972,7	-	2.235,9	-

Based on Table 3, Microcycle 7 showed a decrease in accumulated recovery strategies compared to Microcycle 6, although Massage (Deep Tissue) remained the recovery form with the highest proportion in male athletes (26.2%) and female athletes (23.3%), followed by Compression Garments during eight hours of sleep at 19.3% in males and 22.2% in females. Female athletes still obtained higher total Recovery Points (1,276.0 points) compared to male athletes (1,206.1 points), mainly through the application of Compression Garments during sleep, Pool Recovery Session, and Nutritional Supplementation. Training load indicators showed Total Weekly Training decreased to 1,516.7 AU in male athletes and 1,653.0 AU in female athletes, while Monotony values increased to 1.3 in males and 1.4 in females with Strain of 1,972.7 AU and 2,235.9 AU. This pattern shows a transition phase toward reduced training load that was still balanced with recovery strategy implementation, especially in female athletes who maintained higher accumulated Recovery Points.

MICRO 8 ANALYSIS

Tabel 4.
Recovery Strategy and Workload Indicator on Micro 8

Indicator	Mean Men	Men (%)	Mean Women	Women (%)
Recovery Point Strategy				
1. Compression Garments (>2 jam)	17,0	1,5	33,0	2,4
2. Compression Garments (tidur 8 jam)	203,5	18,5	312,0	22,8
3. Contrast Shower	50,9	4,6	70,9	5,2
4. Pool Recovery Session	67,8	6,2	85,1	6,2
5. Hydration Status	73,5	6,7	80,3	5,9
6. Athlete Training/Recovery Diary	79,2	7,2	70,9	5,2
7. Massage (Deep Tissue)	288,3	26,2	312,0	22,8
8. Self-Massage (Foam Roller)	175,3	15,9	222,2	16,2
9. Nutritional Supplementation	147,0	13,3	184,4	13,5
Total	**1.102,5**	**100,0**	**1.371,0**	**100,0**
Workload				

Tabel 4.
Recovery Strategy and Workload Indicator on Micro 8

Indicator	Mean Men	Men (%)	Mean Women	Women (%)
1. Total Weekly Training (AU)	575,5	-	662,3	-
2. Monotony	0,7	-	0,7	-
3. Strain	416,1	-	465,4	-

Based on Table 4, Microcycle 8 showed a decrease in accumulated recovery strategies in male athletes, while female athletes maintained higher values, with Massage (Deep Tissue) remaining the dominant recovery form in male athletes (26.2%) and Massage (Deep Tissue) together with Compression Garments during eight hours of sleep being the largest proportions in female athletes (22.8% each). Female athletes obtained total Recovery Points of 1,371.0 points, higher than male athletes at 1,102.5 points, mainly through the use of Compression Garments during sleep, Self-Massage, and Nutritional Supplementation. Training load indicators showed Total Weekly Training decreased sharply to 575.5 AU in male athletes and 662.3 AU in female athletes, accompanied by identical Monotony values in both groups (0.7) and Strain of 416.1 AU and 465.4 AU. This pattern shows the unloading phase at the end of Mesocycle 2, when decreased training load was followed by recovery strategy implementation that was still maintained, especially by female athletes.

DISCUSSION

SELF-ADAPTATION TO RECOVERY ROUTINES

Based on Table 1, male athletes obtained Recovery Points of 1,076.9 points, while female athletes reached 1,227.0 points. The largest proportions of activity were found in Massage (Deep Tissue) (23.8% males; 20.7% females) and Compression Garments during sleep (17.8% males; 20.7% females). All of these activities were performed in the same daily life pattern during the training camp, from training schedules, rest periods, to activity restrictions outside the team environment. The repetition of these routines provided opportunities for athletes to recognize bodily signals and build habits for determining appropriate recovery forms according to their needs (de Leeuw et al., 2022).

Female athletes' Weekly Training reached 1,674.4 AU, higher than male athletes at 1,508.4 AU, while Strain reached 2,073.9 AU and 1,770.1 AU. This condition was followed by higher accumulated Recovery Points in female athletes. The alignment between increased training load and implementation of recovery activities indicates that athletes began to place sleep, hydration, therapy, and physical condition recording as part of consciously performed daily routines (Gallo et al., 2016). This experience developed through repeated activities that occurred continuously during the training program (Murray et al., 2019).

STRENGTHENING SELF-RESPONSIBILITY

Based on Table 2, total Recovery Points increased to 1,303.1 points in male athletes and 1,328.0 points in female athletes. Massage (Deep Tissue) remained the activity with the largest proportion (24.7% males; 23.6% females), while the use of Compression Garments during sleep reached 19.8% and 21.4%. This condition occurred during the phase when training schedules became denser, while athletes' life patterns remained within a controlled environment. This situation shows that recovery activities were no longer performed solely due to coach supervision but began to become responsibilities consistently carried out by athletes (Thompson et al., 2024). Weekly Training values increased to 1,892.4 AU in male athletes and 1,924.6 AU in female athletes, while Strain reached 2,065.5 AU and 2,596.3 AU. The increased training demands were not followed by decreased implementation of recovery strategies. This pattern indicates that athletes began to adjust daily decisions by considering physical conditions perceived after training (Muñoz-Jiménez et al., 2022). The experience of living in a structured training environment, time discipline, and social activity restrictions also contributed to forming habits of maintaining physical readiness independently (López-Sierra et al., 2025).

RECOVERY BEHAVIOR ADJUSTMENT

Based on Table 3, Recovery Points reached 1,206.1 points in male athletes and 1,276.0 points in female athletes. Massage (Deep Tissue) remained the most frequently performed activity, at 26.2% in males and 23.3% in females. The decrease in accumulated points was not followed by changes in the types of recovery strategies chosen. This condition shows that athletes began to understand when recovery intensity needs to be adjusted without eliminating previously formed habits (Ihász et al., 2025).

Weekly Training decreased to 1,516.7 AU in male athletes and 1,653.0 AU in female athletes, while Strain became 1,972.7 AU and 2,235.9 AU. This adjustment was followed by changes in accumulated Recovery Points in both groups. The balance between decreased training load and recovery implementation shows that athletes were increasingly able to adjust daily activities based on perceived bodily conditions (Shushan et al., 2022). This experience developed through routines performed repeatedly during the training program (Sanchez-Migallon et al., 2022).

INDEPENDENCE IN MAINTAINING RECOVERY

Based on Table 4, female athletes obtained Recovery Points of 1,371.0 points, while male athletes reached 1,102.5 points. Massage (Deep Tissue) remained the largest activity in male athletes (26.2%), while female athletes maintained equal proportions between Massage (Deep Tissue) and Compression Garments during sleep (22.8%). The decrease in training volume did not change the consistency of recovery activity implementation in both groups. This condition shows that habits of maintaining physical condition had become part of daily routines during the training camp (Schelling et al., 2025).

Weekly Training decreased to 575.5 AU in male athletes and 662.3 AU in female athletes with Monotony values of 0.7 in both groups. Lower training loads were still followed by implementation of various recovery strategies, especially in female athletes. This condition shows that athletes continued to perform recovery activities without depending on the high training load received on that day (Clemente et al., 2025). Routines that occurred repeatedly during the coaching program formed the ability to maintain physical readiness as part of athletes' daily lives (Salazar et al., 2020).

CONCLUSION

Based on data analysis over four microcycles (Micro 5-8), female athletes' total Recovery Points (1,227.0-1,371.0) were consistently higher than males (1,076.9-1,303.1). Deep Tissue Massage (20.7-26.2%) and Compression Garments during sleep (17.8-22.8%) were the dominant strategies in both groups. The three strategies with the lowest proportions were Compression Garments for travel (1.0-2.4%), Contrast Shower (2.8-5.4%), and Hydration Status (5.6-6.7%)—indicating recovery components that have not been optimized.

The response patterns to load changes showed different characteristics between groups. In Micro 6, peak load (males 1,892.4 AU; females 1,924.6 AU) was followed by increased recovery in both groups (males +226.2; females +101.1). In Micro 7, load decrease (males -375.7; females -271.6) was followed by decreased recovery (males -97.0; females -52.1). A distinct phenomenon appeared in Micro 8: load drastically decreased (males -941.3; females -990.7), male recovery decreased (-103.6) to 1,102.5, while female recovery increased (+95.1) reaching 1,371.0. This pattern illustrates that male athletes tend to respond proportionally to load changes, while females demonstrate consistency of internalized recovery habits that are not entirely dependent on daily load fluctuations.

These findings indicate that a structured training camp environment—with fixed schedules, limited mobility, and repetition of daily recovery routines—contributes to the formation of autonomous recovery habits through experiential learning. This process is part of elite sport pedagogical management, where the training curriculum not only transfers theoretical knowledge about recovery but also shapes athletes' personal responsibility in managing recovery sustainably. The different response patterns between males and females indicate that the internalization process of recovery habits can manifest differently across groups, suggesting that pedagogical approaches that consider the specific characteristics of each athlete group are needed to optimize the formation of independent and sustainable recovery habits.

This study is limited to one mesocycle (four microcycles) and thus has not described the long-term development of recovery habit internalization, nor has it explored contextual factors influencing response differences between groups. Future research is recommended to extend the observation period across several mesocycles

or one year of coaching, integrate qualitative approaches to explore athletes' subjective experiences, and develop pedagogical intervention models tailored to the response characteristics of male and female athletes within the framework of elite sport pedagogical management.

ACKNOWLEDGMENTS

The authors express their gratitude to the management of the PON XX 2021 Training Center for the handball sport, all male and female handball athletes, and the coaching team and support staff for their participation and support throughout the process. This research was independently funded by the researchers without external funding involvement.

REFERENCES

Abade, E., Gonçalves, B., Figueira, B., Santos, S., & Coutinho, D. (2025). Impact of eccentric exercises on soccer players' external load, muscle soreness and physical performance: A comparative study of pre and post-training routines. *Journal of Science in Sport and Exercise*, *7*(4), 409–421. https://doi.org/10.1007/s42978-024-00315-7

Braunstein-Minkove, J. R. (2026). Innovative pedagogical practices in sport management education: An introduction. In J. R. Braunstein-Minkove, J. N. Cooper, R. King-White, M. A. Odio, D. A. Pierce, & E. J. Staurowsky (Eds.), *Innovative pedagogical practices in sport management education* (Emerging Issues and Trends in Sport Business, Vol. 3, pp. 1–10). World Scientific. https://doi.org/10.1142/9789819813018_0001

Cleary, M., McHugh, F., & Paradis, K. F. (2023). The association between subjective wellness symptoms and blood biomarker data in English Premier League footballers. *Journal of Science in Sport and Exercise*, *5*(4), 340–347. https://doi.org/10.1007/s42978-022-00189-7

Clemente, F. M., Afonso, J., Trybulski, R., Beato, M., Sanchez, J. S., Mroczek, D., Grzywacz, T., Sawicki, P., & González-Fernández, F. T. (2025). Acute and residual physical fatigue, along with recovery time following sided games: A scoping review and evidence gap map focusing on methodological aspects. *Journal of Sports Science and Medicine*, *24*(4), 779–800. https://doi.org/10.52082/jssm.2025.779

Conte, D., Guerriero, A., Lupo, C., Arruda, A. F. S., & Kamarauskas, P. (2021). Influence of congested match schedules, pre-match well-being and level of opponents on match loads during world rugby women's sevens series. *International Journal of Environmental Research and Public Health*, *18*(22), 12132. https://doi.org/10.3390/ijerph182212132

Coyne, J., Coutts, A., Newton, R., & Haff, G. G. (2021). Training load, heart rate variability, direct current potential and elite long jump performance prior and

during the 2016 olympic games. *Journal of Sports Science and Medicine*, *20*(3), 482–491. https://doi.org/10.52082/JSSM.2021.482

Coyne, J. O. C., Gregory Haff, G., Coutts, A. J., Newton, R. U., & Nimphius, S. (2018). The current state of subjective training load monitoring—A practical perspective and call to action. *Sports Medicine - Open*, *4*(1), 17. https://doi.org/10.1186/s40798-018-0172-x

Dai, X., Yan, J., & Bi, X. (2025). Weekly fluctuations in subjective and objective measures of internal training load and their relationships in male elite rowers. *Journal of Sports Science and Medicine*, *24*(2), 269–276. https://doi.org/10.52082/jssm.2025.269

de Leeuw, A. W., van der Zwaard, S., van Baar, R., & Knobbe, A. (2022). Personalized machine learning approach to injury monitoring in elite volleyball players. *European Journal of Sport Science*, *22*(4), 511–520. https://doi.org/10.1080/17461391.2021.1887369

Duignan, C., Doherty, C., Caulfield, B., & Blake, C. (2020). Single-item self-report measures of team-sport athlete wellbeing and their relationship with training load: A systematic review. *Journal of Athletic Training*, *55*(9), 944–953. https://doi.org/10.4085/1062-6050-0528.19

Gallo, T. F., Cormack, S. J., Gabbett, T. J., & Lorenzen, C. H. (2016). Pre-training perceived wellness impacts training output in Australian football players. *Journal of Sports Sciences*, *34*(15), 1445–1451. https://doi.org/10.1080/02640414.2015.1119295

García-Sánchez, C., Nieto-Acevedo, R., Lorenzo-Calvo, J., Marquina Nieto, M., Navarro, R. M., & de la Rubia, A. (2025). Towards personalized recovery in handball? The effects of playing positions and player role on internal match load and well-being responses in female players. *Applied Sciences*, *15*(3), 1228. https://doi.org/10.3390/app15031228

Gough, L. A., Weldon, A., Clark, C. C. T., Young, A., Roberts, C. J., Clarke, N. D., Brown, M. A., & Williams, R. (2025). The effects of 12-week prebiotic supplementation on general wellness and exercise-induced gastrointestinal symptoms in recreationally trained endurance athletes: A triple-blind randomised controlled pilot trial. *Nutrients*, *17*(21), 3390. https://doi.org/10.3390/nu17213390

Henze, A. S., Burger, J., Matits, L., Degenhardt, H., Fehske, K., Kirsten, J., & Schulz, S. V. W. (2025). Athlete monitoring in handball (ATHMON HB): A survey of current practice in professional women's and men's handball. *BMC Sports Science, Medicine and Rehabilitation*, *17*(1), 77. https://doi.org/10.1186/s13102-025-01177-4

Ihász, F., Takács, J., Alföldi, Z., Kósa, L., Podstawski, R., Ferraz, A., Hinca, B., Barthalos, I., & Katona, Z. B. (2025). A pilot study of the effect of locomotor

and mechanical loads on elite rowers during competition days. *Sports*, *13*(8), 254. https://doi.org/10.3390/sports13080254

Lässing, J., Kwast, S., Bischoff, C., Hölldobler, N., Vondran, M., Falz, R., & Busse, M. (2022). Repeated cardiopulmonary performance measurements in young competitive handball players with and without SARS-CoV-2 infection. *BMC Sports Science, Medicine and Rehabilitation*, *14*(1), 91. https://doi.org/10.1186/s13102-022-00591-2

Lee, D. J., So, W. Y., & Lee, S. M. (2021). The relationship between Korean adolescents' sports participation, internal health locus of control, and wellness during COVID-19. *International Journal of Environmental Research and Public Health*, *18*(6), 2950. https://doi.org/10.3390/ijerph18062950

Li, Z., Qin, S. L., Li, X. T., & Ren, D. M. (2025). Use the rating of perceived exertion to evaluate load in collegiate male soccer player, validity and influencing factors. *Scientific Reports*, *15*(1), 1–8. https://doi.org/10.1038/s41598-025-01942-y

López-Sierra, P., Gómez, M. Á., Feu, S., & Ibáñez, S. J. (2025). A comprehensive analysis of internal and external load monitoring systems in basketball. *Scientific Reports*, *15*(1), 1–13. https://doi.org/10.1038/s41598-025-25768-w

Maric, D., Gilic, B., & Foretic, N. (2021). Monitoring the internal and external loads of young team handball players during competition. *Sport Mont*, *19*(1), 19–23. https://doi.org/10.26773/SMJ.210204

McFarland, M., & Bird, S. P. (2014). A wellness monitoring tool for youth athletes. *Journal of Australian Strength and Conditioning*, *22*(6), 22–26.

Miller, J. J., & Gregg, E. (2026). The academic discipline of sport management: A case study in innovation. In J. R. Braunstein-Minkove, J. N. Cooper, R. King-White, M. A. Odio, D. A. Pierce, & E. J. Staurowsky (Eds.), *Innovative pedagogical practices in sport management education* (Emerging Issues and Trends in Sport Business, Vol. 3, pp. 11–25). World Scientific. https://doi.org/10.1142/9789819813018_0002

Mondt, A. B., & Evans, Z. (2026). Shaping the future of sport management education. In J. R. Braunstein-Minkove, J. N. Cooper, R. King-White, M. A. Odio, D. A. Pierce, & E. J. Staurowsky (Eds.), *Innovative pedagogical practices in sport management education* (Emerging Issues and Trends in Sport Business, Vol. 3). World Scientific.

Muñoz-Jiménez, J., Gámez-Calvo, L., Rojas-Valverde, D., León, K., & Gamonales, J. M. (2022). Analysis of injuries and wellness in blind athletes during an international football competition. *International Journal of Environmental Research and Public Health*, *19*(14), 8827. https://doi.org/10.3390/ijerph19148827

Murray, A., Buttfield, A., Simpkin, A., Sproule, J., & Turner, A. P. (2019). Variability of within-step acceleration and daily wellness monitoring in Collegiate American Football. *Journal of Science and Medicine in Sport*, *22*(4), 488–493. https://doi.org/10.1016/j.jsams.2018.10.013

Nobari, H., Eken, Ö., Singh, U., Gorouhi, A., Bordón, J. C. P., Prieto-González, P., Kurtoğlu, A., & Calvo, T. G. (2024). Which training load indicators are greater correlated with maturation and wellness variables in elite U14 soccer players? *BMC Pediatrics*, *24*(1), 447. https://doi.org/10.1186/s12887-024-04744-9

Nobari, H., Martins, A. D., Oliveira, R., & Paolo Ardigò, L. (2022). Seasonal variations of the relationships between measures of training monotony and strain in professional soccer players. *Scientific Reports*, *12*(1), 15278. https://doi.org/10.1038/s41598-022-15278-4

Nobari, H., Silva, R., Clemente, F. M., Akyildiz, Z., Ardigò, L. P., & Pérez-Gómez, J. (2021). Weekly variations in the workload of Turkish national youth wrestlers: A season of complete preparation. *International Journal of Environmental Research and Public Health*, *18*(7), 3832. https://doi.org/10.3390/ijerph18073832

Oliveira, R., Canário-Lemos, R., Morgans, R., Rafael-Moreira, T., Vilaça-Alves, J., & Brito, J. P. (2023). Are non-starters accumulating enough load compared with starters? Examining load, wellness, and training/match ratios of a European professional soccer team. *BMC Sports Science, Medicine and Rehabilitation*, *15*(1), 43. https://doi.org/10.1186/s13102-023-00743-y

Salazar, H., Svilar, L., Aldalur-Soto, A., & Castellano, J. (2020). Differences in weekly load distribution over two Euroleague seasons with a different head coach. *International Journal of Environmental Research and Public Health*, *17*(8), 2812. https://doi.org/10.3390/ijerph17082812

Sánchez-Otero, T., Tuimil, J. L., Boullosa, D., Varela-Sanz, A., & Iglesias-Soler, E. (2022). Active vs. passive recovery during an aerobic interval training session in well-trained runners. *European Journal of Applied Physiology*, *122*(5), 1281–1291. https://doi.org/10.1007/s00421-022-04926-2

Sanchez-Migallon, V., López-Samanes, Á., Del Coso, J., Navandar, A., Aagaard, P., & Moreno-Pérez, V. (2022). Effects of consecutive days of matchplay on maximal hip abductor and adductor strength in female field hockey players. *BMC Sports Science, Medicine and Rehabilitation*, *14*(1), 3. https://doi.org/10.1186/s13102-021-00394-x

Schelling, X., Spencer, B., Azalbert, V., Alonso-Perez-Chao, E., Sosa, C., & Robertson, S. (2025). Decision support systems for time series in sport: Literature review and applied example of changepoint-based most demanding scenario analysis in basketball. *Applied Sciences*, *15*(19), 10575. https://doi.org/10.3390/app151910575

Shushan, T., McLaren, S. J., Buchheit, M., Scott, T. J., Barrett, S., & Lovell, R. (2022). Submaximal fitness tests in team sports: A theoretical framework for evaluating physiological state. *Sports Medicine*, *52*(11), 2605–2626. https://doi.org/10.1007/s40279-022-01712-0

Soler-López, A., Moreno-Villanueva, A., Gómez-Carmona, C. D., & Pino-Ortega, J. (2024). The role of biomarkers in monitoring chronic fatigue among male professional team athletes: A systematic review. *Sensors*, *24*(21), 6862. https://doi.org/10.3390/s24216862

Thompson, F., Rongen, F., Cowburn, I., & Till, K. (2024). A longitudinal mixed methods case study investigation of the academic, athletic, psychosocial and psychological impacts of being a sport school student athlete. *Sports Medicine*, *54*(9), 2423–2451. https://doi.org/10.1007/s40279-024-02021-4

Vavassori, R., Moreno, M. P., & Ureña Espa, A. (2023). The perception of volleyball student-athletes: Evaluation of well-being, sport workload, players' response, and academic demands. *Healthcare*, *11*(11), 1538. https://doi.org/10.3390/healthcare11111538