Cakrawala Pendidikan
Jurnal Ilmiah Pendidikan
Vol. 45 No. 3, October 2026, pp.674-685
https://journal.uny.ac.id/index.php/cp/issue/view/3181
DOI: https://doi.org/10.21831/cp.v45i3.99382

Evaluation of the long-term athlete development model in the volleyball athlete development program

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ABSTRACT

This study addresses the limited empirical evidence evaluating the implementation of the Long-Term Athlete Development (LTAD) model at the club level, particularly in team sports such as volleyball, where gaps between theoretical principles and coaching practice frequently persist. Using an evaluative case study design with a mixed-methods convergent parallel approach, this research examined the alignment of program structure and developmental stages, the quality of the talent development environment, and the implications for athlete well-being and participation sustainability within the volleyball development program at TVRI Medan Volleyball Club. Qualitative data was collected through document analysis, interviews, and observations, while quantitative data was obtained using the Talent Development Environment Questionnaire (TDEQ), the Athlete Burnout Questionnaire (ABQ), and indicators of training attendance and athlete retention. The findings indicate that LTAD has been adopted within the club's development framework; however, its implementation remains partial and adaptive, largely influenced by short-term competitive demands. The talent development environment was rated as good (M = 3.70), with psychosocial support emerging as the strongest dimension, although the balance between challenge and support requires further improvement. Athlete burnout was found to be at a moderate level (M = 2.58), particularly in physical and emotional exhaustion, while training attendance was high and athlete retention remained stable at 80% across three consecutive periods. These results contribute theoretically by reinforcing context-sensitive evaluations of LTAD at the club level and practically by providing evidence-based insights for designing more sustainable, athlete-centered, and long-term- oriented volleyball development programs.

Keywords: Long-term athlete development, athlete coaching, volleyball, athlete burnout, athlete retention

Article history

Received:	*Revised:*	*Accepted:*	*Published:*
13 June 2026	*13 August 2026*	*20 September 2026*	*25 October 2026*

Citation (APA Style): Daulay, B., Amansyah, A., Mesnan, M., Mahmuddin, M., Daulay, D. E., Widianingsih, O., Haidir, H., Daulay, D. A. A., Ayubi, N., & Rizki, A. Z. (2026). Evaluation of the long-term athlete development model in the volleyball athlete development program. *Cakrawala Pendidikan: Jurnal Ilmiah Pendidikan, 45*(2), pp.674-685. DOI. https://doi.org/10.21831/cp.v45i3.99382

INTRODUCTION

In the last five years, the development of accomplished athletes has increasingly been understood as a complex and multidimensional long-term process, rather than simply an accumulation of intensive training at a young age. The success of sustainable elite performance is highly dependent on the alignment between the stages of training, biological maturity, psychological readiness, and the quality of the coaching environment in which athletes develop (Schlawe et al., 2025). Mismatches between training load and athlete developmental phases are reported to contribute to an increased risk of injury, burnout, and performance stagnation, especially in the transition phase from adolescence to adulthood (Impellizzeri et al., 2020). In this

context, Long-Term Athlete Development (LTAD) is positioned as the main conceptual framework that emphasizes the gradual, individual, and sustainable development of athletes.

Nevertheless, recent empirical findings suggest that the adoption of LTAD in sports coaching practice is not always followed by consistent implementation. Till et al., (2022) revealed that many sports organizations are adopting LTAD normatively, while day-to-day coaching practices are still dominated by short-term achievement orientation, early selection, and premature specialization. This condition creates a gap between the principles of long-term development and the reality of coaching on the field, especially at the club level, as the closest coaching unit to athletes. Thus, the main problem in LTAD does not lie in the conceptual strength of the model, but in how the model is implemented and evaluated in the context of a real coaching organization. The effective coaching environment is characterized by a consistent long-term vision, coordination between coaches and stakeholders, and adequate psychosocial support (Kapoutzis et al., 2024). In contrast, a coaching environment that emphasizes instant results and excessive competitive pressure tends to hinder the long-term development of athletes (Endo et al., 2023). These findings confirm that LTAD cannot be evaluated only through the structure of training programs but must also consider the social and cultural contexts in which athletes develop.

Along with that, (Yang et al., 2024) reports that a process-oriented coaching environment and long-term development are positively correlated with athlete retention and healthy psychological adaptation. Athletes who thrive in an environment that supports autonomy and long-term learning show more stable engagement than athletes who are in a coaching climate that focuses on short-term outcomes (Alkasasbeh & Akroush, 2025). These findings strengthen the argument that the quality of the coaching environment is an important mediator in the successful implementation of LTAD. At the same time, the issue of athletes' mental health and well-being is increasingly occupying a central position in contemporary sports science literature. Sankey et al., 2023) affirms that the modern athlete coaching system must integrate mental health protection as part of long-term development. Choi et al. (2020) found that athlete burnout is closely related to an imbalance between training demands and psychosocial support in a coaching environment. In the context of LTAD, these findings imply that the success of athlete development cannot be measured solely through performance indicators, but also through the well-being and sustainability of athlete participation.

In volleyball, the challenge of athlete development has become increasingly complex due to tactical demands, positional specialization, and physical performance-based selection. Sweeney et al., (2023) shows that biological maturity is often more influential than chronological age in the assessment of young athletes' performance, thus potentially causing bias against athletes who mature early. Morbée et al. (2024) added that volleyball coaching systems that overemphasize short-term physical indicators risk hindering the development of athletes' long-term potential. This condition is contrary to the LTAD principle which emphasizes individualization, flexibility of stages, and opportunities for development for all athletes. Although reputable international literature has developed extensively on LTAD, the athlete development environment, and athlete well-being, research that empirically evaluates the application of the LTAD model at the club level is still very limited, particularly in team sports such as volleyball. Most previous research has focused on national systems, elite academies, or conceptual studies and coaches' perceptions, so they have not provided an adequate picture of how LTAD principles are operationalized in the day-to-day practice of club coaching. As a result, there is still limited empirical understanding of the suitability between program design, the quality of the coaching environment, and the development outcomes of athletes in a single coaching organizational context.

This gap is becoming increasingly significant, given that clubs are a major arena for long-term athlete development, especially in coaching systems in developing countries, but are relatively underrepresented in reputable international literature. Without empirical evaluation at the club level, the effectiveness of LTAD risks being understood only as a normative framework, rather than as a development model tested in real practice. Therefore, research is needed that systematically evaluates how the principles of LTAD are applied, modified, and faced with challenges in the context of volleyball club coaching.

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Based on these gaps, this study aims to evaluate the application of the Long-Term Athlete Development (LTAD) model in volleyball athlete coaching programs at TVRI Clubs. This study is directed to assess the suitability of the structure and stages of the coaching program with the principles of LTAD, examine the quality of the coaching environment that accompanies it, and identify its implications for the development of athletes' performance and welfare. With a case study approach, this research is expected to make a theoretical contribution in the form of strengthening understanding of LTAD evaluation based on the club context, as well as practical contributions in the form of evidence-based recommendations for managers and coaches in designing sustainable volleyball athlete coaching programs.

METHOD

This study uses an evaluative case study with a mixed methods approach and a convergent parallel design. This approach was chosen to comprehensively evaluate the suitability of the application of the Long-Term Athlete Development (LTAD) model in the volleyball athlete coaching program at the TVRI Medan Club, by integrating qualitative and quantitative data simultaneously. This design allows for a balanced assessment of the structure of the coaching program, the quality of the coaching environment, and the outcome of athlete development.

The research participants included volleyball athletes who were actively registered in the TVRI Medan Club, coaches (heads and assistants), and club managers. Athletes are grouped based on developmental stages relevant to the LTAD principles. The selection of participants is carried out purposively to ensure the representation of roles and experiences in the coaching program.

The data collection techniques in this study include qualitative data obtained through document analysis such as training curriculum, annual periodization, competition schedule, and athlete selection policies; semi-structured interviews with coaches and club managers to explore the understanding, practice, and challenges of implementing LTAD; as well as structured observation in training sessions to assess the suitability of coaching practices with LTAD principles and the dynamics of coach-athlete interaction. Meanwhile, quantitative data was collected through the Talent Development Environment Questionnaire (TDEQ) to assess the quality of the coaching environment, the Athlete Burnout Questionnaire (ABQ) to measure athlete burnout levels, as well as athlete development indicators such as training attendance and athlete retention during the observation period.

Qualitative data were analyzed using thematic analysis by mapping findings to the main principles of LTAD. Quantitative data were analyzed descriptively to describe the conditions of the coaching environment and the welfare of athletes. The integration of qualitative and quantitative data is carried out through triangulation and joint display analysis to obtain a comprehensive evaluative understanding.

The validity of the data is maintained through triangulation of sources and methods, as well as member checking on qualitative findings. This research was carried out with the consent of participants (informed consent) and ensured the confidentiality and anonymity of data in accordance with the ethical principles of the research.

FINDINGS AND DISCUSSION

Findings

Overview of participants and research context

This research involves athletes, coaches, and managers of the TVRI Medan Volleyball Club as the subject of an evaluative case study. Participating athletes are active athletes who are enrolled in the club's coaching program for one season of competition. Athletes are grouped based on developmental stages that are relevant to the principles of Long-Term Athlete Development (LTAD), starting from the basic development stage to the performance strengthening stage. In addition to athletes, qualitative participants consist of head coaches, assistant coaches, and club managers who are directly involved in the planning and implementation of coaching programs. The research is carried out over an annual coaching cycle, allowing observations of program

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consistency, athlete engagement, and coaching environment dynamics in the medium term. The context of the TVRI Medan Club as a national non-academy coaching club provides a realistic picture of the implementation of LTAD at the club level, including limited resources, competition demands, and achievement expectations.

Quality of coaching environment (TDEQ)

The quality of the athlete coaching environment was measured using the Talent Development Environment Questionnaire (TDEQ). TDEQ scores are calculated based on the average item score on each dimension of the coaching environment. The statistical analysis used is descriptive, including mean values, standard deviations, and distribution of score categories.

Table 1. Descriptive analysis results of the Talent Development Environment Questionnaire (TDEQ) score

Coaching Environment Dimensions	Number of Items	Mean	SD	Category
Long-Term Development Focus	6	3,78	0,54	Good
Quality Preparation and Training	5	3,65	0,6	Good
Psychosocial Support Network	6	3,82	0,49	Good
Communication and Feedback	4	3,71	0,58	Good
Challenge–Support Balance	4	3,56	0,63	Enough
Total	25	3,7	0,47	Good

Note: N = 30 subjects; Score using the Likert scale of 1–5

The results of the descriptive analysis showed that the quality of the coaching environment of volleyball athletes was in the good category with a total average score of 3.70 ± 0.47. The psychosocial support dimension obtained the highest score (M = 3.82; SD = 0.49), while the dimension of balance between challenge and support showed a comparatively lower score (M = 3.56; SD = 0.63) but still in the good category. These findings indicate that the coaching environment has supported the development of athletes in the long term, although there is still room for improvement in the adjustment aspect of training challenges.

Athlete burnout rate

ABQ (Athlete Burnout Questionnaire) is an instrument to measure the level of burnout in athletes, including emotional and physical fatigue, decreased sense of achievement, and cynical attitude towards sports. The goal is to help coaches and researchers understand the psychological state of athletes and prevent performance declines.

Table 2. Calculation of athlete burnout score based on Athlete Burnout Questionnaire (ABQ)

Number of Items	Dimensional Average Score ($\bar{X}d$)	Interpretation
5	2,85	Medium
5	2,6	Medium
5	2,3	Low
15	2,58	Medium

Based on the results of measuring athletes' burnout levels using the Athlete Burnout Questionnaire (ABQ), it was obtained that in general athletes were at a moderate burnout level, with a total burnout score of 2.58. This score is calculated from the average of the three main dimensions of burnout, namely physical and emotional fatigue, decreased sense of achievement, and devaluation of sports. These findings suggest that although athletes are still able to undergo the process of training and competition, there are indications of psychophysical stress that needs attention in the coaching system.

The physical and emotional fatigue dimensions showed the highest score compared to the other dimensions, which were 2.85, which were in the medium category. This indicates that

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athletes are starting to feel fatigue due to the demands of training, competition, and performance pressure that take place on a continuous basis. In the context of performance sports coaching, physical and emotional fatigue often arises as a result of a high training load, a hectic competition schedule, and a lack of adequate recovery time. This condition, if not managed properly, has the potential to develop into more serious burnout and negatively impact athlete performance and health.

The dimension of decreasing the sense of achievement obtained an average score of 2.60, which was also in the medium category. This score reflects a feeling of dissatisfaction with the athlete's training achievements and performance. Athletes may feel that the effort made is not proportional to the results obtained, so doubts arise about their abilities. In the long run, this condition can reduce the athlete's intrinsic motivation and commitment to the coaching process. These findings show the importance of providing constructive feedback, setting realistic targets, and strengthening psychological aspects in athlete development programs.

Meanwhile, the dimension of devaluation of sports showed the lowest score, which was 2.30, and was in the low category. This indicates that most athletes still have a positive attitude towards the sport they are engaged in and have not shown a tendency to lose interest or meaning in volleyball activities. The low score in this dimension is a relatively good indication, since the devaluation of sport is often considered the most alarming indicator of burnout, given that its impact can trigger a decrease in commitment and even a decision to quit competitive sport.

Thus, a total burnout score of 2.58 in the medium category indicates that athletes are in a relatively vulnerable phase to burnout, but not yet at an alarming level. This condition provides a warning signal for coaches and club managers to make preventive efforts through balanced training load management, improving the quality of recovery, and creating a psychosocially supportive coaching environment. In the framework of long-term coaching, these results confirm the importance of a holistic approach that is not only performance-oriented, but also on the well-being and sustainability of athletes' careers.

Indicators of athlete development: Attendance of training and retention

Athlete development indicators were analyzed through data on training attendance and athlete retention during the observation period of one coaching season. The results of the analysis showed that the attendance rate of athletes was in the high category, with most athletes having an attendance rate above 80%. Athletes in the early stages of development show excellent attendance rates, while a slight decrease in attendance is seen in advanced stage athletes, especially in periods of intense competition.

Athlete retention is calculated based on a comparison of the number of athletes who remain active until the end of the observation period to the number of athletes at the beginning of the season. Athlete retention rates are relatively good, with only a small percentage of athletes dropping out of coaching programs. The reason for the athletes' exit is mostly related to external factors, such as education and employment, not because of dissatisfaction with the coaching program. The attendance and retention indicators support TDEQ and ABQ's findings that the coaching environment is relatively conducive and does not create undue pressure that drives athlete dropout.

Athlete retention rate

Athlete retention rate is a measure of a team's or organization's ability to retain athletes to continue training and competing on an ongoing basis. The goal is to assess athletes' satisfaction, commitment, and career sustainability, as well as to be the basis for improving coaching and psychological support programs.

Based on the table, the athlete retention rate in 2023, 2024, and 2025 shows the same value, which is 80%. This indicates that most athletes are able to be retained by sports organizations from year to year. The consistency of retention rates indicates the stability of the coaching program, relatively good quality of training, and adequate managerial support. Although the number of starting athletes differs each year, the proportion of athletes who survive remains balanced. However, there are still 20% of athletes who do not survive, so it is necessary to further

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evaluate related to motivation factors, training load, psychological well-being, and athlete satisfaction to increase retention in the future.

Table 3. Results of athlete retention rate calculation per period

Period of project	Defensive Athlete (N_t)	Defensive Athlete (N_t)	Retention Rate (%)
2023	50	40	80%
2024	45	36	80%
2025	60	48	80%

Analysis of coaching program documents

Document analysis was carried out on the training curriculum, annual periodization, competition schedule, and athlete selection policy. The results of the analysis show that conceptually, the TVRI Medan Club coaching program document has adopted several main principles of LTAD, such as the division of training stages based on age and emphasis on mastering basic skills in the early stages.

Nevertheless, inconsistencies were found between the curriculum document and the implementation of annual periodization. Although periodization is designed in stages, the tight competition schedule leads to adjustments to training loads that tend to be reactive. In addition, athlete selection policies still show a tendency to prioritize short-term physical performance, with biological maturity considerations that have not been systematically documented.

These findings show that there is a gap between the design of LTAD-based coaching programs and operational practices in the field, especially regarding the flexibility of stages and individualization of training.

Semi-structured interviews with coaches and club managers

The results of interviews with coaches and club managers were analyzed using thematic analysis, by mapping the main themes of LTAD principles. The analysis process yielded several key themes, including understanding of LTAD, performance and competition pressures, training load management, and resource limitations.

The trainer shows a fairly good understanding of the basic concepts of LTAD and the importance of long-term development. However, they also revealed a dilemma between applying the LTAD principles ideally and meeting the demands of short-term achievements, especially in regional competitions. The club manager emphasized that limited resources and competition schedules are the main challenges in maintaining the consistency of the implementation of LTAD.

The interview also revealed that the evaluation of the coaching program has not been carried out in a systematic and structured manner. Evaluation is more based on the results of the competition, not on the indicators of the athlete's long-term development.

Structured observation training session

Observation of training sessions was carried out to assess the suitability of coaching practices with LTAD principles and the dynamics of coach-athlete interaction. The results of the observation showed that the training sessions were generally well structured and emphasized the mastery of basic techniques, especially in the younger age group.

Nevertheless, in the advanced group of athletes, observations showed an increased focus on training outcomes and intensity, with relatively limited time for recovery and reflection on learning. Coach-athlete interactions tend to be instructional, although verbal and motivational support still looks pretty good.

These observational findings reinforce the results of interviews and document analysis, which show a shift in orientation from long-term development to short-term performance demands at certain phases of coaching.

Quantitative and qualitative data integration (Triangulation)

Quantitative and qualitative data integration is carried out through triangulation and joint display analysis. TDEQ's results show that the quality of the coaching environment in the medium

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category is in line with qualitative findings that indicate the support of trainers and a fairly strong basic program structure. However, lower scores on the external coordination and support dimensions were consistent with the interview's findings regarding resource limitations and lack of support systems.

Similarly, the relatively low to moderate level of athlete burnout is in accordance with the results of observations and interviews that show that the coaching climate is still supportive, despite the increase in fatigue during periods of intense training and competition. Good indicators of athlete attendance and retention reinforce the interpretation that coaching programs have not created excessive pressure that drives dropouts.

This triangulation shows that the implementation of LTAD at the TVRI Medan Club is at a partial and adaptive stage, with strengths in the aspects of coach support and athlete involvement, as well as weaknesses in the consistency of periodization, individualization of training, and LTAD-based evaluation system.

Research validity and ethics

The validity of the data in this study was maintained through triangulation of sources and methods, by comparing findings from questionnaires, documents, interviews, and observations. In addition, member checking is carried out by confirming the results of qualitative findings to coaches and club managers to ensure the accuracy of the researcher's interpretation.

This research was carried out by paying attention to the ethical principles of research. All participants give informed consent, and the confidentiality of the participant's identity is maintained using an anonymous code. The data collected is used solely for the purposes of scientific research and reporting.

Based on the analysis of quantitative and qualitative data, it can be concluded that the results of the study show that the LTAD model has been adopted in the coaching program of the TVRI Medan Club, but its implementation is still partial and faces various practical challenges. The coaching environment is relatively supportive of athlete development and welfare, but consistency in the application of LTAD principles, particularly at the advanced stage and in the context of competition, still requires reinforcement through systematic evaluation and structural support.

Ease of reading and comprehension, findings are presented first, followed by discussion. It should provide a concise and precise description of the experimental results, the interpretation, and the conclusions that can be drawn. The Findings subtitle and Discussion subtitle are presented separately. This section should occupy a minimum of 60% of the whole body of the article.

Discussion

Implementation of the Long-Term Athlete Development (LTAD) model at the club level

The results of the study show that the Long-Term Athlete Development (LTAD) model has been adopted in the volleyball athlete development program at the TVRI Medan Club, but its application is still partial and adaptive. These findings suggest that LTAD functions more as a normative framework than as an operational guide that is applied consistently throughout the development stages. Theoretically, these results support the view of Beaudoin et al. (2015) which states that many sports organizations are adopting LTAD conceptually, but face difficulties in integrating it into daily coaching practices.

In the perspective of LTAD, long-term athlete development demands alignment between the stages of biological development, psychological readiness, and training load (Varghese et al., 2022). However, the results of document analysis and observations show that there is a discrepancy between the annual periodization planning and the actual implementation in the field. The tight competition schedule encourages coaches to make reactive adjustments to the training load, so that short-term achievement orientation is still sufficient dominant, especially in the advanced athlete group (Lindsay & Spittle, 2024). This condition is contrary to the main principle of LTAD which emphasizes stability, progressivity, and individualization of athlete development (Lumintuarso et al., 2025).

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These findings reinforce the argument that the main challenge of LTAD lies not in the conceptual strength of the model, but in the ability of coaching organizations to manage competitive pressures and resource constraints. In the context of clubs, regional performance demands, stakeholder expectations, and limited facilities and support personnel often limit the ideal implementation of LTAD. Therefore, the implementation of LTAD at the club level needs to be understood as an adaptive process that is heavily influenced by the structural context and culture of the coaching organization (Millar et al., 2020).

Quality of the coaching environment as a supporting factor for LTAD

The results of the Talent Development Environment Questionnaire (TDEQ) measurement showed that the quality of the athlete coaching environment at the TVRI Medan Club was in the good category, with a total average score of 3.70. These findings indicate that the coaching environment is relatively supportive of the long-term development of athletes, especially through psychosocial support, communication, and a focus on long-term development. The psychosocial support dimension obtained the highest score, which indicates the existence of a fairly positive interpersonal relationship between athletes, coaches and the club environment (Lane, 2024).

Theoretically, these findings are in line with the model of the athlete coaching environment put forward by (Yang et al., 2024), who emphasize that the quality of the coaching environment is a key mediator of the success of athlete development in the long term (Earle et al., 2025). A supportive environment, having a long-term vision, and providing effective communication and feedback has been proven to increase athlete engagement and reduce the risk of dropout (Mazzetti & Schaufeli, 2022). Thus, TDEQ's results support the literature that places the coaching environment as a key element in the effectiveness of LTAD implementation (Gesbert et al., 2021).

Nevertheless, the balance dimension between challenge and support shows a relatively lower score compared to the other dimensions. These findings indicate that the level of demands of training and competition has not been fully adjusted to the capacity and developmental phase of individual athletes. Theoretically, an imbalance between challenge and support has the potential to inhibit long-term learning and increase the risk of psychological fatigue (Gonçalves & Matos, 2025). This shows that even though the coaching environment is relatively good, there is still a need for improvement in the management of training demands to be more in line with LTAD principles.

Athlete burnout in long-term development perspective

The results of the Athlete Burnout Questionnaire (ABQ) measurement showed that athletes were at a moderate level of burnout, with a total score of 2.58. These findings provide an idea that athletes are still able to undergo the process of training and competition, but have shown indications of psychophysical stress that needs attention. Within the framework of LTAD, these outcomes have important implications because athlete well-being is an integral component of long-term development.

The physical and emotional fatigue dimensions showed the highest scores, which indicated that the demands of training and competition exerted considerable pressure significant. These findings are in line with the results of the research of Gustafsson et al. (2021) which shows that physical and emotional fatigue is often the initial dimension of burnout in athletes in a performance-oriented coaching environment. In the context of the TVRI Medan Club, this pressure is likely related to the tight competition schedule and limited recovery time, as revealed in the results of interviews and observations.

In contrast, the dimension of sports devaluation shows low scores, which indicates that athletes still have a positive attachment and meaning to the sport of volleyball. Theoretically, this condition is an important protective factor, as sports devaluation is often associated with athletes' decision to exit the coaching system (Ma et al., 2025). Thus, even though athletes experience fatigue, their commitment and sports identity are still relatively maintained.

These findings support Söker et al. (2025) that emphasizes the importance of integrating mental health aspects in LTAD evaluation. The modern athlete coaching system is required to not only pursue performance, but also maintain the psychological well-being of athletes as a

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prerequisite for the sustainability of sports careers. Therefore, the results of the ABQ in this study reinforce the argument that LTAD evaluation should include welfare indicators, not solely technical performance indicators.

Athlete attendance and retention as an outcome of LTAD implementation

The results of the analysis showed that the attendance rate of athletes' training was in the high category, with the majority of athletes having an attendance rate above 80%. In addition, the athlete retention rate during the 2023–2025 period shows a consistent value of 80%. These findings indicate that most athletes are able to be retained in the club's coaching system, despite variations in the number of early athletes each period. High attendance and retention rates reflect relatively stable athlete engagement, which is one of the indicators of the success of the coaching environment within the LTAD framework (Till et al., 2022). Athletes who feel psychosocially supported and see long-term development prospects tend to show a higher commitment to coaching programs.

However, there are still about 20% of athletes who do not survive every period. The results of the interviews show that external factors, such as educational and job demands, are the main reasons for the athlete's exit. These findings suggest that athlete retention is not only influenced by the quality of coaching programs, but also by the social and economic context of athletes. In the context of LTAD, this emphasizes the importance of program flexibility, transition support, and the integration of dual career planning for athletes.

Compared to previous studies, these findings are in line with the results of (Martínez-González et al., 2025) which found that a process-oriented coaching environment was positively correlated with athlete retention. However, the consistency of the same retention rate over three periods may also indicate stagnation in efforts to improve the sustainability of athlete participation. Therefore, additional strategies are needed to reduce dropout rates, particularly through academic support, schedule flexibility, and more intensive communication with athletes.

Integration of quantitative and qualitative findings in LTAD evaluation

The integration of quantitative and qualitative data through triangulation showed consistency between the results of TDEQ, ABQ, and retention indicators with the findings of interviews, observations, and document analysis. The coaching environment that is assessed as good quantitatively is in line with qualitative findings regarding coach support and a fairly strong basic program structure. However, the inconsistency of periodization and competitive pressures that are revealed qualitatively are also reflected in burnout scores that are in the medium category.

Theoretically, these results reinforce the relevance of the CIPP evaluation model in evaluating sports coaching programs (Aldapit & Suharjana, 2019). LTAD evaluations need to include context, inputs, processes, and products in an integrated manner to provide a comprehensive picture of program effectiveness (Till et al., 2022). The findings of this study show that the implementation of LTAD in the TVRI Medan Club is in a transitional stage, with strengths in the aspects of environmental support and athlete involvement, as well as weaknesses in the consistency of periodization, individualization of training, and LTAD-based evaluation system.

Theoretical and practical implications

Theoretically, this research contributes to the development of the LTAD literature by affirming the importance of empirical evaluation at the club level as the main coaching unit. These findings broaden the understanding of the gap between the concept of LTAD and coaching practices on the field, particularly in team sports such as volleyball. In addition, this study confirms that indicators of the coaching environment and athlete welfare are an essential component in the evaluation of LTAD success.

Practically, the results of this study provide implications for coaches and club managers to strengthen the consistency of the application of the LTAD principle, especially in periodization planning and training load management. Coaches need to integrate recovery strategies, psychological feedback, and individual adjustments to prevent increased athlete burnout. Clubs

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are also advised to develop an internal evaluation system that focuses not only on competition results, but also on indicators of long-term development and athlete well-being.

This discussion emphasizes that the implementation of LTAD at the TVRI Medan Club has a positive foundation, but still needs structural and cultural strengthening in order to be able to support the development of volleyball athletes that are sustainable, holistic, and long-term oriented.

CONCLUSION

The evaluation reveals that the Long-Term Athlete Development (LTAD) model has been partially adopted in the TVRI Medan Volleyball Club's program, yielding a supportive coaching environment (TDEQ M=3.70), moderate athlete burnout (ABQ M=2.58), and stable retention (80%), yet challenged by short-term competitive pressures, inconsistent periodization, and suboptimal challenge-support balance. To enhance implementation, we recommend systematic LTAD-aligned evaluations, individualized training adjustments with integrated recovery protocols, strengthened psychosocial support to mitigate burnout particularly physical/emotional exhaustion and flexible dual-career planning to boost retention beyond 80%, ultimately fostering sustainable, athlete-centered volleyball development at the club level.

ACKNOWLEDGMENT

The authors would like to express their sincere gratitude to the management, coaches, and athletes of the TVRI Medan Volleyball Club for their willingness to participate in this study and for providing access to the necessary documents, training sessions, and interview opportunities. Special thanks are extended to the research assistants who contributed to data collection and processing. This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors. The authors also acknowledge the support of their respective institutions for facilitating the research environment and administrative resources.

REFERENCES

Aldapit, E., & Suharjana, S. (2019). CIPP evaluation model for the coaching program of running athletes. *Psychology, Evaluation, and Technology in Educational Research*, *1*(2), 104. DOI: https://doi.org/10.3389/fpsyg.2025.1645274

Beaudoin, C., Callary, B., & Trudeau, F. (2015). Coaches' adoption and implementation of sport Canada's long-term athlete development model. *SAGE Open*, *5*(3). DOI: https://doi.org/10.1177/2158244015595269

Choi, H., Jeong, Y., & Kim, S. K. (2020). The relationship between coaching behavior and athlete burnout: Mediating effects of communication and the coach–athlete relationship. *International Journal of Environmental Research and Public Health*, *17*(22). DOI: https://doi.org/10.3390/ijerph17228618

Earle, J., Till, K., & Cowburn, I. (2025). A case study of a sports school scholarship programme: Student-athlete dual career competency development and perceptions of the talent development environment. *International Journal of Sports Science and Coaching*, *20*(1). DOI: https://doi.org/10.1016/j.ajsep.2023.07.002

Gesbert, V., von Roten, F. C., & Hauw, D. (2021). Reviewing the role of the environment in the talent development of a professional soccer club. *PLoS ONE*, *16*(2 February). DOI: https://doi.org/10.1371/journal.pone.0246823

Gonçalves, S., & Matos, R. S. (2025). Understanding emotional fatigue: A systematic review of causes, consequences, and coping strategies. *Enfermeria Clinica*, *35*(5). DOI: https://doi.org/10.1016/j.enfcli.2025.502190

Copyright © 2026, *author*, e-ISSN 2442-8620, p-ISSN 0216-1370

Impellizzeri, F. M., McCall, A., Ward, P., Bornn, L., & Coutts, A. J. (2020). Training load and its role in injury prevention, part 2: Conceptual and methodologic pitfalls. *Journal of Athletic Training*, *55*(9). DOI: https://doi.org/10.4085/1062-6050-501-19

Kapoutzis, N., Whiley, L. A., Yarker, J., & Lewis, R. (2024). Coaching culture: an evidence review and framework for future research and practice. *Coaching*, *17*(1). DOI: https://doi.org/10.1080/17521882.2023.2250458

Lane, S. (2024). "It's the people that make the difference": Understanding the significance of psychosocial support for professional athletes. *Mental Health and Prevention*, *36*. DOI: https://doi.org/10.1016/j.mhp.2024.200364

Lindsay, R., & Spittle, M. (2024). The adaptable coach – a critical review of the practical implications for traditional and constraints-led approaches in sport coaching. In *International Journal of Sports Science and Coaching*, *19*(3). DOI: https://doi.org/10.1177/17479541241240853

Lumintuarso, R., Pahalawidi, C., Tirtawirya, D., Zuliswan, Z. Ben, Ilham, Alfarobi, R., Orhan, B. E., & Geantă, V. A. (2025). Balancing academics and athletics: A comparative analysis of Indonesian and Malaysian student-athletes. *International Journal of Human Movement and Sports Sciences*, *13*(3). DOI: https://doi.org/10.13189/saj.2025.130305

Ma, Q. S., Chun, B. O., & Yao, S. J. (2025). Associations between life stress and athlete burnout: the chain mediation role of mindfulness and cognitive emotion regulation strategies. *BMC Psychology*, *13*(1). DOI: https://doi.org/10.1186/s40359-025-02670-8

Martínez-González, N., Atienza, F. L., & Balaguer, I. (2025). Implications of perceived empowering motivational climate on athletes' goal-regulatory processes: A longitudinal analysis. *Journal of Sports Sciences*. DOI: https://doi.org/10.1080/02640414.2025.2598159

Mazzetti, G., & Schaufeli, W. B. (2022). The impact of engaging leadership on employee engagement and team effectiveness: A longitudinal, multi-level study on the mediating role of personal- and team resources. *PLoS ONE*, *17*(6). DOI: https://doi.org/10.1371/journal.pone.0269433

Millar, P., Clutterbuck, R., & Doherty, A. (2020). Understanding the adoption of long-term athlete development in one community sport club. *Managing Sport and Leisure*, *25*(4). DOI: https://doi.org/10.1080/23750472.2020.1713197

Morbée, S., Haerens, L., Soenens, B., Thys, J., & Vansteenkiste, M. (2024). Coaching dynamics in elite volleyball: The role of a need-supportive and need-thwarting coaching style during competitive games. *Psychology of Sport and Exercise*, *73*. DOI: https://doi.org/10.1016/j.psychsport.2024.102655

Sankey, C., Wallace, L., & Caperchione, C. M. (2023). Understanding the role of coaches in supporting the mental health of elite athletes. *Journal of Science and Medicine in Sport*, *26*(8). DOI: https://doi.org/10.1016/j.jsams.2023.06.012

Schlawe, A., Christiansen, A. V., & Henriksen, K. (2025). The high-performance sport environment: laying the foundation for a new research topic. *Frontiers in Sports and Active Living*, *7*. DOI: https://doi.org/10.3389/fspor.2025.1503199

Söker, N., Schamerowski, J., Zech, A., Steib, S., & Rahlf, L. (2025). Long-term athlete development in schools: a systematic review and narrative synthesis. In *Frontiers in Sports and Active Living, 7*. DOI: https://doi.org/10.3389/fspor.2025.1706060

Sweeney, L., Cumming, S. P., MacNamara, Á., & Horan, D. (2023). A tale of two selection biases: The independent effects of relative age and biological maturity on player selection

Copyright © 2026, *author*, e-ISSN 2442-8620, p-ISSN 0216-1370

in the Football Association of Ireland's national talent pathway. *International Journal of Sports Science and Coaching*, *18*(6). DOI: https://doi.org/10.1177/17479541221126152

Till, K., Lloyd, R. S., McCormack, S., Williams, G., Baker, J., & Eisenmann, J. C. (2022). Optimising long-term athletic development: An investigation of practitioners' knowledge, adherence, practices and challenges. *PLoS ONE*, *17*(1). DOI: https://doi.org/10.1371/journal.pone.0262995

Varghese, M., Ruparell, S., & LaBella, C. (2022). Youth Athlete Development Models: A Narrative Review. In *Sports Health*, *14*(1). DOI: https://doi.org/10.1177/19417381211055396

Yang, P., Xu, R., & Le, Y. (2024). Factors influencing sports performance: A multi-dimensional analysis of coaching quality, athlete well-being, training intensity, and nutrition with self-efficacy mediation and cultural values moderation. *Heliyon*, *10*(17). DOI: https://doi.org/10.1016/j.heliyon.2024.e36646

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