RECOVERY STRATEGIES AND TRAINING FREQUENCY AS DETERMINANTS OF FITNESS LEVEL AMONG ATHHLETIC STUDENT-ATHLETES

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Abstract

This study aimed to assess the effects of recovery strategies and training frequency on the fitness levels of 20 athletics student-athletes from Western Mindanao State University using a quantitative correlational research design. The study evaluated various fitness components, including strength, endurance, speed, agility, and cardiovascular capacity, to determine the athletes' overall physical preparedness and examine how training and recovery practices influence performance. Findings revealed that although respondents reported relatively high readings across all variables, recovery strategies and fitness levels showed a significant positive relationship ($r = 0.671$, $p = 0.001$), indicating that proper recovery practices are strongly associated with better physical fitness. In contrast, training frequency did not significantly predict fitness levels ($p = 0.792$), suggesting that increasing the number of training sessions alone does not necessarily improve athletic performance. The results further emphasized that adequate sleep, proper nutrition, and sufficient hydration are more essential for enhancing athletic performance than simply increasing training frequency. Multiple regression analysis also showed that recovery strategies were the strongest predictor of physical preparedness, accounting for 35.5% of the variance in fitness levels. Overall, the study highlights the importance of prioritizing structured recovery protocols to prevent overtraining and maximize athletic adaptation among student-athletes.

Keywords: *Fitness Level, Recovery Strategies, Student-Athletes, Supercompensation Theory, Training Frequency*

Introduction

Student-athletes experience high physiological and psychological demands, making proper recovery and training balance essential for maintaining fitness and preventing overtraining. Recovery strategies such as adequate sleep, proper nutrition, hydration, massage therapy, and cold-water immersion are commonly used to reduce fatigue and improve athletic performance. Studies have shown that cold-water immersion enhances neuromuscular recovery and decreases muscle soreness after exercise (Ihsan et al., 2021). At the same time, training frequency is also important in developing strength, endurance, speed, agility, and

cardiovascular fitness. However, excessive or poorly managed training may increase the risk of fatigue, injury, and performance decline (Bezugloy et al., 2021). Therefore, both recovery strategies and training frequency are considered important factors in improving the fitness levels of track-and-field athletes.

International studies emphasize the importance of combining effective recovery strategies with appropriate training frequency to maximize athletic performance. Research in China found that recovery interventions positively affect muscle repair and fatigue reduction, leading to improvements in athletes' fitness levels (Li et al., 2024). Similarly, studies in Japan revealed that cold-water immersion reduces muscle soreness and improves short-term recovery, while proper weekly training frequency contributes to better strength and fitness development (Xiao et al., 2023). In Greece, Nikolaidis et al. (2023) highlighted that insufficient recovery and excessive training increase the risk of injury and negatively affect athletic performance. These findings show that maintaining a balance between recovery and training is necessary for athletes to achieve optimal fitness and long-term health.

In the Philippines, studies have also highlighted the importance of recovery and training practices among athletes. Research conducted in Bulacan showed that recovery modalities significantly influence the physiological responses and performance of athletes during high-intensity interval training (Santos & De Vera, 2023). Likewise, a study in Davao found that while high-intensity training improved speed, strength, and endurance among student-athletes, inconsistencies in recovery strategies remained a concern (Mañalac & Dominado, 2024). Furthermore, Reyes (2022) noted that although recovery methods such as cryotherapy and compression garments show promising results, no single recovery strategy has been identified as universally effective. These studies suggest that there is still limited research on the combined effects of recovery strategies and training frequency on the fitness levels of student-athletes in the Philippine setting.

Despite the growing body of research, most studies have examined recovery strategies and training frequency separately rather than investigating their combined effects on different fitness components among track-and-field student-athletes. In Western Mindanao State University, limited institution-based studies have explored how recovery practices and training frequency influence strength, endurance, speed, agility, and cardiovascular fitness. Thus, this study aimed to determine the relationship between recovery strategies, training frequency, and the fitness levels of athletics student-athletes. Specifically, it sought to answer the following questions: (1) What are the levels of recovery strategies, training frequency, and fitness levels of athletics student-athletes? (2) Is there a significant relationship between recovery strategies and fitness levels? (3) Is there a significant relationship between training frequency and fitness levels? and (4) What is the combined influence of recovery strategies and training frequency on the fitness levels of athletics student-athletes?

Statement of the problem

This study aimed to determine the relationship of recovery strategies and training frequency with the fitness levels of Athletics student-athletes. Specifically, it sought to answer the following questions:

1. What are the levels of training variables of the Athletics student-athletes?
   1.1 Recovery strategies of the Athletes
   1.2 Training Frequency of the Athletes
   1.3 Fitness level of the Athletes
2. Is there a significant relationship between recovery strategies and fitness levels of Athletics student-athletes?
3. Is there a significant relationship between training frequency and fitness levels of Athletics student-athletes?
4. What is the combined influence of recovery strategies and training frequency with the fitness levels of Athletics student-athletes?

Methods

The study utilized a quantitative descriptive-correlational research design to determine the relationship between recovery strategies, training frequency, and fitness levels of university athletics student-athletes. This approach involved collecting numerical data and analyzing them using statistical techniques to identify patterns and relationships among variables without establishing direct causation. The design was appropriate in determining whether differences in recovery practices and training schedules are associated with variations in athletes' fitness levels. According to Bryman (2020), quantitative descriptive-correlational research is effective in examining relationships between variables and producing objective and reliable findings.

Research Locale

Ethics in sports refers to the moral principles and values that guide the behavior of athletes, coaches, officials, and spectators. It promotes fairness, honesty, discipline, integrity, and respect, helping maintain the true spirit of sports and healthy competition. Ethics also prevent unfair, violent, and unsafe behavior while developing positive attitudes and life skills beyond sports.

Research Respondents

The participants of the study were athletics student-athletes from Western Mindanao State University selected through random sampling to ensure equal chances of participation and better representation of the WMSU athletics community. To qualify, participants had to be current WMSU student-athletes, at least 18 years old, free from bone-related injuries, and willing to sign an informed consent form. Only those who met all inclusion criteria were selected for the study.

Data Gathering Procedure

Before the actual data collection, the researchers secured approval from the appropriate authorities and informed the participants about the purpose of the study, their role, and the confidentiality of the information gathered. Research instruments and data collection plans were also finalized to ensure an organized and ethical process.

During the actual data gathering, the researchers collected information regarding training frequency, recovery strategies, and fitness levels using training logs, self-report questionnaires, injury logs, and standardized fitness tests. Participants provided information about their sleep, nutrition, recovery practices, and overall well-being through the Daily Readiness Questionnaire (DRQ) and other survey instruments. The researchers supervised the process to ensure consistency and completeness of the data gathered.

After the data collection, the researchers reviewed, organized, and verified all gathered information to ensure accuracy and completeness. The data were categorized according to the study variables and prepared for statistical analysis. Descriptive statistics, correlation analysis, and regression analysis were used to determine the relationship between recovery strategies, training frequency, and fitness levels of athletics student-athletes in Western Mindanao State University.

Research instrument

The research instrument used in this study was a self-structured survey questionnaire administered to twenty (20) student-athletes of Western Mindanao State University to gather data on demographic profile, recovery strategies, training frequency, and fitness level. The questionnaire consisted of five parts: Part I covered demographic information such as athletic event, years of experience, and training frequency per week; Part II presented a four-point Likert scale (Never, Seldom, Often, Always); Part III assessed recovery strategies including rest/sleep, nutrition and hydration, cool-down exercises, active recovery, and recovery aids; Part IV measured training frequency, training structure, intensity, balance, and rest days; and Part V evaluated fitness level in terms of strength, endurance, speed, agility, and cardiovascular fitness.

The instrument was validated by experts in sports science and research to ensure clarity, relevance, and reliability of the items used in the study.

Statistical Tools

The data collected in this study were analyzed using both descriptive and inferential statistical tools to properly interpret the results from the survey responses of student-athletes of Western Mindanao State University. For Research Question 1, the Weighted Mean (Gaze Formula) was used to determine the general level of Recovery Strategies, Training Frequency, and Fitness Level based on the Likert-scale responses. This allowed the researchers to identify overall trends and compare the perceived levels of each variable. For Research Question 2, the Pearson Product-Moment Correlation was employed to determine the significant relationship between recovery strategies and fitness levels. For Research Question 3, the same correlation technique was used to analyze the relationship between training frequency and fitness levels. Lastly, for Research Question 4, Multiple Linear Regression analysis was applied to determine the combined influence of recovery strategies and training frequency on fitness levels and to identify which variable had the greater predictive effect on athletic fitness.

Ethical Considerations

Ethical approval for this study was obtained from the College of Sports Science and Physical Education Ethics Review Committee of Western Mindanao State University prior to data collection. The study was conducted with strict observance of ethical standards to ensure that no harm, coercion, or misrepresentation occurred. Participation was voluntary, and informed consent was secured from all respondents after explaining the purpose, procedures, risks, and their right to withdraw at any time without consequences. Although participants were adults, they were assured that their decision to participate or not would not affect their team membership or training. The study involved minimal risk since it only gathered information on recovery strategies, training frequency, and fitness levels without any physical intervention. All data were kept confidential, anonymized, and securely stored, with access limited only to the research team.

Results

Respondents Profile

Table 1

Profile	Category	Frequency	Percentage	Total
	100 m	7	14	
	200 m	1	5	
	800 m	5	25	
Athletic	Long Jump	3	15	100
Event	Shotput	2	10	
	Triple Jump	1	5	
	Hurdles	1	5	
Years of	1 year	1	5	
Athletic	2 years	12	60	
Experience	3 years	5	25	100

	4 years	1	5	
	5 years	1	5	
Average	2 sessions per week	2	10	
Training	3 sessions per week	10	50	
Frequency	4 sessions per week	6	30	100
	5 sessions per week	2	10	

Table 1 presents the demographic profile of the respondents in terms of age. The results show that most of the athletics student-athletes belong to the 18–20 age group, indicating that the majority are within the typical college age range. This suggests that the respondents are in a stage of active physical development, which is relevant to their training and athletic performance.

Table 2

Level of Training Variables Among Athletics student-athletes of Training Frequency

Statement	Mean	Interpretation
1 I take enough rest or sleep after training.	3.40	Very High
2. I used proper nutrition (balanced meals, hydration) to recover.	3.10	High
3. I perform cool down exercises or stretching after training.	3.40	Very High
4. I used active recovery methods (light jogging, swimming, or yoga) after intense sections.	3.15	High
5. I used recovery aids such as massage, ice baths or compression gear after training.	2.65	High
Overall mean	**3.14**	**High**

As shown in Table 2, the overall mean for recovery strategy is 3.14, interpreted as high. This indicates that athletics student-athletes generally practice basic recovery methods such as proper sleep, nutrition, stretching, and active recovery after training. However, the use of advanced recovery techniques like massage, ice baths, and compression garments remains limited. This suggests that most student-athletes rely on simple and accessible recovery practices, while advanced methods are less frequently used, possibly due to limited availability or access.

Table 3

Level of Training Variables Among Athletics student-athletes in terms of Recovery Strategies

Statement	Mean	Interpretation
6. I train regularly every week.	2.80	High
7. I have a balance training schedule (not over or undertrained)	3.00	High
8. I follow a structured training program consistently.	3.00	High
9. I train at high intensity during most sessions.	3.25	High
10. I take rest days as needed to avoid fatigue or injury.	3.70	Very High
Overall mean	**3.15**	**High**

Table 3 illustrates that the frequency of training of athletes' student-athletes is generally High at a mean of 3.15. Rest days to prevent fatigue or injury was the most frequent occurrence among student-athletes' sequenced program offered by coaches. It shows that the student–athletes have a routine that includes training and rest in equal measure.

Table 4

Level of Training Variables Among Athletics student-athletes in terms of Fitness Levels

Statement	Mean	Interpretation
11. I feel physically fit to perform at my best during Athletics activities due to my strength, endurance, speed, agility, and cardiovascular fitness.	3.40	Very High
12. I can endure long training sessions without excessive fatigue because of my muscular endurance and cardiovascular endurance.	3.00	High
13. I recover quickly after intense physical activity as result of my cardiovascular endurance and overall muscular strength.	3.05	High
14. My strength, speed, and endurance meet my personal athletic goals.	3.10	High
15. Overall, I consider my strength endurance, speed, agility and cardiovascular fitness to be high compared to my peers.	3.20	High

Overall mean	**3.15**	**High**

Table 4 indicates that the overall mean of fitness level among athletics student-athletes is 3.15, interpreted as High, suggesting that the respondents possess strong physical capabilities such as endurance, strength, speed, agility, and cardiovascular fitness. This implies that their training and recovery routines contribute to maintaining a favorable level of overall physical fitness.

Table 5

Relationship Between Recovery Strategies and Fitness Levels

Variables	*r-value*	*p-value*	*Interpretation*
Recovery Strategies fitness levels	0.671	0.001	Significant

Table 5 reveals a significant relationship between recovery strategies and fitness level ($r = 0.671$, $p = 0.001$). This indicates that athletes who practice effective recovery strategies tend to exhibit higher levels of physical fitness. This result suggests that recovery practices play a critical role in improving athletic performance and physical adaptation.

Table 6

Relationship Between Training Frequency and Fitness Levels

Variables	*r-value*	*p-value*	*Interpretation*
Training Frequency fitness Level	0.099	0.677	Not Significant

As shown in Table 6, the training frequency does not have a significant relationship with fitness levels ($r = 0.099$, $p = 0.677$) among athletics student-athletes. More training sessions someone undertakes, higher would be their fitness level but it is not necessary if these factors are not well addressed. As such, it is clear that frequency of training is not the only measure of athletic fitness but having proper recovery is necessary for attaining athletic fitness as per the results.

Table 7

Multiple Regression Analysis Showing Relationship of Fitness Levels with Athletic Student-athletes Recovery Strategies and Training Frequency

Training Variables	**B**	**SE**	**β**	**p-value**	**Interpretation**
Recovery Strategies	0.603	0.224	0.571	0.015	Significant
Training Frequency	0.045	0.167	0.057	0.792	Not Significant

The multiple regression analysis in Table 7 shows that recovery strategies significantly predict fitness levels ($\beta = 0.571$, $p = 0.015$), while training frequency does not significantly. predict fitness levels ($\beta = 0.057$, $p = 0.792$). The model explains 35.5% of the variance in fitness levels ($R^2 = 0.355$). This indicates that recovery strategies have a stronger influence on the fitness levels of athletics student-athletes compared with training frequency alone.

Discussion

This chapter presents the results of a study on how the fitness levels of the athletics student-athletes in Western Mindanao State University are influenced by training frequency and recovery strategies. The chapter begins with the discussion of the research findings and interpretation based on the research questions that guided the study, including the weighted mean analysis of training frequency, level of fitness, and recovery methods. The chapter also presents the theoretical and practical implications and concludes with the presentation of the conclusions based on the research findings, and recommendations for the direct beneficiaries of the study.

Levels of training variables of the Athletics student-athletes

The results showed that student-athletes in athletics demonstrated a high level of training variables in terms of recovery strategies, training frequency, and fitness level. This indicates that they generally maintain efficient training routines, recovery practices, and physical fitness. In terms of recovery strategies, the findings revealed that student-athletes commonly prioritize proper sleep, nutrition, hydration, stretching, and cooling down after training to reduce muscle stress. However, advanced recovery methods such as massage, ice baths, and compression gear are not commonly used, while proper diet is considered their main recovery strategy. In terms of training frequency, the data showed that student-athletes follow regular and well-organized training schedules, attend weekly sessions consistently, and maintain balanced workloads to avoid overtraining, while also recognizing the importance of rest to prevent fatigue or injury. In terms of fitness level, the results revealed that most student athletes perceive themselves as physically capable of competing, showing sufficient strength, endurance, speed, agility, and cardiovascular fitness, as well as the ability to sustain longer training sessions and recover from intense activity.

However, recent literature Halson, 2020; Driller & Leabeater, 2023; Li et al., 2024 suggests that while athletes are generally aware of recovery and structured training, many still underutilize advanced recovery modalities such as sports massage, cryotherapy, and compression therapy, relying more on basic strategies like rest, sleep, and nutrition. This indicates that although recovery awareness exists, the application of evidence-based recovery techniques is still limited in many athletic populations.

On the other hand, the findings are supported by the study of G. Gregory Haff and N. Travis Triplett (2022), which emphasized that structured training programs combined with adequate recovery practices such as proper rest, nutrition, and balanced training schedules play a crucial role in maintaining athletes' physical fitness and improving performance. Their study highlighted that when athletes follow organized training routines and recovery strategies, they are better able to sustain training loads, enhance physical conditioning, and reduce the risk of fatigue and injury.

Significant relationship between recovery strategies and the fitness levels of Athletics student-athletes

The findings of the study showed a strong and significant correlation between student-athletes' fitness levels and recovery techniques. The result indicates that there is a strong association between student-athletes' recovery strategies and their fitness levels. This means that student-athletes who regularly engage in recovery strategies including getting enough sleep, eating a healthy diet, staying hydrated, and engaging in cool-down exercises are likely to experience a high level of physical preparedness and better fitness results. It can be noted from the result that recovery techniques are essential for student-athletes for body restoration, as this enables their muscles to heal and energy systems to replenish. Effective recovery techniques allow student-athletes' bodies to respond favorably to training stimulus through restoring glycogen, repairing muscle tissue, and controlling hormonal reactions through

adequate sleep and diet. Stretching exercises also help increase blood circulation and lessen muscular soreness, which speeds up recovery between training sessions. The relationship between fitness levels and recovery strategies emphasizes the importance of organized recovery in training, as neglecting these strategies can lead to decreased performance and possible injury.

However, recent studies suggest that while athletes are aware of recovery practices, the actual application of structured and advanced recovery strategies remains limited. Andrade et al. (2021) found that many student-athletes still rely heavily on basic recovery methods such as sleep, hydration, and nutrition, while advanced recovery modalities like massage therapy, cryotherapy, and compression garments are used inconsistently. Similarly, Dupuy et al. (2022) reported that although recovery interventions exist, their effectiveness varies widely, and many athletes do not fully integrate evidence-based recovery techniques into their regular training routines. These findings suggest that awareness of recovery does not always translate into consistent or optimized application, which may limit potential performance benefits.

These findings are supported by the study of Shona L. Halson (2020), which emphasized that effective recovery strategies such as adequate sleep, proper nutrition, hydration, and active recovery are essential in maintaining athletes' physical fitness and performance. The study highlighted that proper recovery allows the body to repair muscle tissue, restore energy stores, and prepare athletes for subsequent training sessions, thereby improving overall physical readiness and reducing the risk of fatigue and injury. In addition, Saw et al. (2021) also supported that structured recovery practices significantly enhance athletic performance by improving adaptation to training load and reducing physiological stress.

Significant relationship between training frequency and the fitness levels of Athletics student-athletes

The data showed that there is no significant relationship between student-athletes' fitness levels and their training frequency, which indicates that the student-athletes' physical fitness level is not influenced by how much they train or their manner of training. In other words, training frequency does not necessarily influence their performance and fitness in athletic activities. This result implies that other elements such as training quality, appropriate recovery strategies, diet, and sufficient rest are the crucial determining factors of the student-athletes' fitness levels rather than training frequency alone.

Recent sports science literature presents mixed findings, suggesting that while training frequency alone may not guarantee performance improvements, it can still contribute to fitness development when properly structured. Some studies show that higher training frequency, when combined with appropriate training volume and progressive overload, can lead to improvements in strength, endurance, and overall athletic performance. This implies that training frequency still plays a role depending on how it is programmed and applied within the training system. This is supported by the study of Fyfe, Hamilton, Li, & Stellingwerff (2022), which explains that training adaptations are maximized when frequency is integrated with proper load management, recovery, and progressive overload strategies, rather than frequency alone.

This finding is supported by the study of Timothy J. Gabbett et al. (2025), which highlights that training load must be carefully balanced with recovery indicators such as sleep quality, fatigue levels, and internal load responses. The study emphasizes that performance adaptations are more strongly influenced by recovery status and fatigue management rather than training frequency alone. It further explains that poor recovery management can reduce performance adaptations even when training frequency is high.

Combined influence of recovery strategies and training frequency with the fitness levels of Athletics student-athletes

The data shows that the fitness levels of Athletics student-athletes participating in athletics are significantly correlated with both training frequency and recovery. This suggests that discrepancies in the Athletics student-athletes' fitness levels can be explained by the combination of training variables taken together. In particular, recovery strategy has a big

impact on fitness levels, indicating that student-athletes who regularly use proper recovery strategies such as adequate rest, sleep, and proper diet tend to be more physically fit. This highlights the importance of recovery in athletic preparation and performance. However, when examined in conjunction with recovery strategies, training frequency had no significant impact on fitness levels. This suggests that without proper recovery practices, training frequency does
not positively affect fitness levels. Overall, the result implies that when training frequency is combined with proper recovery strategies, student-athletes' fitness levels and performance improve.

However, recent Sport Science literature presents contrasting views. Studies by Halson (2020) and Knuiman et al. (2022) suggest that while recovery is important, training frequency can still contribute to physiological adaptations when properly structured, even if recovery strategies are not optimally applied. These studies argue that consistent training exposure may still improve endurance and strength over time, especially when progressive overload is applied, indicating that training frequency should not be dismissed as insignificant.

These findings are supported by the study of Gabbett, T. J. et al. (2021), which emphasizes that athlete performance and fitness outcomes are more strongly influenced by the interaction between training load and recovery practices rather than training frequency alone. The study explains that the balance between training stress and recovery is critical for improving performance and reducing injury risk, as inadequate recovery can negate the benefits of frequent training. It further highlights that optimal adaptation occurs when training load is matched with sufficient recovery strategies such as sleep, nutrition, and fatigue management.

Conclusion

Based on the statistical analysis and findings of the study, it is concluded that the athletics student-athletes of Western Mindanao State University generally have high levels of recovery strategies, training frequency, and fitness levels, indicating that their training routines contribute to improved physical fitness in terms of strength, endurance, speed, agility, and cardiovascular capacity. The results further suggest that recovery strategies such as adequate rest, proper hydration, and proper nutrition play an important role in enhancing fitness levels by promoting better recovery and performance. However, training frequency alone does not significantly predict physical fitness, indicating that simply increasing training sessions is not enough to improve performance without proper recovery. Overall, the combination of recovery strategies and training frequency has a positive effect on fitness levels, with recovery emerging as a stronger influencing factor, although further studies with larger samples are recommended to support and generalize these findings.

Practical Implications

For student-athletes, coaches, athletic trainers, and sports administrators, providing a structured training program with proper recovery practices is essential for improving sports performance and overall well-being. The study emphasizes the importance of effective recovery strategies, such as getting enough sleep, eating nutritious food, staying hydrated, and performing stretching and cool-down exercises. These practices help reduce fatigue, lower the risk of injury, and support the athletic growth and development of student-athletes.

Sope and Delimitation

The study focuses on determining how recovery strategies and training frequency act as determinants of fitness levels among bona fide athletics student-athletes of Western Mindanao State University. It specifically covers athletes' recovery practices such as rest, stretching, and hydration, as well as their weekly training frequency. The study is limited to currently enrolled WMSU athletics student-athletes for the academic year and excludes other sports participants, former athletes, non-students, and individuals from other organizations. It also relies on self-reported survey data, which may reflect personal perceptions, and does not include other influencing factors such as nutrition, injury history, training programs, or psychological variables.

Conclusions

Student-athletes demonstrated high levels of recovery strategies, training frequency, and fitness, contributing to improved strength, endurance, speed, agility, and cardiovascular capacity. Effective recovery strategies, including adequate rest, hydration, and proper nutrition, positively influence fitness and athletic performance. However, the findings are based on a small sample (n = 20), limiting their generalizability. Student-athletes showed a high level of training frequency through regular and organized training. However, training frequency alone did not significantly improve physical fitness, and further research with larger samples is recommended. The combination of training frequency and recovery strategies benefits student-athletes' fitness levels. Although recovery strategies were a strong predictor in this study, larger and more diverse samples are needed to confirm these findings.

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