European Journal of Physical Education and Sport Science
ISSN: 2501 - 1235
ISSN-L: 2501 - 1235
Available on-line at: www.oapub.org/edu

DOI: 10.46827/ejpe.v12i1.5764 Volume 12 | Issue 1 | 2025

SLEEP, AND PROPER DIETARY BEHAVIOR AS PREDICTORS OF RECOVERY-STRESS AMONG STUDENT-ATHLETES: AN EXPLANATORY SEQUENTIAL DESIGN

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Abstract:
This study examined the influence of sleep behavior and proper dietary behavior on recovery-stress levels among student-athletes in the Davao Region. A mixed methods approach, specifically an explanatory sequential design, was used. Quantitative data were gathered using adapted and validated survey questionnaires; respondents were chosen through stratified random sampling, while qualitative data were collected through in-depth interviews (IDI) and focus group discussions (FGD) with student-athletes who were selected purposively. The findings revealed that student-athletes' sleep behavior and dietary habits were rated moderate, while recovery stress was rated high. Statistical analysis showed a significant relationship between dietary behavior and recovery-stress but there was no strong direct correlation between sleep behavior and recovery-stress. However, qualitative data highlighted that proper sleep played a significant role in reducing stress and enhancing recovery. In an individual capacity, proper dietary behavior emerged as a stronger predictor of recovery-stress among student-athletes. The combined influence of sleep and dietary behaviors highlights their importance in managing stress levels, supporting overall well-being, and enhancing athletic performance. The joint display shows connecting confirming and connecting diverging nature of quantitative and qualitative data.

Keywords: education, student-athletes, recovery-stress, sleep behavior, dietary behavior, explanatory sequential design, Philippines

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1. Introduction

Recovery stress refers to the balance between the physical and psychological, emotional stress imposed on someone through training competitions or other life demands and their ability to recover effectively (Samuel *et al.*, 2019). Overlapping personal obligations and athletic demands create a high-stress environment for many student-athletes, making recovery a significant challenge. This stressed lifestyle often results in shortened recovery periods due to the combined effects of intensive athletic training, competitive pressures, and academic workloads, which contribute to poor sleep quality and inadequate dietary habits in the National Collegiate Athletic Association (NCAA, 2021).

Athletes worldwide face significant challenges in managing stress and ensuring adequate recovery, both of which are crucial for optimal performance and overall well-being. The status of stress recovery among athletes varies globally due to factors such as cultural differences, access to resources, and varying levels of awareness regarding mental health (Kellmann & Beckmann, 2017; Samuel *et al.*, 2019). Further, nearly 60 percent of collegiate athletes fail to meet the recommended dietary allowance (RDA) for key micronutrients essential to recovery and stress resilience (Smith *et al.*, 2020).

Student-athletes in the Philippines often juggle academic responsibilities alongside rigorous training schedules. This dual commitment can lead to significant stress, affecting both their academic performance and athletic development. These athletes experience stress from interpersonal relationships, academic demands, athletic commitments, and family financial concerns. To manage this stress, they employ both vigilant and cognitive avoidance coping strategies (Ines, 2021). For example, research by the National Collegiate Athletic Association (NCAA) reveals that one in three student-athletes struggles to manage responsibilities effectively, with 25 percent experiencing sleep problems severe enough to impair performance (NCAA, 2022).

Moreover, research conducted locally in the Philippines identified these stressors facing student-athletes. As such, Hamlin *et al.* (2019) found among student-athletes in Manila that 86 percent to 95 percent experience stress about their academics, especially during times of peak academic demand, impairing sleep and increasing vulnerability to injury and mental health issues or depression. Further, Rank's (2018) study showed that student-athletes often feel high levels of anxiety and stress, with mean score ranges indicating moderate agreement on experiencing worry about performance as well as images of failure.

Previous studies have identified physical and mental health concerns of student-athletes from the Davao Region. Research in Davao del Norte found that student-athletes faced specific challenges linked to disturbed training schedules and limited access to formal facilities, resulting in fatigue. Demotivation, worries, and disrupted sleeping habits (Indie, 2022). In addition, a study about student-athletes in track and field athletes in the Davao region shows that combining skills with knowledge, embodying a growth mindset, and practicing self-reflection could help develop performance (Rose & Cancio, 2024). The elucidation of this finding is vital for the sports community and athletic group

to include sleep and dietary behaviors when dealing with recovery stress among student-athletes from the Davao Region.

Additionally, the balance of recovery and stress is critical for student-athletes because it varies from high-performance levels to health and wellness. Recovery allows the athlete to restore physiology and cognitive functions while minimizing high-level injuries. Sleep behavior heavily influences this balance; insufficient sleep negatively influences stress, cognitive ability, and physical performance (Bonnar *et al.*, 2018; Fullagar *et al.*, 2015). In a similar manner, a crucial thing after an injury is proper dietary behavior, as nutrition provides energy and nutrients necessary for regeneration. Maintaining a balanced diet aids muscle recovery, restores glycogen stores, ensures immune support to lower stress levels, and increases recovery (Walsh *et al.*, 2021). Hence, sleep and dietary behaviors are key indicators of recovery stress among student-athletes.

Previous research has explored various aspects of student-athletes' sleep and dietary behaviors, yet the combined influence of these factors on recovery stress remains under-examined. Understanding this interaction is especially critical for athletes in the Davao Region, such as quarter-finalists, who face unique challenges due to demanding training schedules, competitive pressures, and overlapping responsibilities. Existing literature has largely treated sleep and nutrition as separate areas of focus, overlooking how these behaviors interact to influence recovery and stress management. Furthermore, regional-specific research tailored to Davao's cultural, environmental, and lifestyle factors is limited. Addressing this gap is vital for creating targeted, evidence-based interventions to enhance recovery, improve well-being, and support the athletic performance of student-athletes in the region.

The dissemination plan for this study aims to target student-athletes, coaches, and higher education institutions in the Davao Region as the primary audience. The findings will be presented through workshops designed to share practical applications, empowering stakeholders to implement effective recovery-stress management strategies. Educational materials tailored to address the unique needs of student-athletes in the region will be distributed in schools, providing actionable insights into improving sleep and dietary behaviors. Additionally, the study's results will be shared through digital platforms such as webinars, online forums, and social media, ensuring wider reach and accessibility. To contribute to academic discourse, the research will also be submitted to peer-reviewed journals. These efforts are guided by the goal of making the findings both accessible and actionable, fostering improved recovery-stress management and overall well-being among student-athletes in the Davao Region.

2. Literature Review

2.1 Athlete Sleep Behavior

Sleep behavior in athletes encompasses various factors such as sleep duration, quality, latency, and disturbances, forming a complex concept that includes habits and behaviors essential for athletic recovery and psychological well-being. Restful sleep plays a vital

role in recuperation, performance, and mental health, requiring consistent sleep schedules, optimal environments, and the minimization of disruptors like late-night training or caffeine consumption.

However, athletes face unique challenges that significantly impact their sleep behavior, primarily due to sport-specific pressures. For example, Lastella *et al.* (2020) reported that 65% of elite Australian athletes experience sleep disturbances caused by late-night training and excessive caffeine intake, leading to compromised sleep quality. Similarly, Nedelec *et al.* (2018) highlighted how dysfunctional sleep and nutrition patterns among U.S. college athletes intensify stress and hinder recovery.

Sports-Related Factors play a pivotal role in disrupting sleep and recovery due to the physical, environmental, and psychological demands of athletic activity. Extreme training, especially during late-night or early morning sessions, raises core body temperature and muscle tension, delaying sleep onset and reducing sleep quality (Silva *et al.*, 2021; Hamlin *et al.*, 2021). Furthermore, jet lag from traveling across time zones disrupts circadian rhythms, causing sleep disturbances like early awakening and nonrestorative sleep. Environmental factors such as poor noise and lighting conditions in accommodations further exacerbate these challenges (Pacheco, 2021). These findings highlight the necessity of monitoring specific interventions to address sports-related determinants of sleep.

Sleep Quality is closely tied to athletic performance, as longer sleep durations have been shown to enhance precision and execution in sports like tennis, golf, and darts (Smith, 2022). Elite athletes often require around eight hours of sleep to feel recovered; however, many fall short of this due to training demands, stress, or travel schedules (Watson, 2017). Insufficient sleep can impair endurance, muscle strength, and the execution of complex motor tasks, compromising both physical and mental performance (Cunha *et al.*, 2023). Thus, prioritizing sufficient sleep time is essential for achieving peak athletic performance.

In summary, sleep behavior is a critical factor in athletes' overall performance and recovery. While the unique pressures of sports can disrupt sleep patterns, targeted interventions addressing training schedules, environmental adjustments, and sleep education can help athletes optimize their sleep and reach their full potential.

2.2 Proper Dietary Behavior

Dietary behavior in athletes encompasses the patterns and practices related to their nutritional intake, including food choices, meal timing, portion sizes, and overall diet quality. Notably, good dietary behavior is essential for fueling athletic performance, enhancing recovery, and maintaining overall health. This involves consuming a balanced diet rich in essential nutrients, such as carbohydrates, proteins, fats, vitamins, and minerals while avoiding unhealthy eating patterns that could hinder performance and recovery.

In addition to these practices, athletes' dietary choices are significantly influenced by their nutrition knowledge. Research has shown that optimal eating habits correlate

strongly with nutrition education. For instance, an article in Frontiers in Nutrition revealed that athletes with proper nutrition knowledge tend to make optimal dietary choices, emphasizing the importance of understanding meal components. On the other hand, Sunuwar *et al.* (2022) noted that athletes, specifically in Taekwondo, often underperform in dietary practices due to inadequate nutrition knowledge, highlighting the need for enhanced education in this area. Moreover, Vázquez-Espino *et al.* (2022) demonstrated through a systematic study that nutritional knowledge, attitudes, and sources of information must be prioritized to improve athletes' eating habits. By comparison, these studies underscore the necessity of proper nutrition education in shaping athletes' dietary behaviors.

However, despite the importance of nutrition knowledge, dietary behavior in athletes is not without its challenges. Psychological barriers, such as motivation, stress, and anxiety, often lead to inconsistencies in regular meals and food quality (Sharples *et al.*, 2021). Additionally, behavioral tendencies, such as a preference for high-fat and high-sugar foods or selecting the most convenient options, further exacerbate the issue (Saad, 2023). As such, a lack of nutrition education remains one of the most pressing concerns. Studies by Iwasa-Madge and Sesbreno (2022) revealed that many athletes are unaware of what to eat to optimize recovery and performance. This gap in knowledge often results in poor nutrition, which can lead to performance decline or health deterioration (Thapa *et al.*, 2023).

Furthermore, repression in dietary behavior among athletes often manifests as a disregard for hunger, reluctance to consume necessary nutrients for recovery, or adherence to harmful dietary patterns despite negative outcomes. Malsagova *et al.* (2021) attribute this to external pressures, such as societal beauty standards or performance goals, which can lead to feelings of guilt and shame (Godoy-Izquierdo *et al.*, 2021).

Finally, compulsory factors related to diet also play a significant role in athletes' behavior. Education has a substantial impact on shaping dietary choices, with studies affirming a strong correlation between nutrition education and improved eating habits. According to Iwasa-Madge and Sesbreno (2022), nutrition interventions lead to better energy balance and more informed food choices. However, Fisher (2015) highlighted that despite the availability of nutritional information, knowledge gaps and challenges in application persist, as nutrition science is complex and constantly evolving.

In conclusion, dietary behavior in athletes is a multifaceted issue influenced by psychological, behavioral, and educational factors. While nutrition knowledge significantly improves eating habits, gaps in education, repression, and external pressures continue to present challenges, underscoring the need for targeted interventions and continuous education in this area.

2.3 Athlete Recovery-stress

The concept of recovery-stress examines how stressors such as intense physical exertion, psychological pressure, and lifestyle factors impact an athlete's body and mind. To counteract these stressors and ensure consistent and sustainable performance, effective

recovery strategies are essential. These strategies are influenced by various factors, including training load, sleep quality, nutrition, mental health, and access to recovery resources.

Sport Non-Specific Stress refers to the psychological, environmental, and personal factors that broadly affect athletes beyond the physical demands of their sports. Unlike specific stressors tied to athletic performance, non-specific stress encompasses challenges such as emotional strain, environmental distractions, and personal issues. Recent studies highlight the origins, impacts, and management techniques for non-specific stress in athletes, offering insights into their broader stress experience.

Sport Non-Specific Recovery is a multi-dimensional process essential for preserving athletic performance and overall well-being. Covering physical, physiological, and perceptual levels, recovery involves techniques such as cold-water immersion, active recovery, massage, and hydration strategies. These methods aim to restore athletes' readiness within 72 hours post-exercise, preventing injuries and enhancing performance across diverse athletic populations.

Sport-Specific Stress focuses on the psychological and physical challenges unique to athletes due to their engagement in specific sports activities. This stress can manifest as injury risks, performance anxiety, or competitive strain. For example, the Heidelberg Risk Sport-Specific Stress Test (HRSST) evaluates stressors in high-risk sports like climbing, using scenarios like fall threats to measure responses. While effective in inducing state anxiety, recent findings show mixed results in its physiological measures, such as salivary cortisol and heart rate variability (McLoughlin *et al.*, 2022).

Sport-Specific Recovery emphasizes tailored strategies to meet the physical, psychological, and social needs of athletes within their specific sports. These approaches vary significantly; for instance, team athletes benefit from land-based exercises and relaxation techniques, while endurance athletes prioritize nutrition and hydration. Recent research highlights the role of recovery planning in reducing injury risks and enhancing performance, with tools such as massages, ice baths, and self-reported monitoring proving beneficial (Braun-Trocchio *et al.*, 2022). By addressing the unique demands of each sport, recovery strategies ensure athletes achieve long-term success and sustainability in their careers.

In conclusion, understanding and managing recovery-stress requires a multifaceted approach that addresses both non-specific and sport-specific stressors while implementing tailored recovery strategies. By integrating physical, psychological, and social recovery techniques, athletes can maintain peak performance and resilience throughout their careers.

3. Material and Methods

3.1 Research Design

This study employed a mixed methods approach, specifically an explanatory sequential design. The quantitative phase focused on collecting and analyzing numerical data to

identify patterns and correlations between student-athletes' sleep behaviors, dietary habits, and recovery stress. Following this, the qualitative phase delved deeper into unexpected or unique quantitative findings through interviews and focus group discussions. This method allowed for the integration of macro-level trends with detailed, contextual insights, offering practical solutions for improving the well-being of student-athletes. The mixed methods approach was chosen for its ability to provide a comprehensive understanding of the research problem, combining statistical reliability with personal experiences.

3.2 Place of Study

The research was conducted across PASUC XI member schools in the Davao Region, Philippines, and encompassing institutions in Davao del Sur, Davao Occidental, Davao del Norte, Davao de Oro, and Davao City. These institutions are recognized for their strong athletic programs alongside academic rigor. The study focused on student-athletes navigating the dual demands of academics and athletics. Insights from this study are particularly significant given the limited resources in public institutions for nutrition, mental health, and recovery support, aiming to address gaps that impact student-athletes' performance and well-being.

3.3 Participants

The study involved two groups of participants. The quantitative phase included 432 student-athletes selected through stratified random sampling, ensuring representation from all PASUC XI institutions. The qualitative phase recruited a purposive sample from this group, specifically focusing on participants with extreme scores in the quantitative surveys. Senior athletes, particularly team captains, were prioritized for their experience and ability to provide deeper insights into sleep, dietary habits, and recovery stress, ensuring that both phases of the study captured a comprehensive range of perspectives.

3.4 Instruments

The study utilized different tools for data collection in the quantitative and qualitative phases. For quantitative data, the Pittsburgh Sleep Quality Index (PSQI) assessed sleep behavior, the Dietary Behavior Questionnaire measured dietary habits, and the Recovery-Stress Questionnaire (RESTQ-Sport) evaluated recovery and stress levels. These instruments were validated and deemed reliable by experts. For the qualitative phase, semi-structured interviews and focus group discussion guides were used to gather in-depth insights into participants' behaviors and contextual challenges, complementing the quantitative findings.

3.5 Data Collection

The data collection process was divided into two phases. In the quantitative phase, validated surveys were administered both face-to-face and online, ensuring ethical compliance with informed consent and participant anonymity. The qualitative phase

involved in-depth interviews (IDIs) and focus group discussions (FGDs) with participants identified from the quantitative findings. Ethical protocols were strictly followed, including obtaining permission and ensuring confidentiality. The qualitative sessions captured detailed personal experiences, enriching the data gathered during the quantitative phase.

3.6 Data Analysis

Quantitative data analysis employed statistical methods such as mean, standard deviation, and multiple linear regression to identify trends and relationships between sleep, diet, and recovery stress. Qualitative data was analyzed using thematic analysis, which involved coding, theme identification, and iterative refinement. This dual analysis provided a nuanced understanding of the research questions, with quantitative data highlighting broad trends and qualitative data offering context and depth. Together, these methods ensured a robust and actionable understanding of the factors influencing recovery stress among student-athletes.

4. Results and Discussion

4.1 Significance of the Influence of Sleep, Behavior, and Proper Dietary Behavior on Recovery Stress

The analysis presented in Table 2 indicates the significance of the influence of sleep behavior and proper dietary behavior on recovery stress. The results reveal that the individual influence of sleep behavior on recovery stress is not significant, with a standardized coefficient of 0.06, a t-value of 1.03, and a p-value of 0.30. This suggests that sleep behavior does not have a statistically significant effect on recovery stress.

On the other hand, the individual influence of proper dietary behavior on recovery stress is significant, with a standardized coefficient of 0.41, a t-value of 7.35, and a p-value of 0.00. This indicates that proper dietary behavior has a meaningful and positive influence on recovery stress.

When examining the combined influence of both predictors (sleep behavior and proper dietary behavior), the results show a statistically significant relationship with recovery stress, as indicated by an R-value of 0.38, an R^2 value of 0.14, and a p-value of 0.00. This means that 14% of the variance in recovery stress can be explained by the combined effects of sleep behavior and proper dietary behavior, demonstrating that while sleep behavior alone is not significant, the integration of these factors contributes to the overall recovery stress.

Furthermore, the R-square value reflects the proportion of variance in the Recovery stress of the student-athletes that can be explained by sleep behavior, and proper dietary behavior. The R-square value is reported at .14 indicating that 14 percent in the variability in the recovery stress of student-athletes can be explained by the combined influence of the two independent variables. The remaining 86 percent is attributable to the unexplained variance, or other factors not included in this study.

Table 2: Significance of the Influence of Sleep behavior and Proper Dietary Behavior on Recovery Stress

z		**Recovery Stress**			
Individual Influence of Predictors		**Standardized Coefficient**	**t**	**p-value**	**Remarks**
Sleep Behavior		.06	1.03	.30	Not Significant
Proper Dietary Behavior		.41	7.35	.00	Significant
Combined Influence of Predictors					
R	.38				
R^2	.14				
F	36.08				
P	.00				Significant

4.2 Profile of the Participants

Shown in Table 3.1 is the profile of the participants involved in the qualitative phase of the study. 20 were involved, purposively selected, of whom 12 were for the In-Depth Interviews (IDI) while eight were for the Focus Group Discussions (FGD). Out of the 12 participants who were interviewed using IDI, there were seven males and five females, and out of the eight FGD participants, six were males and two were females. Participants were stratified per divisions in Region XI to ensure representation. More specifically, there were a total of three from Davao del Sur (two from the IDI group and one from the FGD group), three from Davao Occidental (two from IDI and one from FGD), five from Davao City (three from IDI and two from FGD), three from Davao del Norte (two from IDI and one from FGD), thee from Davao de Oro (two from IDI and one from FGD), and three from Davao Oriental (all were from the IDI group). It was thus a balanced distribution that gave a comprehensive perspective and reflected the different experiences of student-athletes at different divisions.

Table 3.1: Profile of the Participants

Code	**Sex**	**Study Group**	**Division**
IDI 1	Male	IDI	Davao del Sur, Region XI
IDI 2	Female	IDI	Davao del Sur, Region XI
IDI 3	Female	IDI	Davao Occidental, Region XI
IDI 4	Female	IDI	Davao Occidental, Region XI
IDI 5	Male	IDI	Davao City, Region XI
IDI 6	Male	IDI	Davao City, Region XI
IDI 7	Male	IDI	Davao del Norte, Region XI
IDI 8	Male	IDI	Davao del Norte, Region XI
IDI 9	Male	IDI	Davao de Oro, Region XI
IDI 10	Male	IDI	Davao de Oro, Region XI
IDI 11	Male	IDI	Davao Oriental, Region XI
IDI 12	Male	IDI	Davao Oriental, Region XI
FGD 1	Male	FGD	Davao del Sur, Region XI
FGD 2	Male	FGD	Davao Occidental, Region XI
FGD 3	Male	FGD	Davao City, Region XI
FGD 4	Female	FGD	Davao del Norte, Region XI
FGD 5	Male	FGD	Davao de Oro, Region XI

FGD 6	Female	FGD	Davao del Sur, Region XI
FGD 7	Male	FGD	Davao Oriental, Region XI
FGD 8	Male	FGD	Davao City, Region XI

4.3 Standpoints of the Participants on the Salient Points of the Quantitative Results

This theme reflects the synthesized views shared by participants regarding the sleep behavior of student-athletes. The overall mean of 3.11, categorized as moderate, along with a standard deviation of 0.53, suggests that while student-athletes' sleep behavior is not drastically poor, there are noticeable challenges impacting sleep quality. Various factors influencing their sleep patterns were identified by the participants.

4.4 Confirmed the Moderate Level of Sleep Behavior Among Student-Athletes

This theme illustrates the diverse reasons participants stated about their sleep behavior, thus validating the second hypothesis of student-athletes demonstrating a moderate level of sleep behavior. Several respondents noted that the dual pressures of academic and athletic obligations made discipline and time management challenging, if not impossible. Much of this was due to the physical strain of training and sleep disturbances from performance anxiety. Outside distractions like social engagements and environmental variables also influenced erratic sleep patterns. Some participants gained support from coaches and peers, though that was not enough to completely counteract these challenges. All these effects led to moderate sleep behavior of the participants**.**

4.5 Confirming the moderate level of proper diet behavior among student-athletes

This confirms a moderate level of proper dietary behavior among student-athletes. Various factors, both internal and external, contribute to this moderate adherence to a proper diet, as highlighted by the responses.

4.6 Confirmed the moderate level of repression factors among student-athletes

This theme pertains to the synthesized sets of reasons shared by participants regarding factors such as weight control, dietary needs, and social pressures. Not all student-athletes can effectively balance these pressures, leading to moderate repression levels.

4.7 Confirmed the moderate level of compulsory factors among student-athletes

This theme pertains to the synthesized sets of reasons shared by participants regarding factors such as weight and performance management, health and recovery needs, and internal and external pressures that drive self-discipline and fitness.

4.8 Negating the not significant influence of sleep behavior on stress recovery among student-athletes

Although the p-value of .30 indicates no statistically significant relationship between sleep behavior and stress recovery, participants shared how proper sleep contributes to their physical and mental well-being.

4.9 Negating the significant influence of dietary behavior on recovery-stress among student-athletes

Despite the p-value of .00 indicating a significant relationship between dietary behavior and recovery-stress, participants pointed out that dietary practices alone are insufficient for complete recovery, emphasizing the need for other supportive factors like adequate sleep.

Table 3.2: Standpoints of the Participants on the Salient Points of the Quantitative and Qualitative Results

Level	Essential Themes	Typical Reason
Sleep Behavior Overall Mean = 3.11- Moderate SD = .53	Confirmed the moderate level of sleep behavior among student-athletes	- Discipline and time management - Physical strain from training - Dependence on individual factors - Influence of academic and athletic pressure - Inconsistent sleep routine - External distractions and social activities - External distractions and social activities - Support from coaches and peers - Performance anxiety - Environmental factors
Proper Dietary Behavior Mean = 3.06 - Moderate SD = .75	Confirmed the moderate level of proper diet behavior among student-athletes	- Economic constraints - Balancing sports and dietary needs - Lack of nutritional knowledge - Individual body requirements - Time constraints - Influence of external responsibilities - Troublesome factors (moderate) - Financial limitations - Time constraints due to busy schedules - Limited access to nutritional education - Need for weight management - Inconsistent meal routines - External influences and social pressures

Repression Factors Mean = 3.04 - Moderate SD = .85	Confirming the moderate level of repression factor among student-athletes	- Weight control pressures - Balancing dietary needs and sports requirements - Guilt associated with eating choices - Influence of body image concerns - External expectations and social pressures - Limited understanding of balanced nutrition
Compulsory Factors Mean = 3.06 - Moderate SD = .75	Confirming the moderate level of compulsory factor among student-athletes	- Need for weight and performance management - Pressure to follow team or coach recommendations desire to achieve optimal fitness - Health and recovery needs external influence from peers and role models - Internal motivation for self-discipline
Sleep Behavior to Stress Recovery p-value .30 (Not Significant)	Negating the not significant influence of sleep behavior to stress recovery of student-athletes	- Sleep improved physical and mental health - Sleep increased energy and reduced stress - Sleep-enhanced mood and emotional stability - Sleep for relaxation and recovery - Sleep-induced positive physical performance - Sleep causes mental clarity and stress relief
Influence of Dietary Behavior to Recovery Stress p-value .00 (Significant)	Negating the significant influence of dietary behavior stress recovery of student-athletes	- Diet alone is insufficient without sleep - Sleep is essential for mental clarity and mood stability - Diet supports physical health, but sleep complements recovery - Balanced approach of both diet and sleep is necessary - Diet alone may not prevent fatigue
Combine Influence of Sleep Behavior and Proper dietary Behavior to Stress-Recovery p-value .00 (Significant)		- Enhanced physical recovery - Balanced energy and improved performance - Reduced injury risk - Improved mental resilience

		- Optimal hormonal and immune function - Increased motivation and discipline - Long-term health and resilience require both

4.10 Joint Display of the Salient Points of the Quantitative and Qualitative Results

The table presents the joint integration of this explanatory sequential design, which integrates quantitative and qualitative findings to give a holistic understanding of the study variables. The descriptive elements in the quantitative phase give a broad outline of the data collected, and the qualitative phase gives insight into the particulars of the experience and perspectives of the participants. Combining these two lenses, the paper can see the measurable outcomes and the sociocultural realities of life as a student-athlete, allowing the authors to interpret their results in more affluent, contextualized ways.

The sleep behavior status based on student-athlete status among students was moderate, with a mean of 3.11, which showed that sleep behavior was somewhat observed among students. Qualitative findings were consistent with this, and participants pointed out common barriers to moderate sleep behavior, including the inability to manage time, a need to balance training and academic tasks, and external distractions such as gadgets and house chores. Qualitative observations from interviews and FGDs confirmed their consistency with the quantitative data. Hence, the output type is labeled as Connecting Confirmation, as all two finding sets validate student-athletes average sleep behavior.

The status of proper dietary behavior showed a moderate reading of 4.55, which implies that it is sometimes evident. The qualitative findings supported this finding, which identified a range of perceived barriers to positive dietary behaviors, including competing academic and sporting demands, access to nutritious foods, and time constraints. The qualitative data provided similar insights with quantitative data confirming a moderate level of proper dietary behavior. Therefore, the label of the output type is Connecting Confirmation, as student-athletes moderate dietary behavior was confirmed in both sets of findings.

The status of troublesome factors was moderate, with a mean of 3.06, which denotes that this troublesome factor is sometimes evident. Participants reported facing financial constraints and the dearness of nutritious food as frequent difficulties in maintaining appropriate dietary practices, supporting this observation through qualitative findings. Interviews and FGDs revealed insights regarding the moderate presence of some bothersome factors, which corroborated the quantitative data. Thus, the output type of this data is called Connecting Confirmation because both data help support the presence of moderate troublesome factors among student-athletes.

The status of repression factors among student-athletes was moderate, with a category mean of 3.04, indicating sometimes evident. This perspective was supported by qualitative findings, which indicated that many participants experienced repressive

behaviors, such as suppressing preferred food to achieve performance or appearance standards. External pressures, such as those from coaches, peers, and society, often drove these behaviors. Qualitative data corroborated this quantitative data that the level of repression factors was moderate based on interviews and FGDs. Therefore, the output types are identified as Connecting Confirmation since both data types confirm the existence of moderate repression among student-athletes.

The compulsory factors' status among student-athletes was moderate, with the category mean being 3.06, indicating that it is sometimes evident. Qualitative findings corroborated this, with participants noting that almost everyone experienced compulsory behaviors, such as strict adherence to diet or training regimens that achieve a performance or aesthetic ideal. Star players were internally motivated to excel but also received external pressure from coaches and the culture of their teams. The use of insights from the interviews and FGDs corroborated the quantitative data findings, with the compulsion of these factors being moderate. Therefore, this output is Connecting Confirmation since both data confirm the moderate existence of necessary factors for student-athletes.

The status of recovery stress among student-athletes was high, with an overall mean of 3.90, indicating that recovery-stress of student-athletes is oftentimes manifested. Qualitative results were thus aligned, with participants citing effective coping strategies, support from coaches and peers, and a balance of training and rest, amongst other characteristics, as facilitators of recovery stress in the positive domain. However, they also admitted that challenges include balancing academic and athletic commitments. The qualitative data from interviews and FGDs corroborated the quantitative findings, indicating that recovery stress is, by and large, a positive experience for student-athletes. Therefore, the output type is called Connecting Confirmation because both datasets confirm that student-athletes have more significant recovery stress.

The status of Sports non-specific recovery among student-athletes was high, as the overall mean was 3.90, indicating that the recovery-stress of student-athletes is oftentimes manifested. Qualitative findings reinforced this observation, with participants expressing the importance of non-sports-specific recovery activities, including rest, leisure time, and relaxation, in buffering against stress and promoting wellness. This was an important factor in handling the physical and mental requirements of their sporting and academic obligations. Findings from interviews and FGDs supported the quantitative data and confirmed high levels of sports non-specific recovery amongst student-athletes. Thus, the output type is classified as Connecting Confirmation; both sets reinforce the high incidence of sports non-specific recovery in student-athletes.

The status of sport-specific recovery among student-athletes was high, with a category mean of 3.83, signifying that student-athletes are often times manifested. Qualitative results corroborated this finding, as participants described adopting appropriate recovery techniques such as stretching, rehydration, nutrition, and relaxation practices specific to their sport. These practices were emphasized as useful for enhancing physical stressors and refining athletic performance. Interviews and FGDs

provided complementary evidence to the quantitative data, affirming a high level of sport-specific recovery among student-athletes. Therefore, we label the output type Connecting Confirmation since both data sets confirm the emergence of sport-specific recovery routines within student-athletes.

The influence of sleep behavior on stress recovery was not significant, with a p-value of 0.30, indicating that every unit increase in sleep behavior only results in a minimal increase of 0.06 units in stress recovery. Qualitative findings from interviews and FGDs supported this, as participants expressed that while sleep behavior contributes to overall well-being, it does not substantially impact stress recovery. Participants emphasized other factors, such as proper nutrition and stress management techniques, as having a stronger influence. Based on these findings, the qualitative insights diverged from the quantitative data, highlighting the limited influence of sleep behavior on stress recovery. Hence, the output type is labeled as Diverging, as the findings reflect differing perspectives on the role of sleep behavior in stress recovery.

The influence of proper dietary behavior on stress recovery was found to be significant, with a p-value of 0.00, indicating that every unit increase in proper dietary behavior results in a 0.41-unit increase in stress recovery. However, qualitative findings from interviews and FGDs presented a contrasting perspective, as participants negated the significant influence of proper dietary behavior on stress recovery. They emphasized that other factors, such as mental resilience, external support systems, and time management, played a more substantial role in recovery. Based on these findings, the qualitative and quantitative results diverged, reflecting differing views on the role of proper dietary behavior in stress recovery. Hence, the output type is labeled as Diverging, as the data sets offer contrasting conclusions on this aspect.

The combined influence of sleep behavior and proper dietary behavior on stress recovery was significant, with a p-value of 0.00, indicating that 14% of the variability in recovery stress can be explained by the combined effect of these two variables. Qualitative findings from interviews and FGDs supported this, as participants confirmed that the combined influence of maintaining proper sleep and dietary habits positively contributed to their stress recovery. Participants highlighted that integrating adequate sleep and balanced nutrition helped them manage the physical and mental demands of athletic and academic life more effectively. Based on these findings, the quantitative and qualitative results align, validating the combined influence of these variables. Hence, the output type is labeled as Connecting Confirmation, as both data sets confirm the combined impact of sleep behavior and proper dietary behavior on stress recovery.

Table 4: Joint Display of Quantitative and Qualitative Results

Research Area	**Quantitative Results**	**Qualitative Results**	**Nature of Integration**
Status of Sleep Behavior (IV1)	The descriptive level of sleep behavior is moderate, with an overall mean of 3.11, indicating that sleep behavior is oftentimes observed among student-athletes.	Informants/participants confirmed a moderate level of sleep behavior. Based on the interviews and FGD, it could be gathered that the general assertions are confirming of the moderate level of sleep behavior education.	Connecting-Confirmation
On the Status of Proper Dietary Behavior (IV2)	The descriptive level or proper dietary behavior is moderate, with an overall mean of 4.55, indicating that sleep behavior among student-athletes is.	Informants/participants confirmed a moderate level of proper sleep behavior. Based on the interviews and FGD, it could be gathered that the general assertions are confirming of the moderate level of sleep behavior.	Connecting-Confirmation
On Troublesome Factor	The descriptive level of troublesome factors on "*having to spend more money to have proper dietary behavior for an athlete*" is moderate, with a category mean of 3.06, indicating that troublesome factors are sometime evident.	Informants/participants confirmed that troublesome factors are sometimes evident. Based on the interviews and FGD, it could be gathered that the general assertions are confirming of the moderate level of troublesome factors.	Connecting-Confirmation
On Repression Factors	The descriptive level of repressive factors with an category mean of 3.04, indicating that repressive factor is sometime evident.	Informants/participants confirmed repressive factors is sometime evident Based on the interviews and FGD, it could be gathered that the general assertions are confirming the moderate level of repressive factor.	Connecting-Confirmation
On Compulsory Factor	The descriptive compulsory factors is moderate, with a category mean of 3.06, indicating that compulsory factors are sometimes evident among student-athletes.	Informants/participants confirming that compulsory factors are sometimes evident. Based on the interviews and FGD, it could be gathered that the general assertions are confirming of the moderate level of compulsory factors.	Connecting-Confirmation
On Recovery Stress (DV)	The descriptive level of recovery stress is high, with an overall mean of 3.90, indicating that recovery stress is oftentimes positive among student-athletes.	Informants/participants confirm that recovery stress is oftentimes positive. Based on the interviews and FGD, it could be gathered that the general assertions confirm the recovery stress among student-athletes.	Connecting-Confirmation
On Sports Non-Specific Recovery	The descriptive level of sports nonspecific recovery is high, with an	Informants/participants confirm that student-athletes oftentimes demonstrate positive sports	Connecting-Confirmation

	overall mean of 3.90, indicating that student athletes oftentimes demonstrate sports nonspecific recovery.	nonspecific recovery. Based on the interviews and FGD, it could be gathered that the general assertions confirm the high level of sport-non-specific stress recovery among student-athletes.	
On Sport-Specific Recovery	The descriptive level of sport-specific recovery is high, with a category mean of 3.83, indicating that student-athletes oftentimes demonstrate positive sport specific recovery	Informants/participants confirm that sports-specific recovery Is oftentimes demonstrated. Based on the interviews and FGD, it could be gathered that the general assertions confirm high-level sport-specific recovery.	Connecting-Confirmation
On the Influence of Sleep Behavior to Stress Recovery	The influence of sleep behavior on stress recovery is not significant, with a p-value of .30 indicating that every unit of increase in eating behavior increases only .06 unit increases in stress recovery.	Informants/participants negate the not significant influence of sleep behavior to stress recovery Based on the interviews and FGD, it could be gathered that the general assertions negate the not significant influence of sleep behavior to stress recovery activities	Connecting-Diverging
On the Influence of Proper Dietary Behavior	The influence of sleep behavior on stress recovery is significant, with a p-value of .00 indicating that every unit of increase in eating behavior increases .41 unit increases in stress recovery.	Informants/participants Negate the significant influence of proper dietary behavior. Based on the interviews and FGD, it could be gathered that the general assertions negate the significant influence of proper dietary behavior to stress recovery	Connecting-Diverging
On the Combined Influence of Sleep Behavior and Proper Dietary Behavior on Stress Recovery	The combined influence of sleep behavior and proper dietary behavior on stress recovery is significant, with a p-value of .00, indicating 14% in variability in recovery stress can be explained by the combined influence of the two variables	Informants/participants Confirming the combined influence of sleep behavior and proper dietary behavior. Based on the interviews and FGD, it could be gathered that the general assertions are confirming the combined influence of two variables	Connecting-Confirmation

5. Conclusion

The level of student-athletes sleep behavior in PASUC XI is generally moderate. In particular, sports-related factors, sleep-quality factors, and sleep disturbance factors all fall within the moderate level, while habitual sleep deficiency factors are notably low. These findings indicate that the overall status of sleep behavior among student-athletes

can be characterized as moderate. Further, the level of proper dietary behavior among student-athletes in PASUC XI is generally moderate. In particular, troublesome factors, repression factors, and compulsory factors are all at a moderate level. These findings indicate that the overall status of proper dietary behavior among student-athletes can be characterized as moderate.

Furthermore, the level of recovery stress among student-athletes in PASUC XI is generally high. Specifically, both sport non-specific recovery and sport-specific recovery factors are consistently high. These findings indicate that the overall status of recovery stress among student-athletes can be high. Among the predictors, only proper dietary behavior significantly influences recovery stress, while sleep behavior does not contribute to the recovery stress of student-athletes. These predictors have a significant overall effect, but the influence is primarily driven by proper dietary behavior.

The results of the standpoints of the participants on the salient points of the quantitative and qualitative findings confirm the moderate levels of sleep behavior, proper dietary behavior, repression factors, and compulsory factors among student-athletes. Furthermore, the findings confirm the significant influence of dietary behavior on stress recovery while negating the influence of sleep behavior on stress recovery. These results highlight the distinct roles of dietary practices and sleep in recovery.

Finally, the Joint Display of Quantitative and Qualitative Results reveals primarily connecting confirmation, with both findings aligning on the moderate levels of sleep behavior, proper dietary behavior, repression factors, compulsory factors, and high levels of recovery stress. Divergence arises in the influence of predictors, where quantitative results show the non-significant influence of sleep behavior and the significant influence of dietary behavior on stress recovery, while qualitative findings negate these. The combined influence of both predictors on stress recovery achieves connecting confirmation.

6. Recommendation

Since there is a moderate level of sleep behavior among student-athletes, it is recommended that targeted sleep education and management programs be implemented. These programs should involve sports psychologists, athletic trainers, coaches, and sleep specialists. The recommendation includes addressing common issues such as sleep disruptions from travel, inconsistent routines, and performance-related anxiety through sleep hygiene education, relaxation techniques, workshops on managing disturbances, and sleep tracking tools. These initiatives should be introduced at the start of each season and maintained throughout the year to enhance sleep quality, support recovery, and improve performance.

Since there is a moderate level of dietary behavior among student-athletes, it is recommended that programs to improve dietary habits be implemented. These programs should involve nutritionists, coaches, trainers, sports psychologists, school administrators, and local food vendors. The recommendation includes providing

personalized meal plans, integrating dietary guidance into training, addressing body image and performance pressures through counseling, offering subsidized meal options, and ensuring access to nutritious meals. Seasonal evaluations and follow-ups should be conducted to monitor progress, aiming to enhance athletes' health, recovery, and performance.

Since there is a high level of recovery stress management among student-athletes, but it is not yet at an optimal level, it is recommended that structured programs be implemented to sustain and further enhance recovery. These programs should involve athletic trainers, coaches, and sports psychologists. The recommendation includes focusing on sport non-specific and sport-specific recovery factors through personalized recovery plans, access to sports therapy and nutrition resources, and regular monitoring. Incorporating advanced tools and psychological support can help elevate recovery to optimal performance levels.

Since sleep behavior has a limited impact on recovery stress, it is recommended that a combined nutrition and sleep enhancement program for student-athletes be developed. Additionally, since the amount of variance explained does not fully account for recovery stress, researchers may consider exploring other potential predictors in future studies. This program should involve collaboration among coaches, nutritionists, and sleep specialists, focusing on educating athletes on integrating balanced nutrition with consistent sleep routines through meal planning workshops and sleep hygiene sessions. Personalized diet and sleep alignment monitoring tools can optimize recovery outcomes and improve performance.

From the standpoints of the participants on the salient points of the quantitative and qualitative findings, it is recommended that school administrators, coaches, and sports program coordinators implement targeted programs addressing moderate levels of sleep behavior, proper dietary behavior, repression factors, and compulsory factors. Priority should be given to nutrition-focused interventions due to the significant influence of dietary behavior on stress recovery. At the same time, academic institutions should conduct further research to explore other factors contributing to recovery stress.
It is recommended that school administrators, coaches, and athletic trainers implement a recovery optimization program focusing on sleep hygiene and balanced nutrition and addressing the influences of these behaviors. Further research by academic institutions is encouraged to explore the divergence in findings on sleep and dietary behavior's impact on stress recovery while emphasizing their combined influence to enhance recovery and performance.

Acknowledgements
I am deeply grateful to Lord God for His guidance and blessings, and to my family, adviser Dr. Porferia S. Poralan, and the Panel of Examiners for their invaluable support throughout this journey. Special thanks to PASUC XI, institutional leaders, and my PhD classmates for their encouragement and inspiration.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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