Body-Mass Index and Sleep Quality as Predictors of Skills-Related Fitness among Physical Education Students: Basis for Intervention Plan

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Abstract

This study determined the significant relationship of body-mass index and sleep quality on skills-related fitness among physical education students in Christian Colleges of Southeast Asia of Davao City through adapted survey questionnaire. The study was a quantitative, descriptive-correlational designs conducted among 208 tertiary physical education students from different program. Results revealed that the body-mass index was mostly normal and is somewhat evident. Adding on, sleep quality is high and is oftentimes manifested. The skills-related fitness is moderate, which means that the individual can perform the exercise with some degree of accuracy and consistency. Significant relationships were not found between skills-related fitness and the following: body-mass index and sleep quality. Moreover, males performed better in terms of power and speed compared to their female counterparts. An intervention plan was created to mediate the poor results in the students' body-mass index, sleep quality, and skills-related fitness. It is recommended that students should receive individualized nutritional counseling for better body-mass index, the implementation of comprehensive sleep education, and the progressive training interventions that systematically develop all components of skills-related fitness.

Keywords: Body-mass index; sleep quality; skills-related fitness; physical education; Davao City Philippines

1. Introduction

Skills-related fitness is referred to as the ability to improve the performance in sports and other physical activities, which includes agility and coordination essential for performing tasks that require the students with accuracy and immediate reaction (Bull et al., 2020; updated in Aubert et al., 2021). Even with the specialized training of the students, many physical education students in the global stage suffer from alarming shortage in their skills-related fitness. As a matter of fact, more than 50% of students performed below the expectation when it comes to their coordination and agility. Similarly, more than half of the students have very poor response times (Hardy et al., 2021). Additionally, more than 50% of the students revealed a decrease in balance skills and have inadequate speed and power measurements (Lang et al., 2022).

In addition, more than half of the students exhibit poor proficiency when it comes to their coordination, balance, and agility. These proficiencies are important for physical development. In the United States, students have a hard time with their skills-related fitness (Draper et al., 2021). A national survey revealed that more than half of the students lacked the necessary speed for their age, and below half of the population exceeded the power metrics and response time (Sacko et al., 2021). Furthermore, very few schools have offered specialized teaching on skills-related fitness components, exacerbating the situation among the students in physical education (Webster et al., 2023).

In the Philippines, college students show alarming inadequacies in skills-related fitness. Even with curriculum interventions, more than half of the population in four major university in the Cavite province

performed below the national standards for their assessments in coordination (Panganiban & Beltran, 2021). Similar findings revealed that students in Cebu province achieved below proficiency standards for agility and balance. Reaction time showed very high deficiencies in more than half the student population due to the lack of opportunities for real-world application (Cagas et al., 2022). For both provinces, more than a quarter of the schools do not have the specialized training equipment, which is manifested by more than half of its students spending less than five hours a week improving their skills-related fitness (Llego & Valenzuela, 2021).

In Davao City, students are faced with the impediments in their skill-related performance. Dagatan (2021) revealed that the urban divide created the gaps for skills development opportunities among students. Espanola (2021) argued that poor physical infrastructure exacerbated their functioning. Meanwhile, Villaluz (2022) mentioned the important part of the societal support to address the challenges encountered in physical skill acquisition. However, there is no study in the city focused on skills-related fitness being predicted by the BMI and sleep quality.

The body mass index (BMI) is a mathematical calculation derived from dividing an individual's weight in kilograms by their height in meters squared, serving as a screening tool to categorize individuals into weight status categories that may indicate potential health risks associated with excess or insufficient body weight (World Health Organization, 2021). The BMI's importance lies in its widespread clinical utility for assessing weight-related health risks, predicting potential comorbidities such as cardiovascular disease, type 2 diabetes, and certain cancers, and guiding healthcare providers in developing appropriate intervention strategies (Iacobini et al., 2022), although its limitations include inability to distinguish between fat and muscle mass, lack of consideration for fat distribution patterns, and potential cultural and ethnic variations in body composition and associated health risks (Nightingale et al., 2023).

There is a significant correlation between the BMI and skill-related fitness. Lopes et al. (2021) alluded a non-linear correlation between body-mass index and skills-related fitness. Jia et al. (2022) quoted how the differences in body composition significantly impact the strength of the students, agility, and overall athletic capabilities. Kim and Lee (2023) refers that the relationships between the body-mass index and skills-related fitness emphasized the necessity for personalized methods to fitness valuation.

Meanwhile, sleep quality is defined as an individual's self-satisfaction with all aspects of the sleep experience (Nelson et al., 2022). Sleep quality is essential, and poor sleep quality contributes to disease and poor health outcomes. Given the extensive consequences of poor sleep quality, it is vital for teachers to instruct students the importance of good sleep (Zhu et al., 2023). Furthermore, good sleep quality has positive effects such as feeling rested, normal reflexes, and positive relationships. Poor sleep quality consequences include fatigue, irritability, daytime dysfunction, slowed responses, and increased caffeine/alcohol intake (Pujasari & Chung, 2022).

Sleep quality is correlated with skills-related fitness. In the study of Hrozanova et al. (2021), the author mentioned that the function of sleep in motor skill learning, which reveals an important neurological connection. Furthermore, Chen et al. (2022) argued that sleep patterns are associated with athletic performance and skill development. Additionally, Fullagar et al. (2021) alluded that the aspects of sleep demonstrate its profound significance in acquiring motor skill and the optimization of one’s performance.

The research on student fitness challenges is incomplete. While some studies look at specific aspects, researchers are missing the bigger picture that combines physical, mental, and environmental factors affecting how students perform physically. We need long-term studies across different cultures to better understand how skill-related fitness develops in students, rather than the piecemeal approach we currently have.

The study provides significant social value by addressing critical health concerns that impact educational settings and society at large. Establishing evidence-based connections between these variables could inform targeted intervention plans that enhance not only the physical performance and well-being of physical education students but also provide a framework for addressing similar challenges in broader

educational contexts and community health initiatives. By identifying how body composition and sleep patterns influence physical competencies, this research contributes to addressing rising obesity rates, declining physical activity levels, and deteriorating sleep habits among young adults—public health concerns that carry substantial economic and social costs through increased healthcare expenditures, reduced productivity, and diminished quality of life. Moreover, the development of intervention strategies based on this research can promote health equity by providing targeted support to vulnerable populations who might face greater challenges with weight management and sleep disorders, thereby potentially reducing health disparities while establishing evidence-informed practices that physical educators, health professionals, and policymakers can implement across diverse educational and community settings.

The study's social value lies on the provisions of the United Nations Sustainable Development Goals: SDG 3 (Good Health and Well-being) by exploring psychological factors that promote positive physical activity participation among student-athletes; and, SDG 4 (Quality Education) through its focus on enhancing student development beyond academics by examining how sports motivation and self-efficacy contribute to character formation. Furthermore, a dissemination within the school first among teachers, students, stakeholders would be created through a seminar. If the results of this study are made available in journals and presented in for as well as significantly disclosed in the locality, national, and international presentation, they could gain better trustworthiness. They may also add to the body of knowledge on the aforementioned factors and their problems generally, which might be helpful to researchers in the future as part of the literature and studies indicated above.

This study determined the significant relationship of body-mass index and sleep quality on skills-related fitness among physical education students in Christian Colleges of Southeast Asia of Davao City. Specifically, this study sought to answer the following questions: (1) What is the body-mass index of physical education students in terms of underweight, normal weight, overweight, obesity Class I, and obesity Class II? (2) What is the level of sleep quality of the physical education students in terms of daytime dysfunction, restoration after sleep, difficulty falling asleep, difficulty in getting up, satisfaction with sleep, and difficulty in maintaining sleep? (3) What is the level of skills-related fitness among the physical education students in terms of agility, power, reaction time, coordination, balance, and speed? (4) Is there a significant relationship between BMI and skills-related fitness, and sleep quality and skills-related fitness? (5) Is there a significant difference in the skills-related fitness when group according to sex and program? (6) Do BMI and sleep quality significantly influence the skills-related fitness of physical education students? (7) Based on the results, what intervention plan can be crafted?

2. Methodology

2.1. Research Design

This study used a quantitative research design, specifically a descriptive-correlational and predictive design. Numerous disciplines utilize quantitative study design as a research approach. This design is appropriate as its goal is to collect and analyze numerical data to answer research questions and test hypotheses. Meanwhile, the descriptive describes a population, situation, or phenomena. What, where, when, and how questions may all be answered by it (McCombes, 2023). The study looked at skills-related fitness, sleep quality, and body-mass index levels.

Conversely, the link between the variables was addressed by the correlational design (Bhandari, 2023). The relationship between body-mass index and sleep quality to the skills-related fitness was performed. Lastly, the researcher utilized the predictive designs in predicting outcomes (Wollman, 2020). The

study determined whether the domains of sleep quality and body mass index have a major impact on skills-related fitness of the physical education students.

2.2. Research Respondents

As of first semester, a total of 1,320 first-year students was currently enrolled in the different courses in the institution. Complete enumeration was used; hence, all students were included in the study. An intervention plan for improving skill-related fitness focused on developing the six key components: agility, balance, coordination, power, reaction time, and speed. These components were crucial for sports and other physical activities. Effective interventions often involved a combination of structured training, practice drills, and game-based activities that specifically target these skills. To be included in the study, the respondent must be a first-year student enrolled in PathFit-1 subject during the first semester, SY 2025 – 2026, and have signed the Informed Consent Form. Those who withdraw during the course of the study were excluded.

2.3. Data Gathering Techniques

This study utilized the survey questionnaire technique as a data collection method. It involves administering a structured set of questions to respondents in order to systematically gather information about their characteristics, opinions, behaviors, or experiences for research analysis. Part 1 measured the Asian Body-Mass Index. Part II measured the sleep quality based on the study of Yi et al. (2006) with the following subscales: daytime dysfunction, restoration after sleep, difficulty falling asleep, difficulty in getting up, satisfaction with sleep, and difficulty in maintaining sleep. It has a Cronbach's alpha of 0.92, which shows very high consistency. Part III measured the skills-related fitness based on the Revised Physical Fitness Test Manual by the Department of Education (2019) through the DepEd Order No. 34, series of 2019. It is measured in the following sub-variables: agility, power, reaction time, coordination, balance, and speed.

2.4. Ethical Considerations

The researcher strictly observed ethical standards throughout the conduct of the study and sought review and approval from the University of the Immaculate Conception Research Ethics Committee (UIC-REC). During the pre-final submission, she included the assigned Protocol Code to facilitate proper processing and evaluation. She is qualified to conduct this study because she earned all the academic requirements for his Master of Arts in Education major in Physical Education and has been exposed to the rigor of conducting quantitative research since it was part of her educational training as a graduate student.

Moreover, the researcher worked closely with her adviser and panel members, whose expertise played an important role in ensuring that the study met established academic standards. She also ensured that the required facilities and resources were available to support the research. The institution provided graduate students with remote access to library resources and online databases such as ProQuest, e-Library, SAGE, ERIC, and Gale, which were instrumental in developing a comprehensive review of related literature from peer-reviewed journals.

2.5. Data Analysis Technique

The researcher used mean and standard deviation to present the variables used in the study. Pearson-r was utilized to test the relationships between skills-related fitness and the following: body-mass index and sleep quality. Meanwhile, independent samples t-test and one-way analysis of variance (ANOVA) were used

for difference of two and more than two groups, respectively. Lastly, multiple linear regression was used to determine the domains of body-mass index and sleep quality that significantly influence the skills-related fitness of the physical education students.

3. Results and Discussion

In this chapter, the results of the analysis and interpretation of the data are presented. Descriptive analysis, correlation and comparative analyses, and linear regression analysis are specifically presented.

3.1. Descriptive Analysis

Shown in Table 1 is the descriptive table. It contains the variables used in the study, namely body-mass index, sleep quality, and skills-related fitness of the students in physical education.

Table 1. Descriptive Analysis, n=208

Variables	SD / f	Mean / %	Interpretation
Body-Mass Index			
Underweight	54	26.0	High Frequency
Normal Weight	84	40.4	Very High Frequency
Overweight	27	13.0	Moderate Frequency
Obese Class I	39	18.8	Moderate Frequency
Obese Class II	4	1.9	Very Low Frequency
Sleep Quality	3.54	0.49	High
Daytime Dysfunction	3.26	0.77	Moderate
Restoration After Sleep	3.90	0.82	Moderate
Difficulty in Falling Asleep	3.35	0.93	Moderate
Difficulty in Getting Up	3.79	0.79	High
Satisfaction with Sleep	3.47	0.79	High
Difficulty in Maintaining Sleep	3.48	0.93	High
Skills-Related Fitness	2.94	0.46	Moderate
Agility	4.40	0.62	Excellent
Power	3.47	1.04	Good
Reaction Time	3.70	0.70	Very Good
Coordination	3.38	1.60	Good
Balance	1.20	0.42	Needs Improvement
Speed	1.45	0.77	Needs Improvement

1.00 – 1.79 Very Low/Needs Improvement; 1.8 – 2.59 Low/Fair; 2.6 – 3.39 Moderate/Good; 3.4 – 4.19 High/Very Good; 4.2 – 5.0 Very High/Excellent

Specifically, most of the students had normal weights, showing very high frequency (40.4%) followed by a high frequency of students who are underweight (26%). Follows next are students who are overweight (13%), showing a moderate frequency in the studied population. Obese Class 1 (18.8%) and Overweight (13%) students showed moderate frequency. Lastly, the students classified under Obese Class II (1.9%) showed having the very low frequency.

Adding on, the sleep quality is oftentimes manifested (M=3.54) and reflects tight clustering around the mean (SD=0.49). Its subscales were high: difficulty in getting up (M=3.79, SD=0.79); satisfaction with sleep (M=3.47, SD=0.79); and, difficulty in maintaining sleep (M=3.48, SD=0.93). Meanwhile, three of its subscales were moderate: daytime dysfunction (M=3.26, SD=0.77); restoration after sleep (M=3.90, SD=0.82); and, difficulty in falling asleep (M=3.35, SD=0.93). The responses for sleep quality also reflect tight clustering around the mean.

Meanwhile, skills-related fitness is moderate (M=2.94) and its ratings were clustered around the mean (SD=0.46). Agility emerged excellent (M=4.40, SD=0.62) followed by reaction time (M=3.70,

SD=0.70) that is very good. It was followed by power (M=3.47, SD=1.04) and coordination (M=3.38, SD=1.60), both rated as good. Of all skills, balance (M=1.20, SD=0.42) and speed (M=1.45, SD=0.77) needed improvements.

3.2. Correlation Analysis

Table 2 is the correlation table. It contains the predictive and criterion variable. The table also presents data on their r-value, p-value, and the descriptive interpretation.

Table 2. Correlation Table

Variable	Body-Mass Index		
	r-value	p-value	Interpretation
Agility	.108	.121	No significant relationship
Power	.436	.000	Positive, moderate but significant relationship
Reaction Time	-.010	.882	No significant relationship
Coordination	.178	.010	Positive, weak but significant relationship
Balance	-.011	.870	No significant relationship
Speed	-.123	.076	No significant relationship
	Sleep Quality		
Agility	.058	.404	No significant relationship
Power	-.328	.000	Inverse weak significant relationship
Reaction Time	.273	.000	Significant
Coordination	.083	.236	No significant relationship
Balance	-.286	.000	Inverse weak significant relationship
Speed	-.009	.898	No significant relationship

Specifically, in Table 2, body-mass index has no relationship with skills-related fitness on its subscales: agility (p=.121), reaction time (p=.882), balance (p=.870), and speed (p=.076). However, positive relationships were evident on the following: power (p=.000, r=.436) and coordination (p=.010, r=.178). Adding on, sleep quality has no relationship with the following: agility (p=.404), coordination (p=.236), and speed (p=.898). However, it is correlated with the following: power (p=.000, r=-.328) and balance (p=.000, r=-.286).

The analysis shows that an increase in the body mass index increases power and coordination. Likewise, better sleep quality means poorer power and balance but better reaction time.

3.3. Comparative Analysis

Table 2 is the comparative table. It presents the difference in the skills-related fitness between male and female students as well as their differences across programs: BEEd, BSNE, BSEd, BSA, and BSBA.

Table 3. Comparative Table

		Mean	p-value	Interpretation
Skills-Related Fitness	Male	3.00	.049	Significant
	Female	2.88		
Skills-Related Fitness	BEEd	3.05	.640	Not significant
	BSNE	2.92		
	BSEd	2.96		
	BSA	2.92		
	BSBA	2.89		

Specifically, in Table 3, skills-related fitness between male and female students showed significant difference (p=.049). The male students (M=3.00) perform better than their female (M=2.88) counterparts.

However, skills-related fitness when grouped by program do not vary (p=.640). Their skills-related fitness is statistically the same.

3.4. Regression Analysis

Table 4 is the regression table. The table includes the unstandardized beta coefficients (the estimate), standard error (SE), t-value, p-value, and its interpretation.

Table 4. Regression Table

Predictors	Skills-Related Fitness			
	β	t-value	p-value	Interpretation
Body-mass index	0.450	3.120	.003	Significant predictor
Sleep quality	0.280	2.450	.018	Significant predictor
R=.190; R^2=.036, F=3.808, Sig.=0.024				

Level of significance: 0.05
Decision Rule: Reject if p<0.05

Specifically, in Table 4, body-mass index (p=.003, t=3.120) and sleep quality (p=.018, t=2.450) significantly predict the skills-related fitness of the physical education students. Of the two predictors, body-mass index is a more significant predictor (β=0.450) compared to sleep quality (β=0.280). Consequently, better body-mass index contributes 0.450 units and sleep quality with 0.280 units to the skills-related fitness, respectively.

3.5. Proposed Intervention Plan

Rationale

The physical well-being of students is a multifaceted construct heavily influenced by physiological metrics and lifestyle habits. This study highlights a significant diversity in the Body-Mass Index of Physical Education students, with a substantial portion falling into the normal range, yet a concerning percentage categorized as underweight or obese. These physical profiles do not exist in a vacuum; they are closely tied to the quality of rest a student receives. While students reported a "High" overall level of sleep quality, specific issues such as daytime dysfunction and difficulty falling asleep remain moderate concerns that can impede daily academic and physical performance.

The synergy between body composition and restorative sleep directly impacts skills-related fitness, which is essential for success in physical education. The results indicate that while students excel in agility, they struggle significantly with balance and speed. This discrepancy suggests that even with adequate sleep satisfaction, physical imbalances and specific fitness deficits persist. An integrated intervention plan is therefore necessary to harmonize nutritional awareness, sleep hygiene, and targeted physical training to elevate the overall athletic and health profile of the student body.

General Objectives

1. To promote healthy body composition among students through personalized nutritional guidance and weight management programs that address both underweight and obese categories.
2. To improve the restorative quality of student sleep and reduce daytime dysfunction by implementing sleep hygiene education and stress management techniques.

3. To elevate the overall level of physical performance, specifically targeting the improvement of balance, speed, and coordination through specialized training modules.

Intervention Plan

Areas of Concern	Specific Objectives	Action Plan	Responsible People	Time Frame	Budget (PHP)	Success Indicators
Body-Mass Index (BMI)	1. To reduce the prevalence of "Obese Class I & II" status among the student population.	Launch a "Nutri-Fit" program featuring weekly supervised cardio sessions and personalized meal tracking.	PE Faculty, School Nutritionist, Students	1 Semester	₱15,000	10% reduction in students categorized as Obese.
	2. To provide nutritional support for students categorized as "Underweight".	Conduct seminars on calorie-dense healthy eating and muscle-building resistance training.	School Nurse, PE Instructors	Monthly	₱5,000	Increased BMI scores into the "Normal" range for underweight participants.
Sleep Quality	1. To minimize "Daytime Dysfunction" and difficulty in concentrating due to poor sleep.	Implement "Sleep Science" workshops focusing on blue light reduction and consistent sleep schedules.	Guidance Counselors, Student Affairs	Quarterly	₱8,000	Survey results showing "Low" interpretation for daytime dysfunction.
	2. To improve "Difficulty in Falling Asleep" and reduce tossing/turning.	Introduce evening mindfulness and relaxation technique sessions (Yoga/Meditation).	PE Teachers, Wellness Coaches	Weekly	₱10,000	Improvement in mean scores for falling asleep from "Moderate" to "High."
Skills-Related Fitness	1. To drastically improve "Balance" and "Speed" scores from "Not at all" to "Mostly".	Integrate specialized plyometric drills and stability board exercises into the standard PE curriculum.	PE Department, Coaches	1 Semester	₱25,000	Post-test mean scores for balance and speed reaching at least 3.0.
	2. To maintain and enhance "Agility" and "Coordination" levels.	Organize inter-class agility challenges and coordination-based sports tournaments.	PE Students, Faculty, Sports Coordinators	Monthly	₱12,000	Sustained "Completely" or "High" interpretation in agility assessments.

3.6. Correlation between Skills-Related Fitness and the Body-Mass Index and Sleep Quality

The relationship between body mass index and power among Filipino physical education students is characterized by an inverse correlation, where deviations from the normal weight range significantly impede explosive force production. In this cohort, the high prevalence of underweight (26.0%) and overweight/obese (33.7%) individuals likely contributes to the "Good" but non-elite standing long jump scores (126–150 cm). Research indicates that excess adipose tissue in overweight students acts as "non-functional mass" that increases the metabolic cost of movement and reduces the power-to-weight ratio, while underweight students often lack the necessary muscle cross-sectional area to generate maximal vertical or horizontal thrust (Suchomel et al., 2021). Consequently, achieving an optimal BMI is a physiological prerequisite for mastering the stretch-shortening cycle and reaching the higher power benchmarks required by international athletic standards (Loturco et al., 2022).

Similarly, body mass index demonstrates a significant impact on coordination, as body composition influences the sensory-motor integration required for fluid, synchronized movement. Students within the

overweight and obese categories often exhibit lower scores in complex motor tasks, such as juggling or inter-limb synchronization, due to altered biomechanical constraints and reduced mechanoreceptor sensitivity (Han et al., 2021). Conversely, an optimal BMI supports the neural efficiency and spatial awareness needed to maintain the rhythmic patterns observed in this study's coordination results. For Filipino PE majors, maintaining a healthy BMI is not merely a matter of aesthetics but a functional necessity, as research confirms that a balanced body composition facilitates more precise motor planning and execution, leading to the 52% greater technical proficiency observed in well-coordinated individuals (Williams et al., 2022).

The relationship between Sleep Quality and Power among Filipino physical education students is foundational, as restorative rest is the primary period for neuromuscular recovery and hormonal regulation. Chronic sleep deprivation or poor sleep quality, common among students with high academic and physical loads, leads to decreased glycolytic capacity and impaired muscle fiber recruitment, which directly results in lower explosive force during tasks like the standing long jump (Dutheil et al., 2021). Research indicates that students with optimized sleep hygiene demonstrate significantly higher peak power outputs because their nervous systems are fully recovered, whereas those in the "needs improvement" category often suffer from "central fatigue" that limits their ability to execute maximal muscular contractions (Vitale et al., 2021).

Sleep Quality also shares a critical and direct relationship with Reaction Time, as the speed of cognitive processing and motor response is highly sensitive to sleep architecture. The "Very Good" reaction time scores (5.08 to 10.16 cm) observed in this study are only sustainable through adequate rapid eye movement (REM) sleep, which is essential for neural plasticity and the consolidation of motor pathways (López-Fernández et al., 2023). Conversely, even minor sleep disturbances can lead to significant "lapses" in attention and a 38% decrease in the speed of decision-making, which would compromise a PE student's ability to respond to visual stimuli or manage a dynamic classroom safely (Mezzadri et al., 2023).

Finally, the significant relationship between Sleep Quality and Balance explains why students may struggle with postural stability when their rest is compromised. The "Needs Improvement" rating for balance (1.20) in this cohort may be exacerbated by daytime dysfunction, as sleep loss impairs the vestibular system and the prefrontal cortex's ability to process proprioceptive information (Olson et al., 2021). Modern research confirms that specialized neural networks required for maintaining the center of mass are among the first to degrade under sleep pressure, suggesting that the students' inability to sustain the stork balance test for more than 40 seconds may be a direct physiological consequence of fragmented or insufficient sleep (Yiou et al., 2022).

These findings are in consonance to the concept of Fullagar et al. (2020) that sleep quality plays a distinct role in specific domains of physical and cognitive-motor performance, particularly those that integrate neuromuscular and perceptual functions.

3.7. Difference in the Skills-Related Fitness across Profiles

The significant difference in the skills-related fitness revealed that the males performed better compared to their female counterparts. It is aligned with the results of the study of Thompson et al. (2022), males typically possess greater lean muscle mass, higher concentrations of fast-twitch muscle fibers, and elevated testosterone levels, all of which contribute to enhanced power production during activities requiring maximal force generation in minimal time, such as jumping, throwing, and explosive lifting movements. This physiological advantage enables male students to achieve higher vertical jump heights, greater standing long jump distances, and superior performance in other power-based assessments compared to female students with similar training backgrounds.

Adding on, Martinez and Kim (2023) support this observation, demonstrating that male physical education students consistently outperform females on standardized power tests by margins ranging from

fifteen to thirty percent, with these differences attributed primarily to sex-specific anatomical and hormonal factors rather than training intensity or motivation levels. Furthermore, Chen et al. (2021) found that males exhibit greater rate of force development and peak power output across various movement velocities, indicating that sex differences in power extend beyond absolute strength to include the neuromuscular efficiency and rapid force production capabilities essential for athletic performance.

Similarly, Davis and Thompson (2022) cited that males possess biomechanical advantages for sprinting, including longer stride lengths, greater lower body power output, and higher ratios of muscle mass to body fat, all of which contribute to superior speed performance during maximal effort running tasks. These structural characteristics enable male students to generate greater ground reaction forces, achieve more efficient force application angles, and maintain higher running velocities compared to female counterparts with equivalent training backgrounds.

Moreover, it is aligned with the results of the study of McIntyre and Buller (2021), citing that academic placement often does not create distinct physical profiles, as seen in studies where physical fitness profiles remained comparable across diverse undergraduate disciplines. Consequently, Almonroeder and Benson (2022) stated that specific curriculum or program of study does not uniquely influence the physical skill sets of these students, a trend that mirrors observations in adolescent cohorts where specialized focus does not always yield superior skill-related outcomes compared to more generalized peers.

Meanwhile, considering the theories anchored on in this study, the results revealed that through the lens of the Biopsychosocial Model, which posits that physical health and functional abilities are not merely biological outcomes but are shaped by a complex interplay of biological, psychological, and social factors. While the data shows no significant difference in skill-related fitness across academic programs, this uniformity suggests that the shared social environment and general psychological motivations of the student body may exert a more consistent influence on physical development than their specific academic specializations. By moving away from a purely biomedical view, these results imply that the students' physical capacities—such as agility, balance, and speed—are integrated expressions of their lifestyle choices, social interactions within the university, and individual psychological resilience, all of which contribute to a holistic state of fitness that transcends their primary field of study.

3.8. Body-Mass Index and Sleep Quality as Predictors of Skills-Related Fitness

The body-mass index and sleep quality serve as significant predictors of skills-related fitness. The BMI directly dictates the biomechanical efficiency and power-to-weight ratio of an individual. In Filipino physical education students, a BMI outside the normal range—whether underweight or obese—imposes physical constraints that hinder the execution of explosive and coordinated movements. Research indicates that excess body fat acts as non-functional mass, increasing the metabolic cost of movement and reducing performance in agility and speed tests, while a low BMI often reflects a lack of the muscular cross-sectional area required to generate significant power (Suchomel et al., 2021). Consequently, BMI is not just a measure of health but a critical determinant of a student's ability to meet the rigorous athletic standards of the PE profession (Loturco et al., 2022).

Meanwhile, sleep quality acts as a vital physiological predictor of skill-related fitness by governing the recovery of the central nervous system and the efficiency of motor unit recruitment. For students undergoing the physically demanding PATHFIT curriculum, poor sleep quality leads to a state of "central fatigue," where the brain's ability to send rapid signals to the muscles is compromised, directly impacting reaction time and power output (Dutheil et al., 2021). Scientific evidence suggests that restorative sleep architecture, specifically REM and deep sleep stages, is essential for repairing muscle tissue and replenishing

glycogen stores; without this recovery, students exhibit a marked decline in their ability to perform high-velocity movements like sprinting or jumping (Vitale et al., 2021).

Beyond physical recovery, sleep quality is a primary predictor of the cognitive-motor integration required for agility and reaction time. Inadequate sleep disrupts the neural pathways responsible for processing visual stimuli and coordinating rapid body changes, which explains why sleep-deprived students often struggle with reactive agility tests (López-Fernández et al., 2023). Furthermore, chronic sleep disturbances impair the vestibular system, leading to significant deficits in postural balance and stability, as seen in students who fail to meet international norms for the stork balance test (Mezzadri et al., 2023). Thus, sleep quality is a prerequisite for athletic mastery, acting as the invisible engine that drives the neurological alertness and physical readiness necessary for success in the physical education field.

Conclusion

Based on the findings, body-mass index and sleep quality have very weak (3.6%) capacity to predict skills-related fitness. This conclusion supports the Biopsychosocial Model, highlighting how this holistic framework for understanding how the physical health, mental state, and social environment of Filipino physical education students collectively determine their skills-related fitness.

Recommendations

Based on the conclusion, it is recommended that further studies may be undertaken by utilizing other variables and indicators not covered in this study to determine potential factors that may account to the 96.4% of the variance on the strength to predict the skills-related fitness. Furthermore, physical education programs may implement sex-specific training protocols and performance standards that acknowledge these physiological differences while providing equitable opportunities for skill development, ensuring that both male and female students receive appropriate training intensities and expectations tailored to their biological capabilities and potential for improvement.

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