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A Cross-Sectional Study Between Gender and Different Sleep Patterns on Physical Wellness, Nutritional Wellness, Intellectual Wellness, Alcohol & Drug Abuse of Athletes

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ABSTRACT

Sleep plays an important role in maintaining athletes' health, recovery, and overall well-being; however, evidence regarding its association with multiple dimensions of wellness remains limited. The present cross-sectional study examined the independent and interaction effects of gender and different sleeping patterns on physical, nutritional, intellectual wellness, and alcohol & drug abuse among male and female athletes. 90 athletes (45 male and 45 females), aged 18-25 years, were randomly selected from colleges, universities, and sports clubs in Gujarat and classified into three different sleeping duration groups: below 6 hours/day, 6-8 hours/day, and above 8 hours/day. Data were collected using the Lifestyle Assessment Inventory and analysed using 2 × 3 factorial ANOVA, and Least Significant Difference (LSD) post hoc test at 0.05 level of significance. The findings revealed that gender significantly influenced physical wellness and alcohol & drug abuse ($p < .001$), with male athletes reporting higher physical wellness scores and female athletes obtaining higher alcohol and drug abuse scores. Conversely, nutritional wellness and intellectual wellness did not differ significantly between male and female athletes. Sleeping pattern showed no significant effect on any of the selected wellness dimensions or alcohol and drug abuse, and no significant interaction was observed between gender and sleeping pattern. The findings suggest that athlete wellness is a multi-dimensional construct influenced more by gender and sport-related lifestyle factors than by sleep duration alone.

Keywords: Physical Wellness, Alcohol Abuse, Drug Abuse, Nutritional Wellness, Intellectual Wellness, Sleeping Duration, and Gender

INTRODUCTION

For centuries, it was believed that sleep was merely a passive state in which the body and mind rested. Or, as Aristotle believed, sleep was just an unremarkable and unimportant period, marked by the absence of our usual sense of perception. But over the years, this concept has undergone a massive change, with psychologists like Sigmund Freud exploring sleep and the dimensions it opens up through the generation of dreams. His work has been significant in altering the dominant view on dreams. Through dreams, Freud sought to explore what he called the 'subconscious', which he believed held answers to people's behaviour and actions. (Bhatia, 2016)

Physical fitness and wellness are interrelated. Physical fitness is the sum of the fine motor abilities, namely strength, speed, endurance, flexibility and coordinative abilities. The most important aim of sports exercise is to improve and maintain the physical fitness and wellness

of the human being. Exercise is an essential element in the achievement and maintenance of physical fitness and wellness of human beings.

The Alcohol, Drug, and Wellness education serves to provide a 3-pronged approach to education, programming: (1) individuals; (2) the student body as a whole; and (3) the university and the greater community. Through holistic education, prevention, and counselling, the university underscores its mission to prepare students for meaningful work, fulfilling lives and responsible citizenship. By focusing on making healthy choices, including responsible drinking, sexual education, and drug use prevention.

Nutritional wellness can be defined as the science that looks at the relationship between our diet and our health. Though every one of us has the choice to choose what kind of proteins and nutrition our body needs. Our immune system can be damaged by what we choose to eat, and though it would be convenient if we could get all of our necessary nutrients in the form of supplements and continue to eat the way we always have, nature does have a much better job of combining what is necessary for the body to properly absorb and utilize the nutrients in the food we eat and make it available at the cellular level for our bodily functions and growth.

The intellectual dimension recognises one's creative, stimulating mental activities. A well person expands his or her knowledge and skills while discovering the potential for sharing his or her gifts with others. Using intellectual and cultural activities in and beyond the classroom, combined with the human and learning resources available within the university community and the larger community, a well-person cherishes intellectual growth and stimulation. Travelling a wellness path, people were exploring issues related to problem-solving, creativity, and learning. People will spend more time pursuing personal interests and reading books, magazines, and newspapers, while keeping abreast of current issues and ideas.

The consensus of scientific opinion today is that exercise is essential. In the opinion of the author, exercise suited to the individual should be done for a specific duration regularly, at least 4 to 6 days a week, for maintaining physical fitness and wellness of a human being. (Vaidhya, 2006)

Objectives of the Study

1. To compare the level of Physical Wellness, Nutritional Wellness and Intellectual Wellness, and Alcohol & Drug Abuse, between male and female sportspersons.
2. To compare the level of Physical Wellness, Nutritional Wellness and Intellectual Wellness, and Alcohol & Drug Abuse among different sleeping durations of the Sportsperson.
3. To compare the interactional effect between gender and sleeping duration on Physical Wellness, Nutritional Wellness, Intellectual Wellness, and Alcohol & Drug Abuse of the Sportsperson.

Significance of the Study

The present study examines the interactional effect of gender and duration of sleep on different dimensions of wellness, along with alcohol and drug abuse in athletes. Although previous studies predominantly focused on athletic performance, limited attention has been paid to the interaction between sleep patterns and physical wellness, nutritional wellness, intellectual wellness, and substance-related behaviour abuse. By exploring these relationships, the study provides a comprehensive understanding of athlete well-being beyond physical performance.

Research Procedure

Research Design: The study used a 2 x 3 factorial design to assess the gender and different sleeping patter wise difference along with their interactional effect on physical wellness, nutritional wellness, intellectual wellness, and alcohol and drug abuse.

Participants: 90 athletes were randomly sampled using a randomized sampling method, aged between 18 and 25 years, from different colleges, universities and sports centres in Gujarat, and were selected based on self-stated sleeping duration. The subjects were further categorized into: gender (male and female) and different sleeping patterns (below 6 years, 6 to 8 years, above 8 years)

Table No. 1: Distribution of Subjects as per Gender and Different Sleep Patterns (N = 90)

Characteristics	Groups	Number of Participants
Gender	Male Athletes	45
	Female Athletes	45
Different Sleeping Pattern	Below 6 Years	30
	6 to 8 Years	30
	Above 8 Years	30

Variables: Gender and three different sleeping durations were considered as independent variables, and Physical wellness, Nutritional Wellness, Intellectual Wellness, Alcohol & Drug Abuse were considered as dependent variables for the present study.

Questionnaire: Athletes' Lifestyle was assessed by the Lifestyle Assessment Inventory developed by Anspach, Davids, Michael, H. Hamrich and Frank D. Rosato. The validity of the questionnaire in the Indian population was found .89.

Administration of Questionnaire: The Lifestyle Assessment Inventory includes 80 questions. The questions/statements were equally distributed across Physical Wellness, Nutritional Wellness, Intellectual Wellness, Alcohol Abuse and Drug Abuse. The responses of subjects were measured using a five-point ordinal scale, where the maximum response score from the total inventory is 100, and the minimum is 10, and for each subject, the response score ranges from 10 to 100. The normative score of the questionnaire is shown in Table 2.

Table No. 2: Standard Normative Score for Lifestyle Assessment Inventory

Range of Scores	Standard Norms
86-100:	Excellent
70-85:	Good
50-69:	Average
30-49:	Below average
Less than 30:	Needs improvement

Collection of Data: The data were collected during Summer Camp 2017, organised by the Sports Authority of Gujarat at Manjalpur, Devgagh-Baria, and Nadiad. The subjects were given 15 to 20 minutes, along with the necessary instructions required before filling out the questionnaire.

Statistical Test: The IBM SPSS 27 was used to analyze the data of the subjects. The mean and Std. deviation was used as descriptive statistics to describe the nature of the data, then 2 x 3 Way ANOVA (Analysis of Variance) was used at 0.05 significance to check whether the observed mean difference in descriptive statistics was statistically significant or not. Based on the *p*-value of 2 x 3 Way ANOVA, the Least Significant Difference (LSD) post hoc analysis was used where needed.

Result & Discussion

Table No. 3: Descriptive Statistics (Mean ± Std. Deviation) of Dimensions of Wellness and Substance Abuse Based on Gender and Different Sleep Patterns

Parameters	Gender		Sleeping Patterns		
	Male	Female	Below 6 Hours/Day	6 to 8 Hours/Day	Above 8 Hours/Day
Physical Wellness	68.81 ± 2.21	66.30 ± 1.29	67.08 ± 2.02	67.98 ± 2.28	67.61 ± 2.26

Nutritional Wellness	72.60 ± 2.19	72.71 ± 1.64	72.33 ± 1.95	73.01 ± 2.22	72.63 ± 1.55
Intellectual Wellness	83.77 ± 1.30	83.20 ± 1.96	83.59 ± 1.54	83.28 ± 1.81	83.58 ± 1.71
Alcohol & Drug Abuse	78.23 ± 1.55	83.33 ± 2.25	80.86 ± 3.55	80.67 ± 3.44	80.80 ± 2.65

Table 3 presents the descriptive statistics of physical wellness, nutritional wellness, intellectual wellness, and alcohol & drug abuse as per gender and different sleep patterns. According to the standard normative score in Table 2, male athletes reported a mean score of 68.81 ± 2.21 in physical wellness, while female athletes recorded 66.30 ± 1.29. Both scores are categorized as "Average", while males demonstrated a slightly higher level of physical wellness compared to females. Athletes sleeping less than 6 hours/day (67.08 ± 2.02), 6-8 hours/day (67.98 ± 2.28), and above 8 hours/day (67.61 ± 2.26) remained within the "Average" range, indicating minimal variation in physical wellness across different sleeping patterns. Both male (72.60 ± 2.19) and female athletes (72.71 ± 1.64) demonstrated similar scores within the "Good" category. Similarly, mean scores ranging from 72.33 to 73.01 were reported by athletes in all three sleeping patterns, which indicates a "Good" level of nutritional wellness across athletes having three different sleeping patterns. These findings suggest that participants usually maintained satisfactory dietary and nutritional practices irrespective of gender or sleep duration.

Intellectual wellness exhibited the highest scores among all assessed wellness dimensions. Female athletes (83.20 ± 1.96) and male athletes (83.77 ± 1.30) were classified within the "Good" category. Likewise, the mean scores for the three different sleeping pattern groups ranged from 83.28 to 83.59, indicating consistently high levels of intellectual wellness with little variation across groups. According to the normative interpretation, male and female athletes received a good score (78.23 ± 1.55 vs. 83.33 ± 2.25) for alcohol and drug misuse, while female athletes scored relatively higher on alcohol, drug and abuse. The mean scores for each sleep pattern ranged from 80.67 ± 3.44 to 80.86 ± 3.55, all of which are in the good range. These results show similar alcohol and drug abuse among athletes regardless of sleep duration, with females showing comparatively higher scores than males.

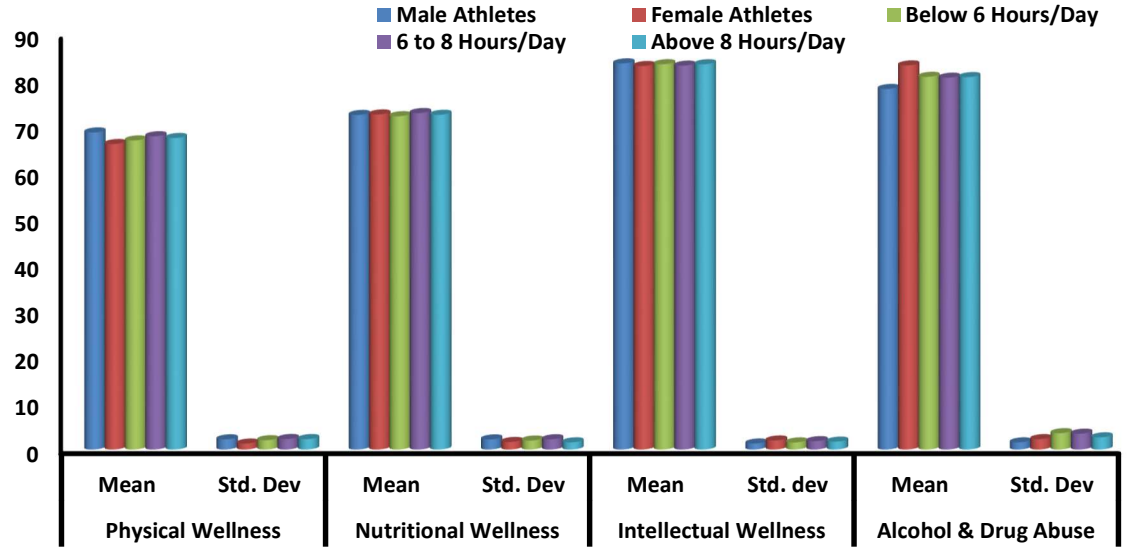

Figure No. 1: Graphical Representation of the Mean Score of Male and Female Athletes and their Different Sleeping Patterns across Dimensions of Wellness and Substance Abuse

To assess whether the observed differences in Table 3 are statistically significant or not, a 2 x 3 Way ANOVA (Analysis of Variance) will be used, comparing two main effects and one interactional effect across the selected variables.

Physical Wellness

Table No. 4: 2 x 3 Way ANOVA Results on Physical Wellness of Male & Female Athletes Based on their Sleeping Patterns

Source	Type III Sum of Squares	df	Mean Square	F Statistics	Sig. (2 tail)
Sleeping Pattern	12.16	2	6.08	1.95	0.14
Gender	141.76	1	141.76	45.65	0.001
Sleeping Patterns x Gender	16.16	2	8.08	2.60	0.80
Error	260.83	84	3.10		
Total	411246.05	90			

Table No. 5: Univariate Test Results of Gender Wise Difference on Physical Wellness of Male and Female Athletes

	Sum of Squares	df	Mean Square	F	Sig. (2 tail)
Contrast	141.76	1	141.76	45.65	.001
Error	260.83	84	3.10		

Table No. 6: Post Hoc Analysis (LSD) of Physical Wellness of Male and Female Athletes with Different Sleeping Patterns

Sleeping Pattern	Gender	Mean	Std. Error	95% C.I	
				Lower Bound	Upper Bound
Below 6 Hours/Day	Male	67.74	0.45	66.83	69.64
	Female	66.43	0.45	65.52	67.33
6 to 8 Hours/Day	Male	69.52	0.45	68.62	70.43
	Female	66.43	0.45	65.53	67.34
Above 8 Hours/Day	Male	69.17	0.45	68.27	70.08
	Female	66.05	0.45	65.14	66.95

As per, Table 4, athletes who slept for less than six hours, six to eight hours, or more than eight hours a day did not significantly differ in their physical wellness scores, according to the research, which showed that the main effect of sleeping pattern was not statistically significant (p = 0.14). Variations in the mean score were observed across different sleeping patterns, as shown in Table 3. These differences were not statistically significant. In contrast, the level of physical wellness between genders was statistically significant (p = 0.001). Male athletes scored much higher on physical wellness than female athletes, indicating that participants' perceptions of physical wellness are influenced by their gender. Thus, there was a statistically significant difference between male athletes (68.81 ± 2.21) and female athletes (66.30 ± 1.29). Additionally, there was no statistically significant interaction between male and female athletes based on their different sleeping patterns (p = 0.80). This suggests that the influence of sleeping duration on physical wellness was similar for both male and female athletes. At the same time, the association between duration of sleep and physical wellness was unaffected by gender.

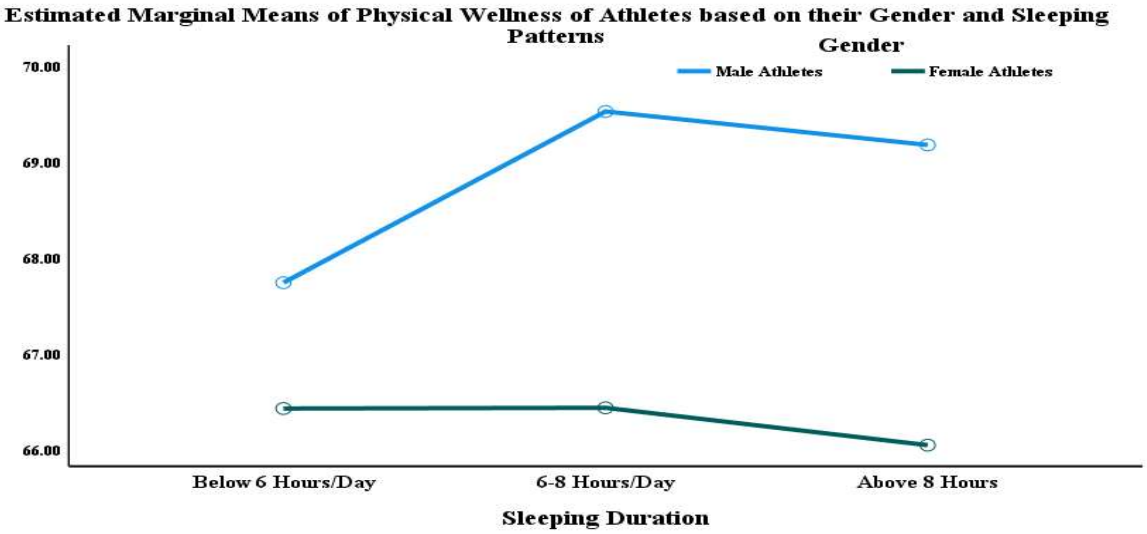

Figure No. 2: Estimated Marginal Mean Plots of Physical Wellness of Male and Female Athletes with Different Sleeping Patterns

Table 6 presents the Least Significant Difference (LSD) post hoc analysis of the estimated marginal mean scores for physical wellness among male and female athletes across different sleeping patterns. The results indicate that male athletes consistently demonstrated higher mean physical wellness scores than female athletes within each sleeping category. Among male athletes, those sleeping 6 to 8 hours/day recorded the highest mean score (69.52), followed by those sleeping above 8 hours/day (69.17), whereas athletes sleeping below 6 hours/day obtained the lowest mean score (67.74). In contrast, female athletes showed relatively similar physical wellness scores across all sleeping patterns, with mean values ranging from 66.05 to 66.43, indicating minimal variation. The 95% confidence intervals further suggest greater physical wellness among male athletes than female athletes across all sleep-duration groups, with the highest confidence interval observed among males sleeping 6 to 8 hours/day (68.62–70.43). Overall, the post hoc analysis indicates that male athletes, particularly those obtaining 6 to 8 hours of sleep per day, exhibited comparatively better physical wellness, whereas female athletes maintained relatively stable physical wellness irrespective of sleeping duration.

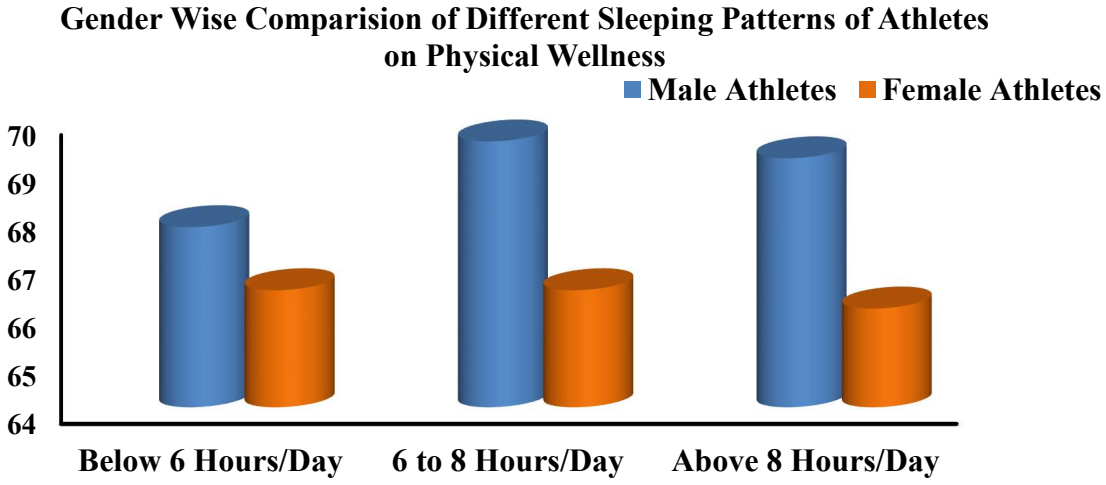

Figure No. 3: Graphical Representation of Mean Value of LSD Post Hoc Analysis of Gender Weise Difference in Sleep Pattern

Compared to female athletes, male athletes reported significantly higher levels of physical wellness. This difference could be explained by males' higher levels of habitual physical activity, muscular mass, aerobic ability, and physical strength compared to females (Warburton & Bredin, 2017). As per previous research, regular physical activity enhances overall physical wellness, although gender related physiological differences may influence the outcomes (Eime et al., 2013). Athletes with different sleeping patterns reported similar levels of physical wellness, as per the non-significant effect of sleeping pattern shown in Table 4. Because recovery is also impacted by sleep quality, dietary practices, training load, psychological well-being, and lifestyle factors, this conclusion implies that the duration of sleep alone is insufficient to explain variations in physical wellness (Fullagar et al., 2015; Walsh et al., 2021). Watson, (2017) previously concluded that sleep quality and recovery behaviour are stronger predictors of athlete wellness rather than sleep quality alone.

The absence of a significant interactional effect implies that there was no gender difference in the association between different sleeping patterns and physical wellness. Since the athletes were competitive athletes with a similar training background, their structured exercise may have minimised differences in physical wellness despite variation in sleeping hours. Overall, the results demonstrate that while habitual sleep duration may not have a major impact on athletes' physical fitness, gender is a significant determinant of physical wellness. To better understand their combined impact on athlete wellness, future research should include objective measures of training load, recovery status, and sleep quality.

Nutritional Wellness

Table No. 7: 2 x 3 Way ANOVA Results on Nutritional Wellness of Male & Female Athletes Based on their Sleeping Patterns

Source	Type III Sum of Squares	df	Mean Square	F Statistics	Sig. (2 tail)
Sleeping Pattern	6.88	2	3.44	0.90	0.41
Gender	0.25	1	0.25	0.06	0.79
Sleeping Patterns x Gender	2.84	2	1.42	0.37	0.69
Error	321.27	84	3.82		
Total	475518.13	90			

The result shown in Table 7 revealed that athletes' different sleeping was not statistically significant (p =0.41), indicating that athletes who slept for less than 6 hours, 6 to 8 hours, or more than 8 hours per day did not significantly differ in their nutritional awareness. Although slight differences in their mean score were observed among the three sleeping patterns in Table 3. Neither the difference between male and female athletes in nutritional wellness was statistically significant (p = 0.79). As per the normative classification, the mean nutritional wellness scores of both male (72.60 ± 2.19) and female athletes (72.71 ± 1.64) both fell into the “Good” category, indicating similar dietary practices and nutritional awareness across genders. Additionally, there was no statistically significant interaction between gender and sleeping patterns of athletes (p = 0.69). This suggests that for both male and female athletes, there was a consistent association between sleep duration and nutritional wellness.

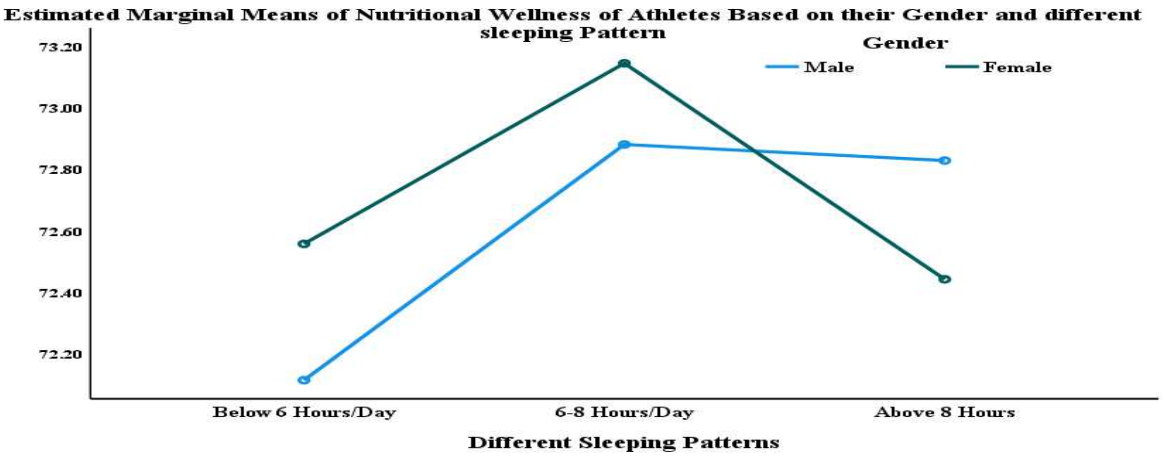

Figure No. 4: Estimated Marginal Mean Plots of Physical Wellness of Male and Female Athletes with Different Sleeping Patterns

The absence of a significant difference may be attributed to the fact that competitive athletes usually receive comparable nutritional education and dietary guidance to support training adaptations, recovery, and performance. As a result, healthy eating habits and nutritional practices are likely to be adopted by both male and female athletes. Previous studies have reported that athletes participating in competitive sports tend to demonstrate healthier dietary habits than the general population because of the increased awareness of the importance of nutrition for athletic performance (Thomas et al., 2016; Kerksick et al., 2018). Similarly, the non-significant effect of sleeping pattern indicates that differences in sleep duration alone did not influence nutritional wellness. While insufficient sleep has been associated with poor food choices, increased energy intake, and altered appetite regulation in the general population, these associations seem to be less pronounced among trained athletes who usually adhere to performance-oriented dietary routines and structured meal plans (Fullagar et al., 2015; Walsh et al., 2021). The lack of a significant interaction effect indicates that there was no gender-specific variation in the association between sleep duration and nutritional health. This result shows that regardless of their reported sleeping patterns, men and female athletes responded to nutritional health in similar ways. Overall, the results suggest that good eating habits and competitive sports involvement may have a greater impact on nutritional wellness than variations in gender or sleep length. Previous research reported that regardless of gender, proper nutritional practices, such as a balanced diet and optimum nutrient timing, are important for enhancing athletic performance and overall health (Jeukendrup, 2017; Close et al., 2019). For a better understanding of the combined impact of these factors on athlete wellbeing, future research should include objective evaluation of nutritional intake, sleep quality, and recovery.

Intellectual Wellness

Table No. 8: 2 x 3 Way ANOVA Results on Intellectual Wellness of Male & Female Athletes Based on their Sleeping Patterns

Source	Type III Sum of Squares	df	Mean Square	F Statistics	Sig. (2 tail)
Sleeping Pattern	1.84	2	0.92	0.33	0.71
Gender	7.43	1	7.43	2.70	0.10
Sleeping Patterns x Gender	11.22	2	5.61	2.04	0.13
Error	231.21	84	2.75		
Total	627574.04	90			

The analysis result in Table 8 revealed that athletes who slept for less than 6 hours, 6 to 8 hours, and above 8 hours per day did not differ significantly in their intellectual ability. As

per the research, the three sleeping pattern groups had different mean intellectual wellness scores (Table 3), but these differences were not statistically significant ($p = 0.71$). Similarly, the gender wise comparison also indicated similar results on well-being, with a $p = 0.10$; the level of intellectual wellness in male and female athletes was similar. While both male athletes (83.77 ± 1.30) and female athletes (83.20 ± 1.96) received scores in the "Good" category shown in Table 3, suggesting a consistent high level of intellectual wellness regardless of gender. Additionally, the interaction effect between gender and sleeping pattern was not statistically significant ($p = 0.13$), indicating that both male and female athletes had similar relationships between sleep length and intellectual wellness. Overall, the results show that athletes' intellectual wellness was consistently high, independent of their gender or regular sleep schedule, suggesting that these variables had no discernible impact on intellectual wellness in the current study.

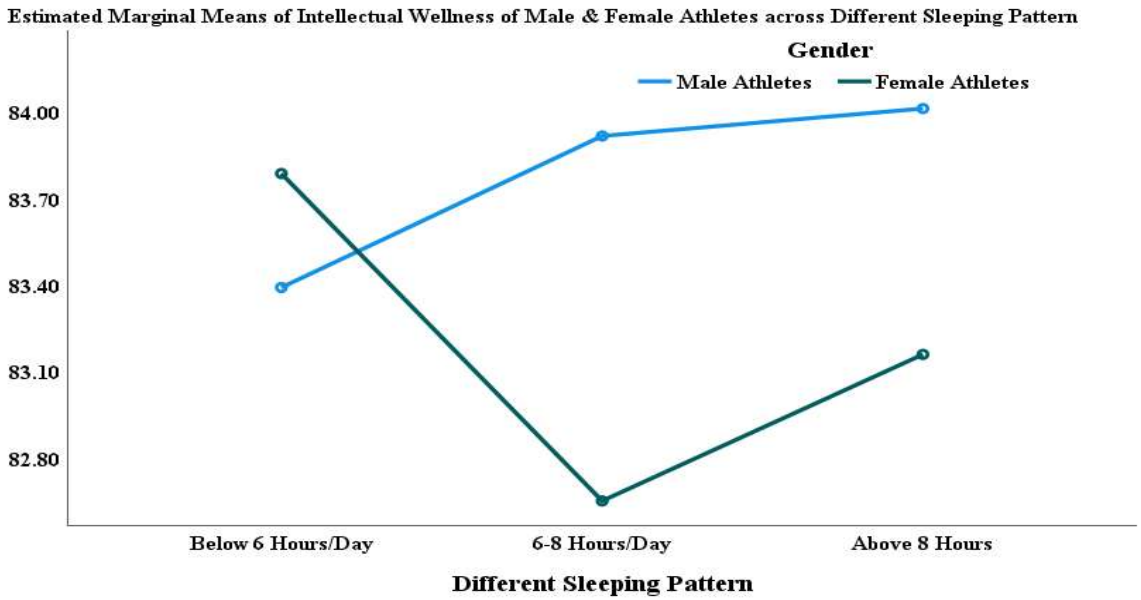

Figure No. 5: Estimated Marginal Mean Plots of Intellectual Wellness of Male and Female Athletes with Different Sleeping Patterns

The results of this study revealed that athletes maintained comparable levels of intellectual wellness regardless of their habitual sleeping patterns or gender. The athletes are routinely engaged in structured learning environments that promote cognitive development, decision-making, problem-solving, and strategic thinking (Donnelly et al., 2016). The non-significant effect of different sleeping patterns suggests that the duration of sleep might not be a reliable indicator of intellectual wellness. While getting enough sleep helps in increasing attention, memory consolidation, and executive functioning, educational experiences, cognitive engagement, motivation, and frequent sports involvement significantly influence intellectual wellness (Walker, 2017; Fullagar et al., 2015; Walsh et al., 2021). As a result, while these conditions continue to be favourable, athletes with varying sleep durations may exhibit comparable levels of intellectual wellness. Similarly, the absence of a significant interactional effect indicates that both male and female athletes had a similar association between sleep duration and intellectual wellness. As per Diamond and Ling, (2016) and Elime et al., (2013), competitive sports training, educational exposure, and ongoing educational stimulation may have a common impact on all groups consistently high intellectual awareness. Overall, the results suggest that involvement in cognitively stimulating environments and structured sports may have a bigger impact on intellectual wellness than gender or regular sleep duration. This emphasises the need for future research

to include objective measures of academic engagement, cognitive performance, and sleep quality.

Alcohol & Drug Abuse

Table No. 9: 2 x 3 Way ANOVA Results on Alcohol & Drug Abuse of Male & Female Athletes Based on their Sleeping Patterns

Source	Type III Sum of Squares	df	Mean Square	F Statistics	Sig. (2 tail)
Sleeping Pattern	0.537	2	0.26	0.07	0.93
Gender	585.46	1	585.46	155.12	0.001
Sleeping Patterns x Gender	13.19	2	6.59	1.74	0.18
Error	317.02	84	3.77		
Total	588214.79	90			

Table No. 10: Univariate Test Results of Gender Wise Difference on Alcohol & Drug Abuse of Male and Female Athletes

	Sum of Squares	df	Mean Square	F	Sig. (2 tail)
Contrast	585.46	1	585.46	155.12	0.001
Error	317.02	84	3.77		

Table No. 11: Post Hoc Analysis (LSD) of Alcohol & Drug Abuse of Male and Female Athletes with Different Sleeping Patterns

Sleeping Pattern	Gender	Mean	Std. Error	95% C.I	
				Lower Bound	Upper Bound
Below 6 Hours/Day	Male	78.05	0.50	77.06	69.64
	Female	86.66	0.50	82.66	84.66
6 to 8 Hours/Day	Male	77.83	0.50	76.84	78.83
	Female	83.51	0.50	82.51	84.51
Above 8 Hours/Day	Male	78.79	0.50	77.79	79.79
	Female	82.81	0.50	81.81	83.80

The analysis result shown in Table 9 revealed that there was not statistically significant (p = 0.93), indicating that athletes sleeping for less than 6 hours, 6–8 hours, or more than 8 hours per day did not differ significantly in their alcohol and drug abuse scores. Although slight differences in the mean scores were observed across the three sleeping pattern groups (Table 3), these variations were not statistically significant. In contrast, the gender wise difference was statistically significant (p = 0.001), indicating a significant difference between male and female athletes in alcohol and drug abuse scores. Based on the descriptive statistics presented in Table 3, female athletes (83.33 ± 2.25) obtained significantly higher scores than male athletes (78.23 ± 1.55). According to the normative classification, both groups fell within the "Good" category; however, the higher score among female athletes suggests comparatively high practice of alcohol and drug abuse. Furthermore, the interaction effect between sleeping pattern and gender was not statistically significant (p = 0.18), indicating that the relationship between sleeping duration and alcohol and drug abuse was similar for both male and female athletes. In other words, gender did not modify the influence of sleeping patterns on alcohol and drug abuse.

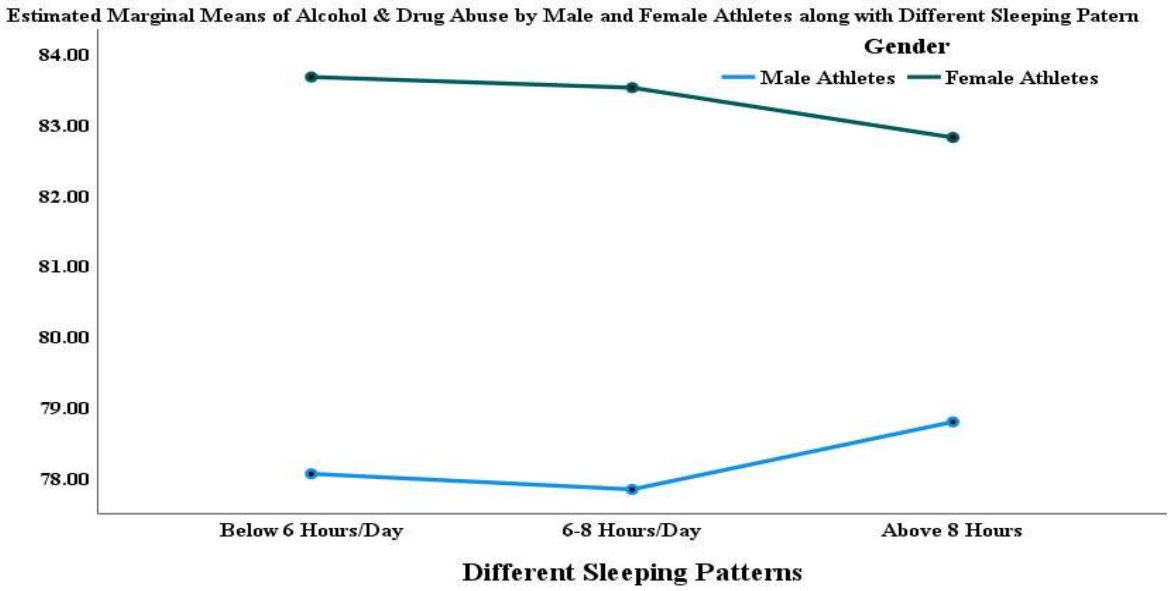

Figure No. 5: Estimated Marginal Mean Plots of Alcohol & Drug Abuse of Male and Female Athletes with Different Sleeping Patterns

Table 11 presents the Least Significant Difference (LSD) post hoc analysis of the estimated marginal mean scores for alcohol and drug abuse among male and female athletes across different sleeping patterns. The results indicate that female athletes consistently obtained higher mean scores than male athletes across all sleeping categories, reflecting comparatively higher alcohol and drug abuse. Among female athletes, those sleeping below 6 hours/day recorded the highest mean score (83.66 ± 0.50), followed by those sleeping 6 to 8 hours/day (83.51 ± 0.50) and above 8 hours/day (82.81 ± 0.50), showing only marginal differences across the three sleeping patterns. In contrast, male athletes demonstrated relatively lower but consistent mean scores, ranging from 77.83 ± 0.50 to 78.79 ± 0.50, with the highest score observed among those sleeping above 8 hours/day (78.79 ± 0.50) and the lowest among those sleeping 6 to 8 hours/day (77.83 ± 0.50). The 95% confidence intervals further indicate that female athletes consistently exhibited higher alcohol and drug abuse scores than their male counterparts across all sleep-duration groups, while minimal overlap within each gender suggests little variation attributable to sleeping pattern. Overall, the post hoc analysis demonstrates that female athletes maintained consistently higher alcohol and drug abuse scores than male athletes, irrespective of sleeping duration, whereas variations across different sleeping patterns within each gender were negligible.

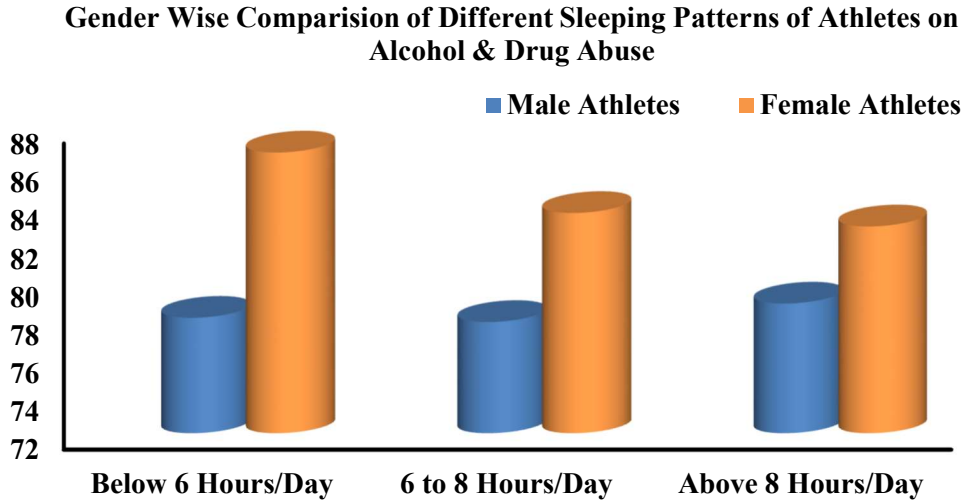

Figure No. 4: Graphical Representation of Mean Value of LSD Post Hoc Analysis of Gender Weise Difference in Sleep Pattern

Conclusion

The present study concludes that while nutritional wellness and intellectual wellness are similar for male and female athletes, gender exerts a significant influence on physical wellness, and alcohol & drug abuse among athletes. Different sleeping patterns, however, had no significant effect on alcohol & drug abuse or any of the dimensions of wellness. Additionally, the absence of significant interaction effects suggests that the relationship between sleep duration and the selected dimension of wellness was consistent between both male and female athletes. The result emphasized that athletes' wellness is multi-dimensional, and might be affected by a combination of physiological, behavioural, nutritional, psychological, and training-related factors rather than sleeping duration alone.

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