



RESEARCH PAPER

The Role of Conscientiousness Personality Trait and Gender in Predicting Sleep Quality among Elite-Level University Student Swimmers Vs Non-Athletes University Students

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ABSTRACT

Personality traits and sleep quality play a major role in the mental well-being and performance of university students. While earlier research has explored the overall connection between personality and sleep, there hasn't been enough focus on how conscientiousness and gender might influence sleep quality, especially considering differences related to athletic backgrounds. This leaves an important gap in our understanding. To fill this gap, this study aimed to explore how both conscientiousness and gender could predict sleep quality among university students, including both elite swimmers and students who are not athletes. The study involved 180 students, with 90 elite-level university student swimmers (Mean age 20.62 years, SD = 2.246) and 90 non-athlete students (Mean age 19.89 years, SD = 1.814). We used a cross-sectional method with self-report questionnaires to gather demographic information, the BFI-10 to measure personality traits and the Pittsburgh Sleep Quality Index (PSQI) to assess sleep quality. The analysis showed that conscientiousness was a significant predictor of sleep quality in both groups. Interestingly, in elite-level university student swimmers, higher conscientiousness was linked to better sleep and the same pattern was observed among non-athletes. Gender was only a major predictor in the early stages of analysis for elite-level university student swimmers but did not remain important once other factors were considered, nor was it major for non-athletes. Overall, these results suggest that conscientiousness is consistently associated with better sleep quality, regardless of athletic status, while gender appears to have only a limited role. This indicates that efforts to improve sleep should consider personality traits, along with gender differences and that strategies might need to be customized differently for athletes and non-athletes.

KEYWORDS Conscientiousness, Gender, Sleep Quality, Elite-Level, Swimmers, Non-Athletes, University Students

Introduction

Sleep quality is a fundamental aspect of psychological and physiological health, playing a critical role in memory consolidation, emotional regulation, cognitive performance and physical recovery (Chakrabarty, 2023). Poor sleep quality has been associated with increased stress, mood disturbances, impaired academic performance and diminished athletic functioning (Charest & Grandner, 2022). In university settings, students are often exposed to numerous stressors, including academic demands, social adjustments and lifestyle changes that can disrupt normal sleep patterns (BENJAMEN, 2025). Among these students, elite-level athletes particularly those engaged in high-intensity, physically demanding sports like competitive swimming face additional challenges such as early morning training sessions, travel for competitions, performance pressure and strict schedules (Sargent, Halson, et al., 2014). These unique demands can significantly impact sleep quality, making athletes especially vulnerable to sleep disturbances.

Personality is a unique set or pattern of actions, which are mostly stable and consistent for most of life, these patterns make human being unique from each other (Costa & McCrae, 1999; McCrae & Costa, 1987). It plays a crucial role in shaping daily habits, stress response, emotional regulation and overall well-being including sleep behavior (Duggan et al., 2014; Gray & Watson, 2002). The Big Five Personality Traits, often referred to as the Five-Factor Model, is one of the most extensively used models of personality. (McCrae & Terracciano, 2005). Five major areas are identified by this model: neuroticism, extraversion, conscientiousness, agreeableness and openness to new experiences. Each of these traits exists on a continuum and individual differences in these traits have been shown to influence a wide range of psychological and behavioral outcomes (John et al., 2010; McCrae & RaC, 2008).

Openness to Experience is associated with imagination, creativity and intellectual curiosity (Christensen et al., 2020). Conscientiousness reflects self-discipline, organization and dependability (Gichanga, 2021). Extraversion is characterized by sociability, energy and assertiveness (Walker, 2020). Agreeableness involves being cooperative, compassionate and trusting (Kallianou, 2024). Neuroticism describes emotional instability, anxiety and vulnerability to stress (Cassello-Robbins et al., 2017). Numerous studies have found that these traits, especially neuroticism and conscientiousness, are closely linked to sleep quality. For instance, individuals high in neuroticism often report more sleep difficulties due to excessive worry and heightened stress sensitivity (Gray & Watson, 2002; van de Laar et al., 2010), whereas high conscientiousness is generally associated with healthier sleep routines and better self-regulation (Duggan et al., 2014).

Among university athletes, personality may play a particularly influential role in determining how well individuals cope with the physical and psychological demands of training and competition. Swimmers, who often train multiple hours daily and adhere to rigid schedules, may experience disrupted sleep due to early wake times, pre-competition anxiety and physical exhaustion (Samuels, 2008; Sargent, Lastella, et al., 2014). These stressors, when combined with certain personality traits, can either exacerbate or buffer sleep-related issues. Conversely, non-athlete university students also experience their own set of stressors such as exam pressure, part-time jobs and social stress which may differently interact with personality traits to affect sleep quality (Becker et al., 2018; Lund et al., 2010).

While prior research has highlighted associations between personality and sleep in general populations, there remains a lack of comparative studies examining these relationships between elite athletes and non-athlete students, particularly in the context of high-performance sports like swimming. Most studies treat athletes as a homogenous group or do not consider sport-specific training demands. As the mental health and well-being of university students both athletes and non-athletes gain increasing attention, understanding the personality-based predictors of sleep quality in these groups is essential (Gupta et al., 2017; Sargent, Lastella, et al., 2014).

This study looks into the role of conscientiousness personality trait and gender in predicting sleep quality among elite-level university student swimmers vs non-athletes university students. By seeing how different personality aspects relate to sleep habits in these two groups, we hope to better understand how resilience, stress management and mental health issues show up in both athletes and regular students. The insights gained could help develop customized strategies to improve sleep habits and overall health, customized to each student's personality and activity level.

Literature review

Recent studies have been putting more focus on how personality traits, especially Conscientiousness, might help predict how well someone sleeps. This is especially

interesting when looking at university students, whether they're athletes or not, since both groups face different kinds of stress that can mess with their sleep. Getting good sleep is really important for both mental and physical health—it influences everything from how well you do in school and sports to your overall happiness (Beattie et al., 2015). For instance, top-level swimmers often have tough training schedules, early morning practice and worries about their performance that can make sleeping difficult. On the flip side, students who aren't involved in sports might find it hard to get enough rest because of academic pressure and social engagements (Milewski et al., 2014). In these situations, Conscientiousness—commonly linked to being organized, disciplined and having self-control—has been suggested as a trait that might actually help protect sleep quality (Gray & Watson, 2002).

A study by Zhao et al. (2024) explored how different personality traits relate to sleep habits among university students. They found that students who scored higher on Conscientiousness tended to have healthier sleep routines, went to bed more consistently and faced fewer sleep issues. Similarly, Litwic-Kaminska and Kotysko (2020) showed that Conscientiousness was a strong indicator of better sleep in both athletes and non-athletes, suggesting that people who are more organized and disciplined are more likely to maintain good sleep habits.

Gender also plays a part in how this relationship works. Lo et al. (2016) found that female students tend to report worse sleep quality than males, mainly because they often deal with higher stress levels and emotional challenges. Interestingly, the positive effects of being conscientious were even more noticeable in women. This suggests that having a routine and strong self-control can be especially helpful for those who experience more sleep issues (Kim et al., 2015).

When it comes to elite athletes, (Knufinke et al., 2018) pointed out that conscientious athletes usually stick to sleep hygiene advice more consistently, even with busy training schedules. On the other hand, non-athletes, who aren't under such demanding physical routines, often have irregular sleep patterns because of schoolwork and social activities. Again, Conscientiousness seems to be an important trait for keeping sleep steady. Overall, it looks like being conscientious might be a kind of universal help for good sleep, though its effects can vary a bit depending on whether someone is an athlete or not.

A study by (Duggan et al., 2014) showed that people who are more conscientious tend to sleep better. This link was seen across different groups of people. Interestingly, women seemed to benefit even more from being conscientious. More recent research by Fernández-Mendoza et al. (2010) supports this idea, emphasizing how personality traits influence our body clocks and help keep sleep habits healthy, especially for young adults.

Putting it all together, these studies suggest that being conscientious plays a big role in predicting good sleep, whether you're an athlete or not. For top-level swimmers, who often deal with unique sleep challenges because of their sport, having a high level of Conscientiousness might really help them keep a healthy sleep routine. On the flip side, students who aren't athletes can also use traits like these to better handle the stress from studying and social life. Overall, this research shows that understanding personality can really help in coming up with strategies to improve sleep for university students.

Material and Methods

The current study used a quantitative cross-sectional survey approach to gather data from participants all at once in order to investigate the role of conscientiousness personality trait and gender in predicting sleep quality among elite-level university student swimmers vs non-athletes university students.

Participants

The study was included 90 elite-level university student swimmers that's were be participants of varsity team, athletes have participated at national and international levels of swimming competition, age of athletes was between 18 to 25 years old ($M = 20.62$, $SD = 2.246$). and 90 were non-athletes who were be enrolled in a BS academic program at a university, age of non-athletes was between 18 to 25 years old ($M = 19.89$, $SD = 1.814$). The department, study program and semester of the elite-level university student swimmers and non-athlete students were same form whom the data was collected. A detailed descriptive analysis is represented in table 1.

Data was collected from participants using two standardized instruments along with self-reported demographic questionnaire. The finalized tool was divided into the following three sections. The first section of our study consisted of 11 demographic components including age, gender, marital status, residence, university name, study program, training season, event, highest level in swimming, days of training per week and training hours per day and lastly screen time in 24 hours and screen time at night.

The tool was used for measuring sleep quality, the Brief-Pittsburgh Sleep Quality Index (B-PSQI) was developed by (Sancho-Domingo et al., 2021) that was a shortened version of the original Pittsburgh Sleep Quality Index (PSQI). This tool was widely recognized and valid tool to assess various dimensions of sleep quality. In B-PSQI the number of items was significantly reduced, making it more practical tool for use in time-limited settings. The B-PSQI included six items, each formulated to capture essential aspects of sleep behavior or experiences, such as sleep duration, sleep disturbance and timing of going to bed and waking up. This brief tool has shown strong relevance in studies involving university students and athletes; hence it is suitable tool for current population.

The Big Five Inventory-Short Version (BFI-10) was a condensed and easy-to-use personality characteristic evaluation tool that developed by (Rammstedt & John, 2007). It was a short version of the original BFI-44 which was developed to minimize fatigue and time consumed during assessment while maintaining acceptable psychometric properties. This tool has been widely used in research involving student-athletes; hence it was suitable tool for current population. In the present study the Cronbach's alpha value of all subscales was as follow: Extraversion = .812, Agreeableness = .836, consciousness = .808, Neuroticism = .832 and openness = .744. These values reflect high validity and internal reliability of tool.

In this study in-person method for data collection was used. Ethical clearance was obtained beforehand from the institution's ethical review board. All athletes were in season of swimming when data was collected from them. It was ensured that the participants were aware of their voluntary participation. The confidentiality of the collected data was warranted and it was also ensured that the data would not be transferred to any third party. Data collection was for research purposes only and it will not impact participants' lives in any way. Questionnaires were handed out individually and participants were allowed to choose the responses that most accurately represented their views. The participants were also encouraged to ask for clarification in case of any confusion or difficulty. Each participant took around ten to fifteen minutes on average to finish the questionnaire.

The data was analyzed using IBM SPSS Statistics version 27.0.1.0 (64-bit edition). Descriptive statistics and Hierarchical Multiple Linner Regression (HMLR) analysis was applied for assessment of the predictive strength of the variables. Significance level of $p < 0.05$ was used to determine statical significant results that was fixed. Moreover, all necessary statistical assumptions of HMLR were checked before running main analyses. Statistical assumptions include normality, linearity, homoscedasticity, multicollinearity and independence of errors testing and all were met.

Results and Discussion

Hierarchical regression was performed by split the file on athletic-base.

Table 1
Demographic characteristics of participants

Variables	Category	Athletes		Non-athletes	
		N	%	N	%
Gender	Male	54	60%	54	60%
	Female	36	40%	36	40%
Residence	Urban	72	80%	72	82.2%
	Rural	18	20%	16	17.8%
Event of Sports	Freestyle	42	46.7%		
	Breaststroke	26	28.9%		
	Butterfly	16	17.8%		
	Backstroke	6	6.7%		
		M	SD	M	SD
Age		20.62	2.246	19.89	1.814

The study included 90 elite-level university student swimmers and 90 non-athletes. Males were 60% and females were 40% among swimmers and same 60% male and 40% female distribution among non-athletes. Regarding residence 80% of the swimmers were urban populated while 20% from villages. Non-athletes university students were 82.2% urban while 17.8% were from villages. Looking at the event of swimming freestyle swimmers were most 46.7%, breaststroke 28.9%, butterfly 17.8% and 6.7% of the swimmers event was backstroke. The average age was 20.62 years with a small variation (SD = 2.246) while non athletes average age was 19.89 years (SD = 1.814).

Table 2
Anova Table for elite-level university student swimmers (N = 90)

Test-Model		SS	Degrees of Freedom	MS	F-ratio	Sig. (p-value)
1	Regression	92.417	4	23.104	3.345	.014 ^b
	Residual	587.183	85	6.908		
	Total	679.600	89			
2	Regression	205.138	9	22.793	3.843	.000 ^c
	Residual	474.462	80	5.931		
	Total	679.600	89			

The ANOVA results indicated that both Model 1 and model 2 statistically significantly predict the dependent variable. Model 1 was $F = 3.345$, $P = .014$. Showed that the statistically significant portion of the variance in sleep quality score among athletes.

The model 2 which included nine predictors was also yield a significant $F = 3.843$ and $P = .000$. that showed complete model, included BFPTs statistically significant predicts sleep quality disorder and explained even a larger amount of variance then model 1.

Table 3
Anova Table for non-athlete students (N = 90)

Test-Model		SS	Degrees of Freedom	MS	F-ratio	Sig. (p-value)
1	Regression	17.780	4	4.445	.660	.622 ^d
	Residual	572.709	85	6.738		
	Total	590.489	89			
2	Regression	142.478	9	15.831	2.827	.006 ^e
	Residual	448.011	80	5.600		
	Total	590.489	89			

The ANOVA results indicated that Model 1 was not statistically significantly predict the dependent variable, $F = .660$, $P = .622$.

The model 2 which included nine predictors was also yield a significant $F = 2.827$ and $P = .006$, that showed complete model, included BFPTs statistically significant predicts sleep quality disorder and explained even a larger amount of variance then model 1

Table 4
Analysis of hierarchical regression for factors that predict Sleep quality in elite-level university student swimmers (N = 90)

Test-Model	Variable	Unstd. B	Std. Error	Beta	t-value	Sig. (p-value)
1	Age	-.128	.124	-.104	-1.028	.307
	Gender	1.368	.568	.244	2.406	.018
	Screen time in 24 hrs.	-.087	.110	-.086	-.794	.429
	screen time at night	.775	.332	.253	2.336	.022
2	Age	-.095	.122	-.077	-.780	.438
	Gender	.789	.568	.141	1.390	.168
	Screen time in 24 hrs.	-.049	.112	-.048	-.433	.666
	screen time at night	.912	.335	.298	2.724	.008
	Extraversion	.185	.234	.081	.791	.431
	Agreeableness	.213	.289	.079	.737	.463
	Conscientiousness	-.879	.240	-.383	-3.658	.000
	Neuroticism	.366	.267	.163	1.368	.175
	Openness	-.251	.272	-.114	-.924	.358

$R^2 = .136$ for model 1; $R^2 = .302$ for model 2

The results (table 4) yield that in model 1 two demographic chrematistics gender ($B = 1.368$, $p = .018$) and Screen time at night ($B = .775$, $p = .022$) were statistically significant predictors while, age ($p = .307$) and screen time in 24 hrs. ($p = .429$), were not statistically significant.

In model 2 screen time at night was remain significant ($B = .912$, $p = .008$) wile, other demographic factors were not statistically significant age ($p = .438$), gender ($p = .168$) and screen time in 24 hrs. ($p = .666$). among BFPTs only Conscientiousness was statistically significant ($B = -.879$, $p = .000$) with negative association. Remaining other BFPTs extraversion ($p = .431$), agreeableness ($p = .463$), neuroticism ($p = .175$) and openness ($p = .358$), were not significant predictors the outcome.

Table 5
Analysis of hierarchical regression for factors that predict sleep quality in non-athletes (N = 90)

Model	Variable	Unstd. B	Std. Error	Beta	t-value	Sig. (p-value)
1	Age	-.041	.160	-.029	-.254	.800
	Gender	.686	.600	.131	1.143	.256
	Screen time in 24 hrs.	.083	.137	.101	.607	.546
	screen time at night	-.064	.310	-.034	-.208	.836
	Age	.064	.152	.045	.419	.676
	Gender	.350	.558	.067	.628	.532
	Screen time in 24 hrs.	.052	.126	.064	.415	.679
	screen time at night	-.376	.309	-.199	-1.217	.227
	Extraversion	-.417	.277	-.156	-1.508	.136
	Agreeableness	-.052	.222	-.027	-.235	.815
	Conscientiousness	-.842	.257	-.413	-3.272	.002
	Neuroticism	.223	.216	.113	1.032	.305
	Openness	-.253	.276	-.095	-.917	.362

$R^2 = .030$ for model 1; $R^2 = .241$ for model 2

The results (table 5) showed that in model 1 all demographic characteristics age ($p = .800$), gender ($p = .256$), Screen time at night ($p = .546$) and screen time in 24 hrs. ($p = .836$), were not statistically significant predictors.

In model 2 remaining same all demographic characteristics age ($p = .676$), gender ($p = .532$), Screen time at night ($p = .679$) and screen time in 24 hrs. ($p = .227$), were not statistically significant predictors. among BFPTs only Conscientiousness was statistically significant ($B = -.842$, $p = .002$) with negative association. Remaining other BFPTs extraversion ($p = .136$), agreeableness ($p = .815$), neuroticism ($p = .305$) and openness ($p = .362$), were not significant predictors the outcome.

Discussion

This new study's primary goal was to determine how BFPTs and sleep quality relate to each other among university students who are not athletes and elite-level university student swimmers. No earlier studies have particularly concentrated on student-athletes, especially in the context of elite-level university student swimmers, thus making this a novel study. The study results demonstrated that big five personality traits had a moderate variance level in PSQI Scores among elite-level university student swimmers and non-athletes university students. Particularly conscientiousness personality trait was negatively associated with PSQI scores in both group of population elite-level university student swimmers and non-athletes university students that indicated individuals higher extraversion was linked with better sleep quality. Since lower score of PSQI reflect improved sleep quality.

The study founded that conscientiousness personality trait was negatively associated with PSQI scores in both group of population elite-level university student swimmers and non-athletes university students that indicated individuals higher extraversion was linked with better sleep quality. Since lower score of PSQI reflect improved sleep quality. No earlier study has conducted on the association between BFPTs and sleep quality among elite-level university student swimmers and non-athletes students until now. Regarding personality traits, conscientiousness was the most reliable predictor of better sleep in both athletes and non-athletes, with a positive effect in athletes and non-athletes. Higher level of conscientiousness was linked to lower PSQI scores, meaning better sleep. This fits with other studies, like However earlier study supported to this idea Duggan et al. (2014), investigated that people with lower conscientiousness tend to sleep poorly and feel sleepier during the day in university students of California. Likewise, Kim et al. (2015) founded the strong links between conscientiousness and sleep quality that showed the conscientiousness had positive effect on sleep quality meaning higher conscientiousness means good sleep quality in a study on young Korean women. Additionally, Stephan et al. (2018) suggested that low conscientiousness was associated with a worsening of sleep quality over time in between middle aged and older adults of USA. Moreover, Sutin et al. (2020) found that lower conscientiousness was positively associated with bad sleep quality (more frequent wakeup, greater fragmentation and feeling unhappy with overall sleep). The study showed that being conscientious was a key factor when it came to better sleep quality not just for elite-level university student swimmers but also for regular university students who were not athletes. People who scored higher on conscientiousness tended to have lower PSQI scores, which means they generally had healthier sleep habits. This points to how personality traits, especially conscientiousness, play an important role in how well someone sleeps and it was a new piece of evidence that applies to both athletes and non-athletes alike.

Recommendations

Future research should look into how personality traits relate to sleep quality, ideally with larger and more diverse groups of people. This could include athletes from

different sports, various age ranges and more female athletes, to make the findings more applicable to everyone. Researchers are also encouraged to conduct long-term and experimental studies that combine self-reports with objective sleep measurements, like using actigraphy. These approaches can help determine cause-and-effect relationships and provide a clearer picture of how factors like stress management and daily habits influence sleep. Overall, our study emphasizes that conscientiousness stands out as a strong predictor of good sleep quality, not just among elite-level university student swimmers but also among students who were not athletes. This emphasizes the important role that personality traits play in promoting healthy sleep habits.

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