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Analysis of the Mental Toughness, Physical Activity Level, and Stress Coping Strategies of University Students

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ABSTRACT

Background: Mental toughness, physical activity, and coping strategies are key psychological components influencing individuals' well-being, performance, and stress management. Exploring these elements in sports science students can offer insights into how personal factors shape behavioral outcomes. **Objective:** To examine the mental toughness, physical activity level and stress coping strategies of students at Hatay Mustafa Kemal University by taking into account individual factors and to analyze the interrelationships between these variables. **Methods:** A total of 183 students (103 men and 80 women) from the Faculty of Sports Sciences voluntarily participated in the study. This research employed a cross-sectional study design. Data were collected using standardized scales for mental toughness, physical activity, and stress coping strategies. Descriptive statistics such as percentage and frequency were used to present participants' personal information. Internal consistency of the scales was assessed, and kurtosis-skewness values were examined to confirm the normality of the data. For hypothesis testing, independent samples t-test, one-way analysis of variance, and Pearson correlation analysis were applied. **Results:** Statistically significant differences were found in mental toughness and stress coping strategies based on participants' purpose of engagement in sports, particularly between those participating for health/leisure and those with an amateur sports license ($p<0.05$). However, no significant differences were observed in mental toughness and stress coping strategies across physical activity categories ($p>0.05$). Correlational analyses revealed meaningful relationships among variables such as years of sports participation, physical activity levels, mental toughness, and stress coping strategies. **Conclusions:** Based on the results, individuals' purpose for engaging in sports significantly influences their mental toughness and stress coping strategies, while overall physical activity level does not; additionally, longer sports participation is associated with higher mental resilience and better coping strategies.

Key words: Psychological Resilience, Motor Activity, Physiological, Stress

INTRODUCTION

Mental toughness, also known as cognitive resilience, refers to the ability to withstand and overcome the adverse impacts of stress when confronted with difficult and demanding circumstances (Cakir et al., 2024). Extended pressure on an individual can negatively impact their emotional stability, focus, and problem-solving skills during times of uncertainty or distress. This pressure can also affect their ability to maintain these skills (Siebart, 2009). Mental toughness encompasses more than simply the ability to withstand challenges (Jones et al., 2002). It involves acquiring the skills to recover from setbacks, cultivating a mindset focused on personal development, and effectively managing sources of stress (Crust, 2008). It entails actively employing coping mechanisms to address the situation in some manner (Bull et al., 2005). It is not an inherent characteristic, but rather develops gradually through different psychological and behavioral mechanisms. According to Demir and Turkeli (2019), it is a skill that can be enhanced and improved over time.

Numerous environmental, individual, and situational variables contribute to mental toughness. This comprehension of these factors can assist educators and support services in effectively promoting mental toughness among college students. According to Bacchi and Licinio (2017) and Wattick et al. (2021), the following are a few of the factors: personality traits, social support, coping strategies, early life experiences, physical health, mindfulness and emotional intelligence. Within the realm of university students, mental toughness pertains to their ability to withstand and recover from challenges, which directly impacts their academic achievements, overall state of being, and the demanding nature of higher education and plays a crucial role in determin-

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ing their ability to navigate effectively in these conditions (Mendizabal, 2024). According to the researchers (Guven & Yazici, 2020), mental toughness is important for university students in terms of; Academic Performance, Emotional Well Being, Goal Achievement, Social Relationships and Transition to Professional Life.

Physical activity level denotes the extent of physical movement and energy expenditure individuals engage in every day. Exercise encompasses various activities, such as sports, walking, cycling, and other forms of movement that promote general physical fitness and health (Sylvia et al., 2013). The significance of physical activity is paramount, as it is a fundamental element of a healthy lifestyle and enhances both physical and mental health. It offers extensive advantages. Physical exercise encompasses any physiological movement generated by skeletal muscles that necessitates energy expenditure. Structured exercise sessions, such as gym attendance or sports participation, as well as daily activities like walking to school or work, ascending stairs, gardening, and performing household chores, are also included. Moderate-intensity activities, such as brisk walking, and strenuous activities, such as running, both enhance overall physical activity levels. Diverse individual, environmental, and societal factors, including age, gender, health, self-efficacy, culture, environment, work, school, and climate, affect a person's level of physical activity. Understanding these factors is essential for college students and the general public to develop effective programs that promote participation in physical exercise.

Stress is the physiological and psychological strain imposed on an individual by an action or circumstance. It is characterized as the response that transpires in the presence of psychological stress (Hellriegel, 1992, p. 36). Stress impacts an individual's well-being. It has detrimental, capacity-reducing, and demanding consequences (Akbag, 2000, Unal & Ummet, 2005). In this setting, university students encounter numerous physical and psychological challenges that surpass their limits and consequently test their capacity (Cakmak & Hevedanli, 2005, Bozkurt, 2004). Accommodation, adolescent period issues, economic difficulties, interpersonal challenges, adjustment issues, family separation, appointment concerns, departmental problems, and security concerns represent the primary sources of stress for university students.

Since the early 20th century, scientific inquiry has been conducted in the domain of stress and stress management. As a pioneering researcher Hans Selye defined the "general stimulus syndrome," often known as "stress syndrome," highlighting that stress is a universal biological response. This phase examines the physiological impacts of stress and the functions of hormones like cortisol and adrenaline. Furthermore, since the mid-20th century, methodologies for professional assistance, including psychotherapy and psychiatric counseling, have been established. During this period, stress management methods, including cognitive behavioral therapy, relaxation techniques, and meditation practices, were increasingly prominent. Since the 21st century, the proliferation of technology and the internet has transformed approaches to managing stress. affected. Stress management programs and digital platforms offer individuals skills for coping with stress. Moreover, advancements in science and medicine have enhanced our comprehension of the neurological foundations of stress (McEwen, 2005, Isikhan, 2017).

According to previous research, mental toughness, stress coping strategies, and physical activity are interrelated (Yilmaz, 2021, Yarar et al., 2021, Yuceant, 2023). Mental toughness is significantly determined by the strategies that individuals employ to manage stress (Vealey, 2024). Seeking assistance and employing relaxation techniques are examples of adaptive coping strategies that facilitate effective stress management. In contrast, mental toughness may be diminished by maladaptive coping strategies, such as substance use or avoidance. Besides, regular physical activity, nutritious diets, and sufficient sleep enhance cognitive functions, mental toughness, and overall stress resistance (Aditya et al., 2024). Researchers have discovered that physical activity yields numerous beneficial effects, including stress reduction, enhanced cognitive functions, and improvements in self-esteem and confidence. Participating in physical exercise improves cognitive ability and concentration (Hogg, 2024). Additionally, it facilitates healing and enhances concentration. This also assists students in efficiently navigating academic challenges (Aksoy, 2022). Moreover, regular physical activity can enhance students' physical health and positively impact their bodies. Their self-confidence may enhance, thereby augmenting mental toughness (Satman, 2018; Ma, 2024).

College students encounter numerous stressors and a variety of academic, social, and personal challenges in today's fast-paced and demanding higher education environment (Ari et al. 2020). These stressors can significantly affect their mental well-being and overall quality of life. Contemporary university students exhibit diverse lifestyles that differ markedly from previous generations, including spending time in specific social circles, shopping, participating in physical and outdoor activities, or spending extended hours on digital entertainment (Ustun & Aktas Ustun 2020). Moreover, university students are considered one of the most dynamic segments of society, as they are in a critical developmental phase marked by the transition to adulthood and the formation of their personality. They also undergo significant physiological and emotional changes (Huang et al., 2014). College life is not only a time for academic achievement but also a stage of personal growth and increasing independence. Students often face psychological challenges such as academic pressure, tight deadlines, uncertainty about their future, and increased personal responsibilities (Ustun, 2018). To cope with these demands, cultivating mental toughness becomes essential. Mental toughness allows individuals to maintain focus, regulate emotions, and persist through adversity, all of which are crucial for academic and personal success in this stage of life. Previous research has shown that regular physical activity is associated with improved cognitive functioning and emotional regulation among university students (Brown et al., 2024). However, although the ben-

efits of physical activity on general mental health are well documented, there is limited and inconsistent evidence regarding its specific impact on mental toughness and stress coping strategies in this population. Furthermore, the interplay between students' physical activity levels, their ability to handle stress, and their psychological resilience remains underexplored, particularly in relation to individual factors such as gender, purpose of engaging in sports, and years of sports participation. Therefore, this study aims to address these gaps by examining the relationships between mental toughness, physical activity level, and stress coping strategies among university students, considering individual variables. Doing so contributes to a better understanding of how these psychological and behavioral dimensions interact and offers insights that may inform the development of support programs for student well-being.

METHOD

Study Design

The current study was designed as a cross-sectional correlational study, which is a type of quantitative research design commonly used in social sciences. This design allows for the examination of relationships between multiple variables at a single point in time. Specifically, the study incorporated two complementary approaches within the cross-sectional models: (i) a comparative approach, which was used to investigate differences in mental toughness, physical activity level, and stress-coping strategies of university students based on individual characteristics; and (ii) a correlational approach, aimed at identifying the associations among these variables. This dual approach aligns with the broader framework of relational survey models, which explore either the extent of relationships between variables or differences across groups (Kuzu, 2013: 27).

Participants

The study population (N) comprises students from the Faculty of Sports Sciences at Hatay Mustafa Kemal University. The study's sample (n) consisted of 183 students who were purposively selected from the population. Certain universes have acceptable sample sizes that are valid for quantitative research. Gay et al. (2011) asserted that a sample size of 20% would be adequate for a research universe comprising 500-1500 units. In the 2023-24 Academic Year, the Faculty of Sports Sciences has 502 students actively registered. Consequently, it is presumed that the sample accurately represents the population. To be eligible for the study, participants had to be at least in the minimally active category or have a low level of physical activity as measured by the International Physical Activity Scale. Sedentary volunteers were not included in the study.

INSTRUMENTS

Mental Toughness Scale

The original scale was formulated by Madrigal et al. (2013), while the Turkish version's adaptation, validity, and reliability were established by Erdogan (2016). The scale is constructed using self-report measures consisting of 11 items and a single-factor structure. The responses provided for the Turkish version of the scale were assessed using a 5-point Likert-type rating scale. A high score on the scale indicates a high level of mental toughness (Erdogan, 2016). The internal consistency coefficient for the total scale in the current study was computed as.893.

International Physical Activity Scale

The International Physical Activity Questionnaire (IPAQ) in abbreviated form, Turkish validity and reliability of the scale was assessed by Sözcü et al. (2006). This self-report scale measures walking, time spent in moderate and vigorous activities, and time spent sitting. The total score of the short form is calculated by adding together the duration (measured in minutes) and frequency (measured in days) of walking, moderate activity, and vigorous activity. Furthermore, in addition to the ongoing scoring, classification is conducted based on the acquired numerical data. The classification consists of three categories: (i) Inactive category, (ii) Minimal active category, and (iii) Very active category. The inactive category represents the minimum level of physical activity. The minimally active category encompasses engaging in vigorous activity for a minimum of 20 minutes on three or more days, or participating in moderate-intensity activity or walking for at least 30 minutes per day on five or more days. This category includes walking and moderate-intensity activity for a duration of five or more days, resulting in a minimum of 600 MET-min/week. The very active category corresponds to engaging in at least one hour or more of physical activity daily at a moderate intensity level (Sozcu et al., 2006).

Stress Cope Strategies Questionnaire

The original scale was developed by Moos (1993), and its Turkish adaptation, validity, and reliability were assessed by Koca Balli and Kiliç (2016). The Turkish version of the scale consists of 21 items based on self-report and has a five-factor structure. The responses to the scale were rated on a 5-point Likert scale, with response options being scored as follows: 1-Never, 2-Rarely, 3-Sometimes, 4-Often, 5-Always (Kocaballi & Kiliç, 2016). In the current study, the internal consistency coefficient for the scale was calculated as 0.917.

Procedure

All procedures performed in this study involving human participants were in accordance with the ethical standards of the University of Hatay Mustafa Kemal University and the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study has received the necessary ethical approval from the Hatay MKU Social and Human Sciences Ethics Committee with the decision 09/04 dated 02.09.2020. The researchers obtained consent from the creators of the measurement instruments utilized in the study. The data collection tools were later transformed into digital

forms using Google Forms© and distributed to the participants. Participants who willingly agreed to participate in the study were asked to submit their informed consent form online. Individuals who did not give consent were unable to use the data collection tools.

Data Analyzes

The data was analyzed using the SPSS 26 software package for the Windows operating system. The distribution of participants' personal information was determined through percentage and frequency analyses. First, the coefficients of internal consistency were computed for the data collection instruments. Then, the kurtosis and skewness values of the data were analyzed to determine the appropriate hypothesis tests. The study employed hypothesis tests, including the independent samples t-test, one-way analysis of variance (ANOVA) test, and Pearson correlation test.

RESULTS

The male participants account for 56.3% of the total, while the female participants make up 43.7%. Besides, 43.7% of the participants are enrolled in the "sports management" department, while 39.3% are in their second year of study. In addition, 47.0% of the participants are participating in sports as "amateur licensed" while 9.3% are involved at a "elite" level (Table 1).

Upon examining the results of the descriptive analysis, it was found that the participants had an average score of 45.24±6.27 on the mental toughness scale. They received an average score of 3.98±0.63 on the problem-solving sub-dimension of the coping with stress scale, an average score of 4.00±0.56 on the positive evaluation sub-dimension, and an average score of 3.98±0.63 on the logical analysis sub-dimension. The average score is 4.02±0.64, and the average score for the professional support-seeking sub-dimension is 3.51±0.96. The average score of the participants in the seeking environmental support subscale of the methods of coping with stress scale was calculated to be 4.14 with a standard deviation of 0.67. Upon analyzing the kurtosis and skewness scores, it becomes evident that the data exhibits minimal deviation from the normal distribution and is consistent with it.

The descriptive analysis results indicate that the total score of the participants in the international physical activity survey was calculated to be 5988,52±5207.12. In addition, it was found that 51 of the participants exhibited minimal levels of activity, while 132 participants were classified as highly active (Table 2).

The one-way analysis of variance test results revealed a significant difference in the mental toughness of participants based on how they participated in sports ($F_{(2\text{-}180)} = 3.91$, p=0.02), specifically between those pursuing sports for health and recreational purposes and those participating with an amateur license ($p<0.05$). In addition, a significant difference was identified in the participants' approaches to coping with stress in the positive assessment sub-dimension according to their involvement in sports $F_{(2\text{-}180)} = 3.20$, p=0.04). This difference belongs to individuals engaged in sports for health and recreational purposes vs those participating with an amateur license ($p<0.05$).

Table 1. Distribution of participants' characteristics

Variable	Category	n	%
Gender	Male	103	56.3
	Female	80	43.7
Department of Study	PE Teacher Education	29	15.8
	Coaching department	28	15.3
	Sports Management department	80	43.7
	Recreation	46	25.1
Class	First Grade	51	27.9
	Second Grade	72	39.3
	Third Grade	37	20.2
	Fourth Grade and extended	23	12.6
Purpose for Participating in Sports	Health/Recreation	80	43.7
	Amateur Licensed	86	47.0
	Elite	17	9.3

Table 2. Descriptive analysis results regarding data collection tools

Scale	Kurtosis	Skewness	Mean&SD
Mental Toughness	-0.77	1.85	45.24±6.27
Problem-Solving	0.44	-0.51	3.98±0.63
Positive Evaluation	0.76	-0.56	4.00±0.56
Logical Analysis	0.45	-0.65	4.02±0.64
Seek for Professional support	-0.49	-0.29	3.51±0.96
Seek for Close Support	0.82	-0.76	4.14±0.67

The results of the independent sample t-test indicate that there is no statistically significant difference between mental toughness and approaches to coping with stress based on the physical activity categories derived from the classification of scores obtained from the international physical activity survey ($p>0.05$).

The Pearson Correlation test results indicated that there were medium to high positive correlations between mental toughness and approaches to cope with stress, as well as a weak and positive correlation between mental toughness and sports year and moderate physical activity. There were no significant correlations between the sports year and approaches to cope with stress. However, there were weak but positive correlations between moderate activity and stress coping approaches.

DISCUSSION

The present study aimed to investigate university students' mental toughness, physical activity level, and stress coping strategies. The obtained findings were subsequently analyzed and discussed in the context of existing literature. In

the contemporary era, characterized by technological progress, numerous transformations have commenced in individuals' ways of living. A significant alteration is the adoption of a sedentary lifestyle. Individuals who choose to lead a sedentary lifestyle are at a heightened risk of developing various diseases, including cancer, obesity, and diabetes. The sedentary lifestyle is considered a risk factor that can have an impact on health (Vanhees et al., 2005, pp. 102-114). Upon examining the studies, it becomes evident that individuals are progressively engaging in fewer physically active lifestyles globally and within our nation. Urbanization and technological advancements contribute to a sedentary lifestyle. Recent research has indicated that leading a sedentary lifestyle is associated with a range of health issues and a higher risk of death (Bek, 2008). However, in the present study, the analysis results indicate that the average score of participants in the international physical activity questionnaire was calculated as 5988,52±5207.12 (Table 3). Categorically, 51 participants were classified as minimally active, while 132 participants were classified as very active. All of the participants were classified as active, none were categorized as inactive.

Table 3. Descriptive analysis results regarding participants' physical activity levels

Variable	n	Mean&SD
Total Physical Activity Score	183	5988.52±5207.12
Walking	183	1373.11±1170.89
Moderate Activity	183	1073.44±1138.33
Vigorous Activity	183	3521.31±4483.86

According to the analyzed results, the mental toughness levels of the participants showed a significant difference based on their engagement purpose in sports. Consequently, individuals who engage in sports with an amateur license exhibit considerably higher mental toughness compared to those who participate in sports for recreational purposes related to health and hobbies (Table 4). In contrast, there was no significant difference in the variable mental toughness based on their physical activity categories, as indicated in Table 5. The mental toughness scores of the participants in the minimally active category were determined to be 44.92±5.94, whereas the scores of the participants in the very active category were determined to be 45.37±6.41. Mental toughness is a psychological attribute. What is evident is that individuals persist in facing challenges, sustaining their productivity, and managing hardships. A common attribute among successful athletes is their ability to exhibit performance disparities and possess strong mental toughness (Cox, 2011). According to certain experts, there is a consensus that the concept of mental toughness is not sufficiently comprehended within the field of sports psychology. When analyzing the global body of literature, researchers have explored mental toughness in relation to various factors. However, it has been determined that the current understanding of this concept is still inadequate (Jones et al., 2002). According to a study, there is no significant difference in the mental toughness of athletes when considering the educational backgrounds of their mothers and fathers. Nevertheless, there exists a significant difference depending on the sports background variable (Eroglu et al., 2020). Simsek et al. (2023) found that amateur football players exhibited superior mental toughness com-

Table 4. Mental toughness levels and stress coping strategies of participants based on sports involvement purposes

Scale	Sports Involvement Purpose	n	Mean&SD	F	p	Difference
Mental Toughness	Health/Recreation (1)	80	43.80±6.93	3.91	0.02*	1<2
	Amateur Licensed (2)	86	46.43±5.46			
	Elite (3)	17	46.06±5.83			
Problem Solving	Health/Recreation (1)	80	3.94±0.66	0.57	0.56	
	Amateur Licensed (2)	86	4.04±0.60			
	Elite (3)	17	3.93±0.74			
Positive Evaluation	Health/Recreation (1)	80	3.93±0.58	3.20	0.04*	1<2
	Amateur Licensed (2)	86	4.11±0.50			
	Elite (3)	17	3.82±0.72			
Logical Analyses	Health/Recreation (1)	80	4.02±0.66	0.20	0.81	
	Amateur Licensed (2)	86	4.04±0.65			
	Elite (3)	17	3.93±0.64			
Seek for Professional Support	Health/Recreation (1)	80	3.52±1.00	0.38	0.68	
	Amateur Licensed (2)	86	3.55±0.93			
	Elite (3)	17	3.32±0.93			
Seek for Close Support	Health/Recreation (1)	80	4.11±0.71	0.47	0.62	
	Amateur Licensed (2)	86	4.19±0.62			
	Elite (3)	17	4.06±0.79			

*$p < 0.05$

pared to professionals in a separate study. Blanco-García et al. (2021) found that the mental toughness of athletes matches up across different sports and levels of competition.

Participants' involvement purpose in sports was found to have an impact on the positive evaluation aspect of coping with stress (Table 4). Individuals who engage in sports with an amateur license tend to favor the positive evaluation approach as a means to cope with stress, in contrast to those who participate in sports for recreational health purposes. However, no significant difference was found in the participants' strategies for coping with stress based on their level of physical activity, as indicated in Table 5. Stress not only induces tension in the individual but also disrupts the individual's psychological and physiological well-being (Unsal, 2012 p.345). Hence, it is crucial to examine the factors that contribute to stress. Causes of stress include individual stressors, career development anxiety, interpersonal relationship stressors, organizational structure and climate stressors, environmental stressors, societal stressors, and organizational role stressors (Okutan & Tengilimoglu, 2002). Among the strategies for coping with stress: Various coping strategies can be employed to address different aspects of one's well-being, including physical, mental, behavioral, spiritual, and belief-related coping methods (Isitan & Gokten, 2012). The strategies employed by individuals to manage stress differ. Individuals with varying personality traits often develop strategies to effectively manage or shield themselves from stress. While certain individuals seek solace in their beliefs to deal with stress, others modify their actions or engage in mental exercises. Irrespective of the approach employed, it is advisable for the individual to possess a thorough understanding of oneself, recognize the stressors that impact them, and effectively address those stressors.

Table 5. Participants' mental toughness levels and approaches to coping with stress according to physical activity categories

Scale	Physical Activity Category	n	Mean&SD	t	p
Mental Toughness	Minimally Active	51	44.92±5.94	-0.44	0.65
	Very Active	132	45.37±6.41		
Problem Solving	Minimally Active	51	3.99±0.61	0.18	0.85
	Very Active	132	3.97±0.64		
Positive Evaluation	Minimally Active	51	4.00±0.56	-0.05	0.96
	Very Active	132	4.00±0.56		
Logical Analyses	Minimally Active	51	4.01±0.63	-0.00	0.99
	Very Active	132	4.02±0.65		
Seek for Professional Support	Minimally Active	51	3.45±0.94	-0.55	0.58
	Very Active	132	3.53±0.97		
Seek for Close Support	Minimally Active	51	4.11±0.68	-0.30	0.76
	Very Active	132	4.15±0.67		

Upon examining the analysis results, a weak positive correlation was observed between the number of years the participants had been involved in sports and their mental toughness levels, as well as between moderate physical activity and mental toughness (Table 6). After conducting a literature review, Kalkavan et al. (2020) discovered that the mental toughness of mountain bikers is positively influenced by both age and years of participation in sports. Demir and Celebi (2019) discovered that the mental toughness of university athletes is positively influenced by their age and years of participation in sports. Kayhan et al. (2018) found that the mental toughness levels of individual and team athletes did not vary statistically significantly based on their age and duration of participation in sports. The analysis results suggest that there is no significant correlation between the participants' sports year variable and their approaches to coping with stress. However, there is a positive weak correlation between moderate physical activity and coping approaches (Table 6). Akyol and Taskiran (2023) found no significant correlation between the wrestlers' stress coping strategies and their age and years of sports experience, which aligns with the results of the present study. According to Kocyigit et al. (2022), the factors of athlete age and weekly training frequency were found to influence the stress coping abilities of taekwondo athletes. Aktas Ustun & Ustun (2020) found that female volleyball players with 6-10 years of experience rely more on social support to deal with stress compared to those with over 11 years of experience in the sport. Upon analyzing the findings on the relationship between concepts, it becomes evident that there are moderate and strong positive relationships between the participants' mental toughness levels and their strategies for coping with stress (Table 6). Upon reviewing the literature, a recent study by Poulus et al. (2020) reveals a correlation between mental toughness and the strategies used to handle stress in both high-performance traditional sports and competitive e-sports athletes. A recent study conducted with high school athletes found that there is a direct correlation between the participants' psychological toughness and their strategies for managing stress (Romanova, 2020). According to Wu et al. (2020), university students' positive coping approaches were influenced by their levels of mental toughness.

Limitations and Recommendations

This study has several limitations that should be considered when interpreting the findings. Firstly, the research was conducted using a cross-sectional design, which limits the ability to draw causal conclusions between the variables. Secondly, the sample size was relatively limited, which may reduce the statistical power and generalizability of the results. Thirdly, data were collected through self-report measures, which are

Table 6. Pearson correlation results

	1	2	3	4	5	6	7	8	9	10
1. Mental Toughness	1									
2. Problem Solving	0.698**	1								
3. Positive Evaluation	0.723**	0.822**	1							
4. Logical Analyses	0.592**	0.799**	0.785**	1						
5. Seek for Professional Support	0.451**	0.636**	0.612**	0.541**	1					
6. Seek for Close Support	0.639**	0.619**	0.660**	0.613**	0.429**	1				
7. Sports Year	0.182*	0.082	0.087	-0.010	-0.059	0.095	1			
8. Walking	0.036	0.014	-0.004	0.001	0.106	-0.023	0.055	1		
9. Moderate Physical Activity	0.210**	0.223**	0.160*	0.134	0.164*	0.151*	0.184*	0.221**	1	
10. Vigorous Physical Activity	0.086	0.061	0.035	0.057	-0.047	0.043	0.272**	0.076	0.307**	1

**p<.05 **p<.01*

subject to biases such as social desirability and inaccurate self-perception. Additionally, the study did not include a quasi-experimental or longitudinal design, which could have provided more robust insights into the dynamics of mental toughness, physical activity, and stress coping over time.

Strengths and Practical Implications

One of the key contributions of this study is its focus on the simultaneous examination of mental toughness, physical activity, and stress coping strategies in a university population. The use of validated measurement tools enhances the reliability of the findings. Furthermore, the inclusion of both comparative and correlational analyses offers a comprehensive perspective on individual differences and inter-variable relationships. From a practical standpoint, the findings suggest that promoting physical activity among university students may positively influence their mental toughness and ability to cope with stress. Educational and wellness programs targeting students can incorporate these insights to design more effective interventions. University administrators, counselors, and physical education professionals may use this information to develop initiatives that support students' psychological resilience and overall well-being.

CONCLUSION

The current study found significant differences in variable mental toughness based on participants' purpose for participating in sports, with amateur licensed varsity athletes outperforming recreational sports participants, but no differences based on participants' physical activity categories. Furthermore, amateur licensed varsity athletes had a higher positive evaluation when faced with stress than recreational sports participants. Mental toughness, stress coping approaches, and moderate physical activity were all found to be positively correlated, while sports year and mental toughness were found to be weakly correlated.

AUTHORS' CONTRIBUTIONS

UDU and HE designed the study, UDU performed the data analyses and prepared the manuscript. HE reviewed the literature and collected the data. All authors contributed to and approved the final manuscript.

FUNDING

The study has no external funding.

AVAILABILITY OF DATA AND MATERIALS

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was approved by the Hatay Mustafa Kemal University Social and Human Sciences Ethics Committee (Protocol number: 21817443-050.99-, Date: 02/09/2020, Decision Number: 09/04). All procedures performed in this study involving human participants were in accordance with the ethical standards of the Hatay Mustafa Kemal University, and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

COMPETING INTERESTS

The authors declare no competing interests.

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