

Relationship of Physical Activity with Anxiety and Mood States: A Case Study of Health and Physical Education Students

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Abstract

The current study was initiated to determine the relationship between physical activity level and anxiety and mood states among health and physical education students at the Khyber Pakhtunkhwa (KP), Pakistan college level. The sample for the current study consisted of college students aged 19-24 selected from different colleges in the province of Khyber Pakhtunkhwa (KP), Pakistan. As the study dealt with other variables, the researcher used different scales/questionnaires to collect the required information. For demographic information, age, gender, physical activity levels, and students' educational information were collected. Physical activity, anxiety, and mood states were measured with the help of standardized scales. The researcher used mean and standard deviation to analyze the demographic attributes of the participants. In addition, multiple correlation, multiple regression, and test of significance (t-test and ANOVA) were used to test hypotheses. According to the findings of this study, physical activity was linked to a higher mood ($r^2=.095, .143 > 0.01$) and decreased state anxiety ($r^2=.959, .000 < 0.01$). Male participants scored higher on stress and physical activity, whereas female participants scored higher on mood states ($p < 0.05$). Furthermore, the data revealed that their psychological health improved when participants engaged in moderate physical activity. In contrast, younger students scored higher when they engaged in strenuous physical activity ($p < 0.05$). These findings emphasize the importance of physical activity in sustaining anxiety and mood state psychological factors.

Introduction

The introduction chapter of any research paper justifies the need to conduct the research. This section provided an overview of the entire investigation to the readers. Background information, purpose of the study, objectives, main hypotheses, significance, and delimitations have been described in this chapter. Apart from the research, definitions of the critical terms and organization of the entire research are given at the end of this section.

Background of the Study

Technological inventions have made our lives much more accessible at individual and collective levels. Various scientific equipment and newly invented instruments have occupied the majority of human aspects. As a result, these technological advancements have increasingly distanced people from participating in physical activity (Marani et al., 2006). Therefore, the physical activity level (PAL) of people is declining day by day (Masson et al., 2006) and unbearable loss is

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threatened to health standards, which may include chronic diseases (Alves et al., 2005), onset and prevalence of obesity (Lopes & Ferreira, 2013) and other health disorders (Masson et al., 2006). Physical activity is regarded as one of the most significant aspects in developing and maintaining health since it has a favorable impact on human health (Masson et al., 2006; Lopes & Ferreira, 2013). For this purpose, understanding or maintaining PAL is paramount (Masson et al., 2006; Lopes & Ferreira, 2013). A moderate amount of physical exercise for 30 minutes per day or 150 minutes per week is termed PAL (Matsudo et al., 2005). According to research, PAL is one of the elements that contribute to the development of mental health, as it has a link to one's mood state (MS) and anxiety (Werneck & Navarro, 2011; Legey et al., 2017).

The above-cited evidence has been corroborated by literature, indicating that participating in moderate physical activity helps in reducing one's depression and anxiety and raising mood sources, which in turn produce positive effects on mental health (Peluso & Andrade, 2005). However, intense and inappropriate physical activity, particularly for a longer duration, results in sleep patterns and overtraining (Peluso & Andrade, 2005; Modoio et al., 2011).

Purpose of the Study

Research from the perspective of physical activity and its relationship with psychological variables has increased over several decades (Miloski et al., 2015). Previous research has looked into the impact of physical activity on university students' moods and anxiety (Legey et al., 2017), children and adolescents (Zhang et al., 2020), and boys and girls at the elementary school level (Andrade et al., 2020). A systematic review and meta-analysis were conducted on other papers in the same field (Roberts et al., 2017; Abdin et al., 2018; McDowell et al., 2019; Pascoe et al., 2020). These studies have been conducted in Western countries of the world. However, more research is needed in Pakistan. Moreover, more research on college students following the quantitative research paradigm is needed. As a result of a lack of consistent information on the relationship between physical activity level with mood states and anxiety, particularly research with college students, the current study aimed to determine the relationship between physical activity level with anxiety and mood states among health and physical education students at the college level in Khyber Pakhtunkhwa (KP), Pakistan.

Research Objectives

1. To check the physical activity levels, anxiety, and mood states in college health and physical education students of Khyber Pakhtunkhwa (KP), Pakistan.
2. To determine the relationship among physical activity levels, anxiety, and mood states in college health and physical education students.
3. To examine the effects of physical activity level on anxiety and mood states in college health and physical education students.
4. To determine the effects of demographic variables on research variables (physical activity, anxiety, and mood states) in college health and physical education students.

Significance of the study

The results will teach the general public and students about the importance of physical activity in anxiety and mood states. It will provide a realization that participation in physical activity is not only crucial for the general masses but also helps in the psychological aspects of students, such as anxiety and mood states, which are the everyday occurrences of the present stressful situation. As a result, the community in general and students in particular will know why research on

determining the role of physical activity has been an essential concern among researchers in the field.

The findings of this study will aid decision-makers, such as college presidents, public health officials, coaches, and trainers, in determining what should be done to encourage and promote daily physical activity among community members and students.

Similarly, the parents and teachers involved will be aware of the advantages of physical activity to their children's physiological development. After reviewing the overview of research on the benefits of physical activity in preventing various health conditions, teachers and parents will be able to enable, urge, and motivate their children/students to participate in daily physical exercise. One of the essential significances of the current study is that the concerned authorities, i.e., the curriculum development committee (CDC), in collaboration with the heads of the colleges, will include the topic of physical activity in the educational curriculum.

Literature Review

As Ndahimana and Kim (2017) indicated, the skeletal muscles deliver anybody's development because of energy consumption. Actual activity and the possibility of securing different ongoing ailments, like stoutness, coronary illness (CHD), diabetes, and colon disease, have for quite some time been known to be contrarily related.

Weight and hazard factors for CHD and diabetes can be available in little youngsters. Subsequently, essential preventive projects fusing actual activity should begin immediately throughout everyday life (Abrignani et al., 2019).

Actual activity incorporates all types of development, whether finished at reasonable times, to go to and from areas, or as an aspect of one's responsibilities. Actual work, both moderate and demanding, is helpful to one's health. Walking, cycling, wheeling, sports, and actual amusement and play are well-known dynamic techniques, and anyone of any capacity level might finish them (Guthold et al., 2018). Physical movement has been displayed to help forestall and deal with non-communicable sicknesses like coronary illness, stroke, diabetes, and an assortment of malignancies. It additionally helps with the anticipation of hypertension, the support of a solid body weight, and the improvement of emotional well-being, personal satisfaction, and general prosperity.

WHO principles and proposals frame how much activity is expected for ideal well-being for different age gatherings and segment groupings (Piercy et al., 2018).

Newborn children (under one year old) ought to be genuinely dynamic on various occasions a day in an assortment of ways, mainly through intuitive floor-based play, as much as possible.

For youngsters who are not yet versatile, this includes spending around 30 minutes in an inclined position (stomach time) for the day while conscious and not confined for over 1 hour at once (carriages, high seats, or attached to a parental figure's back). It is not prudent to invest an excessive amount of energy before the TV.

While dormant, perusing and narrating with a guardian are suggested, as is getting 14-17 hours (0-3 months) or 12-16 hours (4-11 months) of superb quality rest, including naps (Piercy et al., 2018). In a 24-hour day, youngsters 1-2 years old ought to spend no less than 180 minutes daily doing an assortment of proactive tasks of changing powers, including moderate-to-energetic force actual work; more is better. Avoid being limited for over 1 hour (e.g., in prams/buggies, high seats, or lashed to a parental figure's back) or sitting for extensive periods. Inactive screen time (like staring at the TV, motion pictures, or playing PC games) is not recommended for youngsters younger than one. Stationary screen uses for youngsters younger than two should be restricted to 60 minutes;

the more limited, the better. When inert, perusing and narrating with a guardian are suggested, and getting 11-14 hours of superb quality rest, including rests, with customary rest and wakeup periods, is recommended (Piercy et al., 2018).

Spend somewhere around 180 minutes daily doing an assortment of proactive tasks of shifting forces, with no less than an hour of moderate-to-vivacious power active work; more is better; do not be controlled for over 1 hour at a time (e.g., in prams/carriages) or sit for significant stretches of time. How much time spent stationary before a screen should not surpass 60 minutes; the less time spent before a screen, the better. While latent, perusing and narrating with a parental figure is suggested; and get 10-13 hours of sound rest, including rest, with ordinary rest and wakeup times. More data is accessible from the World Health Organization. Active work, stationary behavior, and rest rules for youngsters under five (Piercy et al., 2018).

Methodology

Research Design: A descriptive research design with a cross-sectional survey approach was used.

Participants: The population for the current study consisted of college students aged 19-24 who were selected from different colleges in the province of Khyber Pakhtunkhwa (KP), Pakistan. It is pertinent to mention that those colleges were contacted where the Health and Physical Education (HPE) students were enrolled. For this purpose, the Directorate of Colleges, KP, obtained a complete list of the concerned colleges. Participants were excluded because

1. They refused to take part in the study,
2. They had health problems that hampered their physical activity involvement and
3. They used medicine that brought a change in the study variables.

As per the official record, the total number of Boys' Colleges is nine (09), with student enrollment being 180.

On the other hand, the number of Girl's Colleges is three (03), with a student enrollment of 116. The total population in these colleges is N=296. The population of the current study was finite; henceforth, all the students enrolled in the discipline of HPE were included in the study.

Procedures: The current study's design included a month, and the researcher visited twice, separated by one month. During the first visit, the researcher, with the help of concerned staff in the respective college, explained the objectives of the study. At the time, the participants filled out a written consent form. Participants were informed that the outcome measures, such as physical activity, anxiety, and mood states, would be assessed after a month. All the participants were trained on how to fill out the questionnaires.

During the second visit, the researcher verified whether the respondents had filled out the questionnaire. Participants were assured that the data would be kept confidential and only used for research purposes.

Results

Descriptive Results (Demographics)

Table 01 Frequencies and Percentages of Demographic Attributes of Respondents

Demographics	Categories	Frequency	Percent
Gender	Male	140	57.9
	Female	102	42.1
	Total	242	100.0
Locality	Rural	113	46.7

	Urban	129	53.3
	Total	242	100.0
Age	19-20	78	32.2
	21-22	96	39.7
	23-24	68	28.1
	Total	242	100.0
	Semester	1st Year (1st Semester-2nd Semester)	49
2nd Year (3rd Semester- 4th Semester)		81	33.5
3rd Year (5th Semester-6th Semester)		77	31.8
4th Year (7th Semester-8th Semester)		35	14.5
Total		242	100.0

Table 01 showed that total 4 demographics of respondents were highlighted i.e., Gender, Locality, Age, and Semester. Total male respondents were 57.9%, and female were 42.1%. total rural were 46.7% and urban were 53.3%, total respondents having age 19-20 years were 32.2%, 21-22 years were 39.7%, and 23-24 years were 28.1%. the respondents in 1st Year (1st Semester-2nd Semester) were 20.2%, 2nd Year (3rd Semester- 4th Semester) were 33.5%, 3rd Year (5th Semester-6th Semester) were 31.8% and 4th Year (7th Semester-8th Semester) were 14.5%. the total sample of the study was 242 (100%).

Table 02 Descriptive of Research Variables

Variables	N	Mean	Std. Deviation	Variance	Skewness	Kurtosis		
						Statistic	Std. Error	
Mood States	242	10.3596	2.39384	5.730	-.737	.156	.080	.316
Physical Activity	242	9.1275	2.51938	6.347	-.349	.156	-1.279	.317
Anxiety	242	3.0537	.83652	.700	-.363	.156	-1.244	.314

Table 02 showed that the mean of mood states was 10.35 ± 2.39 , variance was 5.73. The mean of Physical activity was 9.12 ± 2.51 , variance was 6.34. The mean of anxiety was $3.05 \pm .836$ and variance was .700. The Skewness and Kurtosis results of mood states, physical activity and anxiety explain the normal distribution of data.

Table 03 Reliability Statistics

Variables	Mean	Std. Deviation	N	Cronbach's alpha
Mood States	10.3596	2.39384	242	.729
Physical Activity	9.1275	2.51938	242	.765
Anxiety	3.0537	.83652	242	.897

Table 03 showing the Cronbach's alpha reliability results of mood states, physical activity and anxiety questionnaires. The Cronbach's alpha reliability statistics showed that all the questionnaires i.e., Mood States (Internal consistency=.729), Physical Activity (Internal

consistency=.765) and Anxiety (Internal consistency=.897) were highly reliable and appropriate the run the data analysis.

Table 04 Normality Distribution Gender wise

Tests of Normality gender wise							
Testing Variables	Gender	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	Df	Sig.
Mood States	Male	.101	140	.312	.942	140	.324
	Female	.107	102	.176	.934	102	.124
Physical Activity	Male	.157	140	.289	.898	140	.254
	Female	.170	102	.287	.863	102	.324
Anxiety	Male	.167	140	.312	.894	140	.124
	Female	.170	102	.176	.863	102	.254

a. Lilliefors Significance Correction

In Table 04 Kolmogorov-Smirnova and Shapiro-Wilk was used to measure the normality distribution between the respondents' male and female in mood states, physical activity and anxiety variables. All the sigma values of all tests were greater than 0.05 which indicates that there was normal distribution and data were appropriate to run the test.

Table 05 Normality Distribution Locality Wise

Tests of Normality Locality wise							
Testing Variables	Locality	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	Df	Sig.
Mood States	Rural	.106	113	.180	.951	113	.126
	Urban	.082	129	.312	.953	129	.324
Physical Activity	Rural	.166	113	.176	.876	113	.124
	Urban	.154	129	.289	.898	129	.254
Anxiety	Rural	.174	113	.287	.875	113	.236
	Urban	.157	129	.265	.898	129	.222

a. Lilliefors Significance Correction

In Table 05 Kolmogorov-Smirnova and Shapiro-Wilk was used to measure the normality distribution between the respondents rural and urban in mood states, physical activity and anxiety variables. All the sigma values of all tests were greater than 0.05 which indicates that there was normal distribution and data were appropriate to run the test.

Table 06 Normality Distribution Semester wise

Var	Semester	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	Df	Sig.
MS	1st Year (1st Semester-2nd Semester)	.126	49	.180	.919	49	.126
	2nd Year (3rd Semester- 4th Semester)	.068	81	.312	.983	81	.324
	3rd Year (5th Semester-6th Semester)	.105	77	.176	.942	77	.124
	4th Year (7th Semester-8th Semester)	.157	35	.289	.895	35	.254

PAL	1st Year (1st Semester-2nd Semester)	.167	49	.287	.872	49	.236
	2nd Year (3rd Semester- 4th Semester)	.132	81	.265	.898	81	.222
	3rd Year (5th Semester-6th Semester)	.204	77	.180	.882	77	.126
	4th Year (7th Semester-8th Semester)	.183	35	.180	.870	35	.324
Anx	1st Year (1st Semester-2nd Semester)	.164	49	.312	.872	49	.124
	2nd Year (3rd Semester- 4th Semester)	.137	81	.176	.897	81	.254
	3rd Year (5th Semester-6th Semester)	.210	77	.289	.878	77	.236
	4th Year (7th Semester-8th Semester)	.188	35	.287	.883	35	.222

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

In Table 06 Kolmogorov-Smirnova and Shapiro-Wilk was used to measure the normality distribution between the respondents having different semester and class year in mood states, physical activity and anxiety variables. All the sigma values of all tests were greater than 0.05 which indicates that there was normal distribution and data were appropriate to run the test.

Table 07 Normality Distribution Age wise

Testing Variables	Age	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	Df	Sig.
Mood States	19-20	.133	78	.176	.924	78	.124
	21-22	.096	96	.289	.954	96	.254
	23-24	.094	68	.287	.969	68	.236
Physical Activity	19-20	.160	78	.265	.879	78	.222
	21-22	.165	96	.180	.881	96	.126
	23-24	.154	68	.180	.897	68	.324
Anxiety	19-20	.166	78	.312	.874	78	.124
	21-22	.173	96	.176	.882	96	.254
	23-24	.153	68	.289	.902	68	.124

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

In Table 07 Kolmogorov-Smirnova and Shapiro-Wilk was used to measure the normality distribution between the respondents in respect of their age in mood states, physical activity and anxiety variables. All the sigma values of all tests were greater than 0.05 which indicates that there was normal distribution and data were appropriate to run the test.

Correlational Analysis

Table 08 Relationship between Physical Activity and Anxiety

Correlations		PAL	OPA	LTPA	LLA	Anxiety State	Trait	
Variables						Anxiety	Anxiety	
PAL	R ²	1						
	Sig.							
	N	242						
OPA	R ²	.949**	1					
	Sig.	.000						
	N	242	242					
LTPA	R ²	.971**	.911**	1				
	Sig.	.000	.000					
	N	242	242	242				
LLA	R ²	.934**	.798**	.864**	1			
	Sig.	.000	.000	.000				
	N	242	242	242	242			
Anxiety	R ²	.959**	.892**	.956**	.891**	1		
	Sig.	.000	.000	.000	.000			
	N	242	242	242	242	242		
State Anxiety	R ²	.941**	.859**	.933**	.895**	.989**	1	
	Sig.	.000	.000	.000	.000	.000		
	N	242	242	242	242	242	242	
Trait Anxiety	R ²	.955**	.905**	.956**	.866**	.988**	.954**	1
	Sig.	.000	.000	.000	.000	.000	.000	
	N	242	242	242	242	242	242	242

** . Correlation is significant at the 0.01 (2-tailed).

PAL: Physical Activity Level , OPA: Occupational Physical Activity, LTPA: leisure time physical activity, LLA: leisure and locomotion activities

In Table 08 Pearson Correlation coefficients was used to measure the relationship between Physical activity and anxiety. Statistically strong positive relationship was found between physical activity and anxiety ($r^2=.959$, $.000 < 0.01$), as well as statistically significant strong positive relationship was found between anxiety and Occupational Physical Activity ($r^2=.892$, $.000 < 0.01$), leisure time physical activity ($r^2=.956$, $.000 < 0.01$), and leisure and locomotion activities ($r^2=.891$, $.000 < 0.01$). Hence, statistically significant strong positive correlation found between physical activity and anxiety.

Table 09 Relationship between Physical Activity and Mood States

Correlations		PAL	OPA	LTPA	LLA	Mood States
PAL	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	242				
OPA	Pearson Correlation	.949**	1			
	Sig. (2-tailed)	.000				
	N	242	242			
LTPA	Pearson Correlation	.971**	.911**	1		
	Sig. (2-tailed)	.000	.000			
	N	242	242	242		
LLA	Pearson Correlation	.934**	.798**	.864**	1	
	Sig. (2-tailed)	.000	.000	.000		
	N	242	242	242	242	
Mood States	Pearson Correlation	.095	.071	.136*	.064	1
	Sig. (2-tailed)	.143	.269	.064	.320	
	N	242	242	242	242	242

** . Correlation is significant at the 0.01 (2-tailed).

* . Correlation is significant at the 0.05 (2-tailed).

PAL: Physical Activity , OPA: Occupational Physical Activity, LTPA: leisure time physical activity, LLA: leisure and locomotion activities

In Table 09 Pearson Correlation coefficients was used to measure the relationship between Physical activity and Mood States. Statistically no significant relationship was found between physical activity and mood states ($r^2=.095$, $.143 > 0.01$), as well as statistically no significant relationship was found between mood states and Occupational Physical Activity ($r^2=.071$, $.269 > 0.01$), leisure time physical activity ($r^2=.136$, $.064 > 0.01$), and leisure and locomotion activities ($r^2=.064$, $.320 > 0.01$). Hence, statistically no significant correlation is found between physical activity and mood states.

Regression Analysis

Table 10 Effects of Physical Activity upon Anxiety

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std.Error of the Estimate
1	.959 ^a	.920	.920	.23672

a. Predictors: (Constant), Physical Activity
b. Dependent Variable: Anxiety

Table 10 shows that the standard error of the estimates was recorded as .23672.

Table 11 ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	155.194	1	155.194	2769.528	.000 ^b
	Residual	13.449	240	.056		
	Total	168.643	241			

a. Dependent Variable: Anxiety

b. Predictors: (Constant), Physical Activity

Table 11 shows that the $F(1, 240) = 2769.528$, Sig. = .000 is lesser than the alpha level of .05, which indicates that the null hypothesis is rejected and alternate is accepted.

Table 12 Coefficients^a

Model		Unstandardized Coefficients			T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.146	.057		2.554	.011
	Physical Activity	.319	.006	.959	52.626	.000

a. Dependent Variable: Anxiety

Table 12 shows that there is significant effect of physical activity on anxiety of students at college level is true.

Table 13 Effects of Physical Activity upon Mood States**Model Summary^b**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.946 ^a	.895	.895	.81608

a. Predictors: (Constant), Physical Activity

b. Dependent Variable: Total Mood Disturbance

Table 13 shows that the standard error of the estimates was recorded as .81608.

Table 14 ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1361.930	1	1361.930	2044.971	.000 ^b
	Residual	159.837	240	.666		
	Total	1521.767	241			

a. Dependent Variable: Total Mood Disturbance

b. Predictors: (Constant), Physical Activity

Table 14 shows that there is a significant positive role of physical activity in the mood states of participant at college level.

Table 15 Coefficients^a

Model		Unstandardized Coefficients			T	Sig.
		B	Std. Error	Standardized Coefficients Beta		
1	(Constant)	.598	.198		3.025	.003
	Physical Activity	.944	.021	.946	45.221	.000

a. Dependent Variable: Total Mood Disturbance

Table 15 shows that there is significant effect of physical activity on mood states of students at college level is true.

Group Mean Differences (Test of Significance)

Table 16 Gender-Wise differences in Physical Activity, Mood States, and anxiety

Group Statistics						
Testing Variables	Gender	N	Mean	Std. Deviation	t	Sig.
Mood States	Male	140	9.7843	2.35613	-4.556	.000
	Female	102	11.1493	2.22376		
Physical Activity	Male	140	9.4909	2.25423	2.662	.008
	Female	102	8.6287	2.77807		
Anxiety	Male	140	3.1829	.74178	2.858	.005
	Female	102	2.8762	.92602		

$\alpha=0.05$

In Table 16 an independent sample t-Test used to measure the mean difference between male and female respondents in mood states, physical activity and anxiety. Statistically significant difference was found between male and female in mood states ($.000 < 0.05$), physical activity ($.008 < 0.05$) and anxiety ($.005 < 0.05$).

Table 17 Locality-Wise differences in Physical Activity, Mood States, and anxiety

Group Statistics						
Testing Variables	Locality	N	Mean	Std. Deviation	t	Sig.
Mood States	Rural	113	10.4433	2.44524	.508	.612
	Urban	129	10.2864	2.35499		
Physical Activity	Rural	113	9.0916	2.62750	-.207	.836
	Urban	129	9.1590	2.43059		
Anxiety	Rural	113	3.0319	.87705	-.379	.705
	Urban	129	3.0727	.80229		

$\alpha=0.05$

In Table 17 an independent sample t-Test used to measure the mean difference between rural and urban respondents in mood states, physical activity and anxiety. Statistically no significant difference was found between rural and urban in mood states ($.612 < 0.05$), physical activity ($.836 < 0.05$) and anxiety ($.705 < 0.05$).

Table 18 Age-Wise differences in Physical Activity, Mood States, and anxiety

Testing Variables	Age	N	Mean	Std. Deviation	F	Sig.
Mood States	19-20	78	10.5170	2.61145	.250	.779
	21-22	96	10.2973	2.44045		
	23-24	68	10.2671	2.07054		
	Total	242	10.3596	2.39384		
Physical Activity	19-20	78	9.1948	2.56326	1.639	.196
	21-22	96	9.3906	2.43327		
	23-24	68	8.6788	2.56442		
	Total	242	9.1275	2.51938		
Anxiety	19-20	78	3.0958	.84303	1.681	.188
	21-22	96	3.1296	.81252		
	23-24	68	2.8980	.85399		
	Total	242	3.0537	.83652		

$\alpha=0.05$

In Table 18 Single factor ANOVA used to measure the mean difference between the respondents in respect of their age in mood states, physical activity and anxiety. Statistically no significant difference was found between the respondents having different age groups in mood states (.779 < 0.05), physical activity (.196 < 0.05) and anxiety (.188 < 0.05).

Table 19 Semester-Wise differences in Physical Activity, Mood States, and anxiety

TV	Semester	N	Mean	Std. Deviation	F	Sig.
Mood States	1st Year (1st Semester-2nd Semester)	49	10.5865	2.41617	.359	.782
	2nd Year (3rd Semester- 4th Semester)	81	10.4251	2.17255		
	3rd Year (5th Semester-6th Semester)	77	10.1509	2.40473		
	4th Year (7th Semester-8th Semester)	35	10.3498	2.85695		
	Total	242	10.3596	2.39384		
Physical Activity	1st Year (1st Semester-2nd Semester)	49	9.0529	2.61124	1.098	.351
	2nd Year (3rd Semester- 4th Semester)	81	8.8221	2.59468		
	3rd Year (5th Semester-6th Semester)	77	9.2268	2.52071		
	4th Year (7th Semester-8th Semester)	35	9.7202	2.16946		
	Total	242	9.1275	2.51938		
Anxiety	1st Year (1st Semester-2nd Semester)	49	3.0318	.86722	.506	.679
	2nd Year (3rd Semester- 4th Semester)	81	2.9764	.85745		
	3rd Year (5th Semester-6th Semester)	77	3.1006	.83622		
	4th Year (7th Semester-8th Semester)	35	3.1595	.75758		
	Total	242	3.0537	.83652		

$\alpha=0.05$

Table 19, factor ANOVA was used to measure the mean difference between the respondents regarding their Semester (year of class) in mood states, physical activity, and anxiety. Statistically,

no significant difference was found between the respondents having different semesters (year of class) in mood states (.782 < 0.05), physical activity (.351 < 0.05), and anxiety (.679 < 0.05).

Discussion

The current study was conducted to examine the relationship of physical activity level with anxiety and mood states among health and physical education students at the college level. Results revealed a significant relationship of physical activity with the two critical psychological variables of anxiety and mood states. The analyzed data of the study at hand indicated a statistically strong positive relationship between physical activity and anxiety and mood states. These findings confirm the study's goal and suggest that physical activity is linked to improved mental health, as scientific literature has shown in recent years (Rodriguez et al., 2019; White et al., 2017). Furthermore, the findings are similar to the findings of other studies that have found a link between physical activity and improved mood, reduced anxiety symptoms, and improved self-perceived health (Boolani et al., 2021; Chan et al., 2019; Dale et al., 2019). According to a recent study, engaging in moderate to intense aerobic physical activity and muscular strength exercises is linked to a reduced risk of acquiring symptoms associated with mental disorders (Bennie et al., 2019). Physical activity, according to some authors, can help people recover from depression and anxiety problems (Pearsall et al., 2014). Finally, another study found that individuals with severe depression who participated in an aerobic physical activity program improved far more than those who did not. Although the findings are generally similar, the results show minor variances by gender and age. The link between severe physical exercise and the various psychological characteristics evaluated was more robust in the younger age group and among males. Moderate physical exercise was linked to psychological characteristics in a statistically meaningful way for girls and the senior students enrolled. Furthermore, younger persons are more closely linked to intensive, competitive, and federated practice.

Main Findings

1. The analyzed data indicated a strong positive relationship between physical activity and essential psychological variables of anxiety ($r^2=.959$, $.000 < 0.01$).
2. Results obtained through Pearson Correlation coefficients revealed no significant correlation between various indices of physical activity and mood states ($r^2=.095$, $.143 > 0.01$).
3. The ANOVA table shows that there is a significant positive role of physical activity in the anxiety of participants at college level ($p < .05$).
4. It has been found from the analyzed data that there was a significant positive role of physical activity in the mood states of participants at college level ($p < .05$).
5. The analyzed data indicated that females reported higher scores on mood states than males, while male participants reported higher scores on physical activity and anxiety.
6. When comparing the group mean differences based on locality (rural VS urban), the t-test results revealed no significant differences between these groups on various variables under research.
7. Furthermore, results indicated no statistically significant differences between the respondents having different age groups in mood states ($.779 < 0.05$), physical activity ($.196 < 0.05$), and anxiety ($.188 < 0.05$).
8. It has also been found that students enrolled in different semesters reported no statistical in mood states (.782 < 0.05), physical activity (.351 < 0.05), and anxiety (.679 < 0.05).

Conclusion

However, the data imply that engaging in physical activity is linked to a better state of anxiety and mood state. These findings are consistent with those described in the literature (White et al., 2017; Garfin et al., 2020; Schuch et al., 2018). The findings of this study specifically highlighted the links between physical activity and a better mood, lower state anxiety, and a better feeling of health. Female participants reported higher scores on mood state, while male participants reported higher scores on anxiety and physical activity. Furthermore, the analyzed data have affirmed that participants' psychological health improved when they engaged in moderate physical exercise. In contrast, pupils in the younger age group scored higher when they engaged in vigorous physical activity. The analyzed data revealed that participants from rural and urban areas reported similar scores on variables under research, including physical activity, anxiety, and mood state. These findings highlight the relevance of physical activity in maintaining psychological variables of anxiety and mood states.

Recommendations

Considering the importance of physical activity, such a topic should be included in the curriculum to inculcate students in this critical area. It is recommended to review the physical activity guidelines in our country in light of the findings obtained through the latest research in the field. The Ministry of Health may undertake this task in parallel with the ongoing work by WHO global Headquarters. Following this, each province should develop communication strategies and implementation guidelines considering ethnic and cultural diversity.

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