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Understanding the Psychological Pathways of Exercise: Affective Commitment's Role in Promoting Cognitive and Emotional Health

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ABSTRACT
Understanding the Psychological Pathways of Exercise: Affective Commitment's Role in Promoting Cognitive and Emotional Health aspects, particularly in higher education settings, is less explored. This study explores the role of physical activity in enhancing thinking skills and emotional behavior among university students in Punjab, Pakistan, with a specific focus on the mediating effect of affective commitment. The objectives of the study include examining the impact of physical activity on students' cognitive and emotional outcomes and investigating how affective commitment influences this relationship. A cross-sectional survey was conducted among students from various higher education institutions in Punjab. Data were collected through a structured questionnaire measuring students' levels of physical activity, emotional behavior, thinking skills, and affective commitment. To analyze the data, correlation and regression analyses were employed to assess the strength and nature of the relationships among the variables. The results demonstrated a significant positive correlation between physical activity and both thinking skills and emotional behavior. Students who regularly engaged in physical activity exhibited enhanced cognitive abilities and more positive emotional responses. The study further identified affective commitment as a key mediating factor, reinforcing the link between physical activity and its emotional and cognitive benefits. These findings underscore the vital role physical activity plays in supporting mental and emotional development among university students.

Keywords: *Psychological, Thinking Skills, Emotional Behavior, Affective Commitment.*

Introduction

The introduction of research helps in providing the suitable information in linking the research phenomena through rational and background information that why research issues are vital to be research again and to what extent this research study might help in producing the information for problem-solving.

Physical activity plays a vital role in enhancing thinking skills and emotional behavior across all age groups. It contributes to improved cognitive function by increasing cerebral blood flow, stimulating the growth of new neurons, and enhancing communication between different brain regions [1]. Regular physical exercise has been consistently associated with improved memory, attention span, and overall cognitive performance, largely due to the stimulation of neurotrophic factors, such as brain-derived neurotrophic factor (BDNF), which support the development and maintenance of neural pathways [2].

Moreover, physical activity positively influences executive functions, including problem-solving, decision-making, and goal-setting skills that are fundamental for both academic and professional achievement [3]. In addition to cognitive benefits, physical activity promotes emotional well-being by stimulating the release of endorphins and other neurotransmitters, which induce feelings of happiness, relaxation, and stress relief.

The regular exercise is also associated with improved self-esteem and self-confidence as exercise has a profound impact on emotional well-being by reducing stress, anxiety, and depression. Many forms of physical activity involve social interaction, whether it's team sports, group fitness classes, or simply walking with a friend [4]. Social engagement has been shown to have positive effects on mental health and emotional resilience as engaging in regular physical activity is often associated with other healthy lifestyle habits, such as nutritious eating and adequate sleep [5]. These factors contribute to overall well-being and cognitive function as exercise promotes neuroplasticity, the brain's ability to adapt and reorganize in response to experience [6]. This allows individuals to learn new skills, adapt to challenges, and recover from brain injuries more effectively towards the desired leading outcomes.

The research suggests that physically active individuals are less likely to experience the cognitive decline as they age as regular exercise help protect against age-related conditions [7]. The physical activity plays the crucial role in promoting thinking skills and emotional behavior by enhancing cognitive function, supporting brain health, regulating emotions, fostering the social connections, and promoting overall well-being [8]. Thus, incorporating regular exercise into daily routines is essential for maintaining optimal cognitive and emotional functioning across the lifespan. The impact of physical activity on thinking skills and emotional behavior has been extensively studied across various fields, including neuroscience, psychology, and exercise science [9]. The research consistently demonstrates the profound effects of exercise upon cognitive function and emotional well-being of students.

The physical activity influences brain structure and function through the various neurobiological mechanisms as exercise increases cerebral blood flow, oxygenation, and glucose metabolism in the brain that support neuronal activity and synaptic plasticity [10]. The exercise stimulates the production of the neurotrophic factors, such as brain-derived neurotrophic factor which promote neurogenesis, synaptogenesis, and neuronal survival [11]. These processes are crucial for learning, memory, and overall cognitive function as numerous studies have shown that the regular physical activity is associated with improved cognitive performance across multiple domains, including attention, memory, executive function, and processing speed [12]. Exercise has been particularly effective in enhancing tasks that require complex cognitive processes, such as task-switching and the problem-solving.

The physical activity enhances brain plasticity, allowing brain to adapt and reorganize in response to experience. This plasticity underlies the brain's ability to learn new skills, recover from injury,

and compensate for age-related decline [13]. The exercise promotes the formation of new neural pathways and strengthens existing connections, leading to enhanced cognitive abilities. Exercise has profound effects on emotional well-being and mental health [14]. Physical activity triggers the release of endorphins, serotonin, and other neurotransmitters that promote feelings of happiness, relaxation, and stress reduction [15]. The regular exercise is associated with lower rates of anxiety, depression, and mood disorders, improved self-esteem and self-efficacy as engaging in activities, team sports, exercise classes foster social connections, promotes a sense of belonging, and reduces feelings of loneliness.

Objectives of Study

1. To examine association between physical activity, effective commitment, thinking skills & emotional behavior (correlation: in line with H_1).
2. To examine impact of physical activity and effective commitment on the thinking skills (regression: in line with H_2).

Literature Review

The literature review in important section is research studies that helps in providing the leading support to research issues through existing literature that is available while conducted by diverse researchers to research the research variables from every possible dimension and provide details about their relationships.

The research suggests that physical activity positively influences cognitive function across various domains, including attention, memory, processing speed, and executive function as engaging in regular exercise stimulates the release of neurotrophic factors to improved cognitive abilities [16]. The physical activity has been associated with better academic performance, cognitive flexibility, and problem-solving skills, particularly in children and adolescents [17]. The physical activity is strongly linked to improved emotional well-being and mental health outcomes. Regular exercise stimulates the release of endorphins, serotonin, and other neurotransmitters, which contribute to feelings of happiness, relaxation, and stress reduction [18]. The exercise interventions are often recommended as adjunctive treatments for mental health conditions due to their antidepressant and anxiolytic effects.

The research indicates that physical activity can alleviate symptoms of anxiety, depression, and mood disorders as engaging in physical activity promotes self-esteem, self-confidence, and a sense of accomplishment, which are essential components of emotional resilience and well-being. The commitment to physical activity involves consistency, goal setting, self-discipline, and social support [19]. Regular exercise requires individuals to establish routines, set achievable goals, and persist in face of challenges as effective commitment strategies, such as self-monitoring, planning, and goal reinforcement, enhance adherence to exercise regimens and promote long-term behavior change [20]. The social support networks, including friends, family, and exercise partners, play a crucial role in sustaining motivation and accountability are leading parameters required towards desired consequences.

The regular physical activity is shown to improve various cognitive functions, such as attention, memory, and executive roles. The aerobic exercises, in actual, can augment neuroplasticity and increase the hippocampus volume that is vital for memory and learning [21]. Students who engage in physical regular activity show better concentration, faster processing information and better problem-solving skills. There is helpful link amid physical fitness and academic performance [22]. The regular exercise helps individuals manage their emotions better. It provides a healthy outlet

for frustration and stress and can improve resilience and self-esteem. The exercise is beneficial for mental health, reducing symptoms of depression, stress and anxiety [23]. The cognitive skills are fundamental, which is used to treat the emotional and behavioral disorders by changing thought patterns and behaviors.

The students who are engaged in regular physical activity tend to have higher levels of affective commitment to their tasks. As physical activity triggers release of endorphins, which are natural mood cranks [24]. The higher cognitive skills give better emotional intelligence, as individuals with strong at managing and recognizing their own emotions and influencing and understanding emotions of others. Participation in team sports foster a sense of camaraderie and belonging, which boosts affective commitment towards tasks. This is partly as exercise can reduce stress and improve well-being, leading to greater satisfaction and loyalty. When student feel competent and capable, their commitment is stronger. The active problem-solving skills and decision-making that are components of strong cognitive function, can boost an individual's commitment towards their leading objectives.

Research Methodology

The research methodology provides the suitable guidelines regarding the techniques and tools under methods and procedures as writing research involves outlining strategies and techniques used to conduct research. These tools and related techniques are thus support through methods and leading procedures.

Research Design

The present study employs a quantitative research design, with the primary objective of analyzing statistical relationships among the key variables—physical activity, affective commitment, thinking skills, and emotional behavior. This approach enables the researcher to draw conclusions and make informed decisions based on empirical data. Designing such a study requires meticulous planning and the integration of multiple components to ensure that it is methodologically robust, logically structured, and capable of effectively addressing the research questions and hypotheses. The selected research design also reflects the researcher's perspective on the intended outcomes, guiding the application of various strategies and techniques to achieve meaningful and valid results that contribute to the existing body of knowledge.

Research Strategy

Selecting an appropriate research design—whether experimental, correlational, descriptive, qualitative, quantitative, or mixed-methods—is essential, and this choice should align closely with the research questions and objectives. Formulating a comprehensive research strategy is fundamental to carrying out research that is both effective and meaningful. A well-developed strategy not only guides the entire research process but also ensures that the objectives are achieved while strengthening the validity and reliability of the results. Such a strategy enables researchers to make informed decisions about which methodological approaches to adopt from the existing literature, facilitating the achievement of targeted outcomes and supporting the successful execution of the study.

Population & Sampling

The population in research refers to the entire group of individuals, cases, or elements that meet the predefined criteria for inclusion in a study. Accurately defining the population and selecting an appropriate sampling strategy are essential steps, as they significantly impact the generalizability and validity of the research findings. The population serves as the broader group

to which the study results are intended to be applied. In the present study, the population comprises 2,754 college students from various districts across Punjab, Pakistan. Using a standard statistical formula for sample size determination, a sample of 300 students was selected to ensure representativeness. Consequently, 300 questionnaires were distributed for data collection, and 226 completed responses were received through simple random sampling, allowing the researcher to obtain reliable data and draw meaningful inferences.

Table.1 Sample-Size Determination

Formula	E	N = 2754	Sample = 300
$n = N/1 + Ne^2$	0.04	n = 2654**/** (1+2654 (0.0025)), n = 359.27	Sample = 300

Data Collection & Analysis

Both primary and secondary sources will be utilized for data collection in this study. Primary data will be gathered through questionnaires, while secondary data will be obtained from existing literature. The collected data will be analyzed using argumentative methods and statistical techniques to draw valid conclusions, achieve the research objectives, and support informed decision-making. Data collection and analysis are essential components of the research process, as they involve systematically gathering information and converting it into insights that directly address the study's research questions and hypotheses. This process requires not only technical proficiency but also critical thinking, as transforming raw data into meaningful findings demands careful interpretation and analytical skill. Ultimately, effective data collection and analysis contribute to the advancement of knowledge by offering new perspectives and insights.

Results & Discussion

The results as obtained through diverse statistical procedures for realizing research objectives are accessible in current study to comprehend research purpose, necessities and anticipated outcome in particular context in order to attain the desired and leading outcomes through the statistical procedures of study.

Results of the Study

The results of study are presented in this section comprising descriptive and testing of hypotheses in order to realize the desired outcomes used for reaching the anticipated conclusion and make suitable decisions. Thus, the results provide important information through descriptive as well as testing of hypotheses.

Table.2 Gender-Based frequencies

Gender					
		Frequency	Percent	Valid Percent	Cumulative %
Valid	Male	232	71.2	71.2	71.2
	Female	94	28.8	28.8	100.0
	Total	326	100.0	100.0	

Frequency tabulations offer valuable insights into the demographic characteristics of the respondents who participated in the present study, contributing their perspectives toward the measurement of research variables and the exploration of their interrelationships. In terms of gender distribution, the data revealed that out of 326 participants, 232 (71.2%) were male, while 94 (28.8%) were female. These respondents provided critical input that supported the study's objectives and the analysis of variable relationships.

Table. 3 Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Physical Activity	326	1.30	4.80	3.2027	.77403
Affective Commitment	326	1.80	4.60	3.1707	.83969
Thinking Skills	326	1.70	4.70	3.4491	.59318
Emotional Behavior	326	1.63	4.62	3.3493	.60653
Valid N (listwise)	326				

Descriptive statistics offer essential insights into the research variables from multiple perspectives, presenting details such as sample size**,** minimum and maximum values**,** mean, and standard deviation. These results provide a clear and informative summary of the dataset, helping to understand the general patterns and distribution of responses. The information derived from descriptive analysis serves as a foundation for measuring variables and formulating a contextual understanding of the data. This, in turn, enables researchers to proceed confidently to inferential analysis, supporting hypothesis testing and drawing meaningful conclusions.

H-No. 1 There exists a positive association among physical activity, affective commitment, thinking skills, and emotional behavior (In line with objective-1).

Table. 4 Correlations Analysis

		[1]	[2]	[3]	[4]
Physical Activity [1]	Pearson Correlation	1	.378**	.618**	.642**
	Sig. (2-tailed)		.000	.000	.000
	N	326	326	326	326
Affective Commitment [2]	Pearson Correlation	.378**	1	.403**	.393**
	Sig. (2-tailed)	.000		.000	.000
	N	326	326	326	326
Thinking Skills [3]	Pearson Correlation	.618**	.403**	1	.649**
	Sig. (2-tailed)	.000	.000		.000
	N	326	326	326	326
Emotional Behavior [4]	Pearson Correlation	.642**	.393**	.649**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	326	326	326	326
**. Correlation is significant at the 0.01 level (2-tailed).					

The correlation analysis offers valuable insights into the strength and direction of the relationships among the study variables. By employing this statistical procedure, the associations between variables were assessed. The results indicated positive and significant correlations among key variables**:** physical activity and thinking skills (R = .618, p = .000), physical activity and emotional behavior (R = .642, p = .000), affective commitment and thinking skill**s** (R = .403, p = .000), affective commitment and emotional behavior (R = .393, p = .000), and physical activity and affective commitment (R = .378, p = .000). These findings confirm statistically meaningful associations, thereby supporting the corresponding hypothesis of the study.

H-No. 2 A positive influence of both physical activity and affective commitment on thinking skills was observed, (In line with objective-2).

Table.5 Regression Analysis

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of Estimate
1	.645a	.419	.412	.45490

Table.6 Regression Analysis

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	47.515	2	23.757	114.807	.000b
	Residual	66.840	323	.207		
	Total	114.355	325			

Table.7 Regression Analysis

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.673	.123		13.578	.000
	Physical Activity	.416	.035	.543	11.829	.000
	Affective Commitment	.160	.032	.198	4.302	.000
a. Predictors: (Constant), Affective Commitment, Physical Activity						
b. Dependent Variable: Thinking Skills						

The results of the regression analysis support the hypothesized relationship between the dependent variable (thinking skills), the independent variable (physical activity), and the mediating variable (affective commitment), thereby establishing a cause-and-effect relationship. The findings indicate that 41.6% of the variance in thinking skills can be explained by physical activity and affective commitment. Specifically, physical activity demonstrated a significant predictive impact on thinking skills (β = .419, p = .000), as did affective commitment (β = .160, p = .000). These results confirm the strength of the relationship and validate that physical activity serves as a stronger predictor of thinking skills among the respondents. Based on this evidence, the hypothesis is supported and accepted.

Discussion of Study

Students who engage in regular physical activity often demonstrate higher levels of affective commitment toward their tasks and responsibilities. This can be attributed to the physiological and psychological benefits of exercise, such as the release of endorphins, which act as natural mood enhancers and contribute to overall well-being. Higher cognitive abilities are also associated with improved emotional intelligence, enabling individuals to effectively recognize and regulate their own emotions while also understanding and influencing the emotions of others.

Participation in team-based physical activities fosters a sense of belonging and social connectedness, which can enhance an individual's affective commitment to both tasks and group objectives. Physical activity has also been linked to reduced stress levels and enhanced mental well-being, which in turn promotes greater satisfaction and loyalty among students. When individuals feel competent and capable, their commitment to goals and responsibilities tends to strengthen. Furthermore, problem-solving and decision-making skills—as components of strong cognitive functioning—can significantly contribute to a deeper commitment to achieving personal and academic objectives.

These physiological and psychological benefits of physical activity contribute to enhanced thinking skills and cognitive performance. A positive correlation has been observed between physical fitness and academic achievement, which is partly due to improved emotional regulation and reduced occurrences of emotional outbursts. Regular engagement in physical exercise enhances an individual's resilience to stress and emotional pressure. It also supports better mental health by providing a healthy outlet for managing negative emotions and stress, making individuals better equipped to handle emotional challenges and setbacks.

Additionally, positive social interactions gained through group exercise and sports participation contribute to emotional stability. Engaging in such activities encourages social support and interpersonal connection, which are essential for emotional well-being from a broader perspective.

Physical activity not only helps in reducing stress and anxiety by releasing endorphins but also serves as a constructive outlet for dealing with emotional and psychological challenges. Achieving fitness goals and experiencing physical improvement can boost an individual's self-image and overall emotional well-being. Moreover, physical activity has been shown to promote affective commitment and increase satisfaction with academic or organizational settings. This enhanced emotional attachment—whether to a team, institution, or task—is also linked to higher levels of confidence and self-esteem. In workplace settings, individuals who exercise regularly report lower stress and burnout levels, which leads to greater satisfaction and organizational loyalty. Finally, participation in group fitness activities and team sports promotes team bonding and collaboration, further strengthening emotional ties and social cohesion.

Conclusion

This study highlights the critical role of physical activity in enhancing emotional behavior and thinking skills among students in higher education institutions across Punjab, Pakistan. Through comprehensive analysis, it was observed that students who regularly participate in physical activities exhibit improved positive emotional responses and cognitive functioning. Moreover, the study identified affective commitment as a key mediating variable, bridging the relationship between the predictor (physical activity) and outcome variables (emotional behavior and thinking skills). Students who display a stronger emotional connection and sense of commitment to their academic institutions tend to experience greater emotional and cognitive benefits derived from physical activity. This suggests that emotional attachment and belongingness can magnify the positive psychological effects of physical activity, thereby supporting desired developmental outcomes.

These findings carry significant implications for higher education institutions. To maximize the emotional and cognitive advantages of physical activity, institutions should not only encourage regular exercise but also foster environments that strengthen students' affective commitment. This can be achieved by cultivating a supportive, inclusive, and engaging campus culture where students feel valued and connected. Integrating physical activity as a core component of university life—beyond its physical health benefits—can contribute meaningfully to students' emotional well-being and academic success.

By simultaneously promoting affective commitment and encouraging physical activity, institutions can play an essential role in nurturing the holistic development of students. Future research is encouraged to explore these dynamics across different populations and educational contexts to further validate and expand upon the current findings.

Recommendations

- Higher education institutions should offer a wide range of physical activities—including team sports, individual fitness routines, recreational events, and structured fitness classes—to address the varied interests of students and promote engagement that leads to desired emotional and cognitive outcomes.
- Institutions should encourage students to incorporate physical activity into their daily routines by initiating campus-wide programs such as morning exercise sessions, walking clubs, and fitness challenges aimed at enhancing students' overall development.
- Awareness campaigns should be launched to educate students about the psychological and intellectual benefits of physical activity. These campaigns can utilize social media, informational posters, and interactive workshops to positively influence student attitudes and behaviors toward active participation in sports and fitness.
- Invite health and education experts to deliver talks and workshops emphasizing the importance of physical activity for academic achievement and mental health. These initiatives can help create a campus culture that values emotional attachment, a sense of belonging, and goal-oriented behaviors.

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