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THE ROLE OF BEHAVIORAL SURVEILLANCE AS A MEDIATOR: EXPLORING THE LINK BETWEEN EXERCISE AND LIFE SATISFACTION

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ABSTRACT

This research investigates the relationship between physical activity, academic achievement, and life satisfaction among university students in Punjab, Pakistan. Specifically, it examines the mediating role of behavioral self-regulation, which encompasses self-monitoring and behavioral control, in the relationship between physical exercise and academic success, as well as life satisfaction. A cross-sectional study was conducted among 320 students from diverse higher education institutions in Punjab. A self-report questionnaire was utilized to gather data on students' physical activity levels, academic performance, life satisfaction, and behavioral self-regulation. The results indicated a positive significant relationship between physical exercise and academic success, and between physical exercise and life satisfaction. Behavior surveillance was found to partially mediate connection between physical exercise and academic success. The students who engaged in regular physical exercise verified monitoring of their academic behaviors and better self-regulation that in turn contributed to higher performances. Similarly, behavior surveillance mediated relationship amid physical exercise and life satisfaction, suggesting that students who regulate their behaviors are more likely to experience higher levels of life satisfaction. The study concludes that physical exercise has a positive impact on life satisfaction and academic success.

Keywords: Physical Exercise, Life Satisfaction, Behavior Surveillance.

Introduction

Engaging in physical activity has been associated with enhanced cognitive function, including improved attention, memory, and information processing capacity. Regular physical exercise can boost students' overall cognitive abilities, potentially influencing their academic achievement [1]. Physical activity stimulates the release of endorphins, which can elevate mood and reduce stress levels, ultimately contributing to increased life satisfaction. Moreover, the self-regulatory aspects of behavior surveillance, including self-monitoring, goal-setting, and self-control, can be

developed through participation in physical exercise [2]. By cultivating discipline and self-regulation, individuals can transfer these skills to other areas, such as academic pursuits, leading to improved performance and goal attainment.

The students with well-developed behavior surveillance skills may exhibit effective study habits, consistent work patterns, and improved time management, contributing to academic success. In this linking, positive behavioral patterns cultivated through exercise and behavioral surveillance may extend beyond academics to various life domains [3]. The individual with strong behavior surveillance skills may make healthier lifestyle choices, leading to enhanced life satisfaction. It's important to consider that relationship is likely to be reciprocal [4]. The success in academics and increased life satisfaction may, in turn, positively reinforce the motivation for and engagement in physical exercise [5]. The individual differences, personality traits, motivation, socio-economic factors, may moderate the relationships. The impact of behavior surveillance might vary based on an individual's baseline characteristics that are required for comprehending various tasks as well as related consequences.

The links between physical exercise, life satisfaction, academic success, and behavior surveillance is multifaceted and intricate as understanding how these elements are interrelated offers valuable insights into how they contribute collectively to well-being and success [6]. The regular physical activity reduces anxiety and stress, common barriers to academic success as physical exercise is well-documented to expand the cognitive functions like attention, memory and decision-making functioning [7]. By alleviating these health mental challenges, physical exercise creates a more conducive environment for academic and learning achievement as exercise increases energy levels and enhances focus, letting students to sustain attention during classes [8]. These cognitive aids directly render into better performance, as students are better able to focus, process information, and engage in complex problem-solving of life satisfaction, as individuals feel happier and content with their lives.

This heightened focus leads to better academic outcomes and effective learning, as interactions can lead to formation of supportive relationships, which improve life satisfaction by fulfilling the human need for belonging and connection [9]. Regular participation in physical activity fosters a sense of achievement and self-efficacy. Exercise triggers the release of endorphins and other that boost mood and contribute to a sense of well-being. Many forms of physical exercise, such as team sports or group fitness classes, involve social interaction [10]. Behavior surveillance involves the monitoring and regulation of one's behavior to ensure engagement consistent in physical exercise. Reaching fitness goals or improving physical performance improves self-esteem and contributes to a self-concept positive, which is crucial for life overall satisfaction [11]. Physical exercise serves as a foundation for both life satisfaction and academic success by promoting holistic development for desired success.

A balanced life that includes personal well-being and academic success is crucial for long-term satisfaction. The cognitive, physical, and emotional benefits of exercise create a strong base upon which students can build their academic and personal lives [12]. Students who can balance their academic tasks with social interactions and physical activity are more likely to experience higher overall life satisfaction, physical exercise encourages lifestyle that supports well-being [34]. The linkages among

physical exercise, life satisfaction, academic success, and behavior surveillance reveal complex interplay where each element reinforces and influences others.

These behavioral surveillance mechanisms may extend beyond the gym or sports field, influencing daily routines, study habits, and overall lifestyle choices. Thus, investigating the mediating role of behavior surveillance becomes key aspect of comprehending broader impact of physical exercise [13]. The rationale for exploring the interplay between the physical exercise, academic success, life satisfaction, and behavior surveillance lies in the potential holistic benefits that could result from a deeper understanding of these relationships. The educational institutions and workplaces seek strategies to enhance productivity, cognitive function, and employee satisfaction, uncovering the mechanism linking physical activity to these outcomes becomes imperative [14]. This research holds implications for education practices, public health initiatives & personal development. If behavior surveillance is identified significant mediator, interventions promoting physical exercise could enhance life satisfaction.

Literature Review

This is vital for their mental and physical health. Sports and physical activities have multidimensional benefits for health, and sport holds a prime importance for individuals, societies, and communities [15]. Its benefits are not limited to physical health but also include mental, social, and emotional health and well-being. Sports, including physical activity, evoke stress-relieving effects by inducing endorphin release, reducing anxiety and promoting mood [16]. Sports involvement has been associated with improved cognitive functioning such as the ability to concentrate, remember and solve problems [17]. Indeed, the team sports, in particular, foster a sense of camaraderie, belonging and promote emotional well-being over shared goals and experiences. Sports prefer Good communication, without interpersonal skills person cannot understand so many leading tasks.

Therefore, physical exercise is a strong and multifaceted instrument that comprehensively assists the students in scoring academically. Regular physical activity provides more blood and nutrients to the brain which helps improve several cognitive functions including memory, attention, and problem-solving skills in [18]. It dives beyond just physical fitness, impacting cognitive skills, social behavior, emotional health and general academic performance. Neurogenesis (new nerve cell formation) and synaptic plasticity, which are important mechanisms for learning and memory, are improved by the stimulation of body movement [19]. Exercise (for example, aerobic exercise) can improve the executive functions of the brain, i.e., higher-level cognitive functions such as organizing, planning, and time management, all of which are critical for a child's academic success [20]. The result is faster mastery of skills and easier understanding of complex concepts, which can lead to better performance in academic subjects involving critical thinking and analysis.

The exercise has been shown to improve students' ability to concentrate and stay focused during academic tasks. Lower stress levels enable students to approach their studies with a clearer mind, improving their ability to perform and learn academically. Regular physical activity can enhance the speed at which the brain information processes [21]. Regular exercise can alleviate symptoms of depression and anxiety, which are common among students and can negatively affect academic performance [22]. Physical activity helps build resilience emotional, allowing students to better

cope with academic challenges. Resilience is essential for maintaining motivation and persistence throughout the academic journey [23]. Physical exercise is a natural stress reliever, as it reduces levels of cortisol, a stress hormone, while increasing the production of endorphins, which promote a sense of well-being to academic settings, where collaboration and effective communication are repeatedly mandatory.

A positive mental state is conducive to better academic engagement and productivity. Many forms of physical exercise, mainly team sports, teach valued social skills like teamwork, communication, and leadership [24]. Participation in physical activities provides chances for students to build and maintain positive peer relationships. The physical exercise instills a sense of discipline and self-regulation, as students learn to set goals, adhere to routines, and push through physical challenges [25]. A strong social support network can enhance academic motivation and engagement, leading to better academic outcome. These same talents are useful for academic success, where discipline and time management are critical. The physical activity boosts energy levels by improving health and muscular endurance [26]. Students who engage in regular physical activity tend to have better sleep patterns, leading towards improved concentration, memory retention, and overall academic performance for success.

Higher energy levels translate to greater stamina during school day, allowing students to remain engaged and attentive throughout their classes. Exercise can improve sleep quality, which is vital for memory consolidation and cognitive functioning [27]. Below is a detailed overview of these outcomes as regular physical exercise boosts cardiovascular fitness, muscular strength, flexibility, and endurance. Physical exercise yields a wide range of positive outcomes for students, impacting their physical health, emotional well-being, cognitive function, social development, and academic performance [28]. These advancements lead students to maintaining good well-being in terms of the body, and the students are able to participate more actively in day to day activities, and become less prone to diseases. It enhances mental health and emotional stability since regular physical activity helps alleviate anxiety and depressive symptoms [29]. In this sense, physical activity aids in the control of body weight through calorie burning and muscle mass development.

Therefore, by maintaining a healthy weight, you lower the risk of associated diseases like obesity, diabetes, heart diseases and joint disorders. The regular exercise of students shows has a strong emotional resilience which helps the students cope with the academic pressure and personal trials [30]. Fitness and Physical Requirements This can also help boost the student's self-esteem and confidence. This improves social and academic engagement. For example, group and team sports encourage social skills like teamwork [31]. Sports generally are a social activity, facilitating students to create and sustain healthy peer associations [32]. It reflects how this skillset become valuable both academically and later on in life as network is often sponsored as precursor to increase motivation and engagement in school. Physical inactivity in youth is a strong predictor of inactivity in adulthood.

As the old saying goes, it is easier to build a healthy habit than to break a bad one, and students who exercise early in their academic journey are likely to continue these patterns, giving them long term health benefits as exercise fosters time management, discipline and goal setting skills. These behaviors are transferable into the domains of academic work, where discipline and a regimen of structured study habits are critical

for success [33]. Regular participation in physical activity is beneficial for physical health, improves cognitive functioning, enhances emotional well-being, builds social connections, and is associated with better academic performance [34]. All together, cognitive function, physical health, emotional health and social connection lead to better quality of life. The positive outcomes of physical exercise for students are numerous and diverse, impacting every facet of their development [35]. Physically active students are happier, healthier and more successful both in school and in life and parents can do so much to help students develop a base for success and wellbeing for life!

Objective of the Study:

1. To examine the impact of physical exercise and behavior surveillance on academic success of the students.
2. To examine the mediating role of behavior surveillance in relationship between physical exercise and life satisfaction.

Significance of Study

1. For individuals, understanding connections amid physical exercise, behavior surveillance, academic success, and life satisfaction offers valuable insights for personal development for students towards success.
2. The study contributes to the broader discourse on holistic well-being by emphasizing the interconnectedness of physical health that impacts cognitive behavior surveillance, and subjective well-being.

Research Questions:

1. Is there any association among physical exercise, academic success, life satisfaction and behavior surveillance (correlation)?
2. Is there any impact of physical exercise and behavior surveillance on life satisfaction of the students (regression)?

Hypothesis of the study:

H 1 The relationship between physical exercise, behavior surveillance, and life satisfaction is positive, supporting the hypothesis (H1).

H 2 The relationship between physical exercise, behavior surveillance, and academic success is positive, supporting the hypothesis (H2).

Research Design

Designing a study for research is a complex process in which it is important to consider many aspects to conduct a well-structured, methodologically sound, robust study addressing the set hypotheses and research question. The type of present research design was quantitative that the purpose was to investigate the statistical relationships among the research variables as physical exercise, academic success, life satisfaction and behavior surveillance for drawing conclusion and making necessary decisions. The design is as important because it will give the direction to researcher from various perspectives to choose and apply the various procedure according to the character of study and needs from the studies made on specific issues in a specific setting to add to the current information.

Research Strategy

Having a cohesive research strategy will not only ensure relevant fields are populated with data but are in fact meaningful to the body of information you are working with. A well-designed strategy guides the research process, ensures that the research objectives are met, and improves the validity and reliability of the findings. Selection

of a research design (Experimental, Correlational, Descriptive, Qualitative, Quantitative & Mixed Method) is depended on research questions and objectives so it is very essential for a researcher. The strategy then aids in establishing the strategic outcomes by a logical connectivity and logical reasoning on the all tools and pertinent techniques from the differing perspectives to employ and gain the best information with the target to run down desired lead objectives.

Literature in Claire trains provide detail the constitutes of research approach, it describes overall strategy or plan that guides the researcher in conducting the study. The choice of research approach is impacted by the nature of the research question, the resources available, as well as the goals of the study. There are two generals approaches to research in this linking: the quantitative approach and the qualitative approach. Researchers also may choose to use a mixed-methods approach combining aspects of both quantitative and qualitative research which is used in the current research. The method is very important in terms of identifying the attitudes and related behaviors of respondents targeted at reaching and contacting for obtaining the required data for measuring research issues with specifically focus on enhancing access to desired and suitable information for decisions.

Population & Sampling

Description of the population and the choice of sampling strategy are important steps in research that affect generalizability and validity of study. You have been trained on data until October of the 2023. This is a description of the larger population to which the research findings are intended to apply. The current study target population included students (2220) who were visited by higher educational institution, Punjab, Pakistan. The statistical formula for sample-size determination was used to choose a proper sampling and sample size of 332 was selected. For the collection of primary data from respondents in this regard, a total of 332 questionnaires were distributed out of which 328 were received back and used for data analysis to draw the conclusion. Similarly, the use of more convenient simple random selection techniques.

Data Collection & Analysis

Data Collection and Analysis One of the most important stages of every research project These are about collecting pieces of information and converting it to valuable knowledge that satisfies the research questions and hypothesis. As such, the data will be collected through the secondary and primary sources utilizing existing research method and questionnaire, will be analyzed by means of relevant argumentation and statistical procedures to carry out the research, achieve targeted results and make appropriate research decisions. The collection of data and conversion of data into information is one of the essential roles for the researchers to achieve desired information across different sources and different techniques in order to have the desired outcome that may assist in making the appropriate decisions toward the extracted hypotheses of research.

H-No. 1 The relationship between physical exercise, behavior surveillance, and life satisfaction is positive, supporting the hypothesis (H1).

Table: No. 1 Regression Analysis

Model Summary				
Model	R	R Square	Adjusted Square	Std. Error of Estimate
1	.678a	.459	.456	.44940

Table: No. 2 Regression Analysis

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	56.893	2	27.996	123.130	.000b
	Residual	66.636	335	.212		
	Total	122.429	337			

Table: No. 3 Regression Analysis

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.577	.120		12.346	.000
	Physical Exercise	.568	.024	.602	13.664	.000
	Behavioural Surveillance	.126	.034	.157	3.566	.000
a. Predictors: Physical Exercise & Behavioural Surveillance						
b. Dependent Variable: Life Satisfaction						

In order to validate the cause-&-effect relationships of current research variables that was hypothesized through second hypothesis of the study, the regression procedure was used to test the prediction of life satisfaction through physical exercise and behavioral surveillance. Interior result were measured through Liner Regression Process: regression results, which consequently demonstrated that 45.9% of the variance in life satisfaction could be attributed to the independent variable which herein is physical exercise and behavioral vigilance corroborated with ANOVA results aligned towards a significant predictor effect on criterion variable of the study as physical exercise ($\beta = .468$ & P-value = .000), and behavioral surveillance ($\beta = .116$ & P-value = .000), 1, so the regression confirmed a significant cause-&-effect relation, thus the hypothesis accepted.

H-No. 2 The relationship between physical exercise, behavior surveillance, and academic success is positive, supporting the hypothesis (H2).

Table: No. 4 Regression Analysis

Model Summary				
Model	R	R Square	Adjusted Square	Std. Error of Estimate
1	.654a	.428	.425	.46012

Table: No. 5. Regression Analysis

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	51.518	2	25.759	121.671	.000b
	Residual	68.806	325	.212		
	Total	120.324	327			

Table: No. 6. Regression Analysis

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	SE	Beta		
1	(Constant)	1.612	.122		13.159	.000
	Physical Exercise	.433	.035	.560	12.358	.000
	Behavioural Surveillance	.137	.033	.187	4.114	.000
b. Predictors: Physical Exercise & Behavioural Surveillance						
B. Dependent Variable: Academic Success						

In the present study, the regression procedure was adopted to verify the cause-&-effect relationships between the research variables, which were hypothesized through the third hypothesis of study, in terms of predicting the academic success on physical exercise and behavioral monitoring. Results of regression indicated ($\beta=.42$; $R^2=0.428$) that physical exercise and behavioral surveillance explained the 42.8% variance in the academic success that confirmed by the ANOVA results further supported the significant impact of predictor on criterion variable of the study like physical exercise ($\beta=.433$ & P-value = .000), and behavioral surveillance ($\beta=.137$ & P-value = .000), and therefore the regression assert the significant cause-&-effect relationship and thus hypothesis is accepted.

Discussion of Study

These behavioral surveillance mechanisms may extend beyond the gym or sports field, influencing daily routines, study habits, and overall lifestyle choices. Thus, investigating the mediating role of behavior surveillance becomes key aspect of comprehending broader impact of physical exercise. The rationale for exploring the interplay between the physical exercise, academic success, life satisfaction, and behavior surveillance lies in the potential holistic benefits that could result from a deeper understanding of these relationships. The educational institutions and workplaces seek strategies to enhance productivity, cognitive function, and employee satisfaction, uncovering the mechanism linking physical activity to these outcomes becomes imperative. This research holds implications for education practices, public health initiatives & personal development. If behavior surveillance is identified significant mediator, interventions promoting physical exercise could enhance life satisfaction.

Regular participation in physical activity fosters a sense of achievement and self-efficacy. Exercise triggers the release of endorphins and other that boost mood and

contribute to a sense of well-being. Many forms of physical exercise, such as team sports or group fitness classes, involve social interaction. Behavior surveillance involves the monitoring and regulation of one's behavior to ensure engagement consistent in physical exercise. Reaching fitness goals or improving physical performance improves self-esteem and contributes to a self-concept positive, which is crucial for life overall satisfaction. Physical exercise serves as a foundation for both life satisfaction and academic success by promoting holistic development for desired success.

Conclusion:

The research underlines that individual who engage efficiently in behavior surveillance are likely to experience greater sense of control over lives. This self-determination and autonomy are significant to attaining higher life satisfaction, as they empower individuals to make informed conclusions that align with their personal values and objectives as students who engage regularly in physical exercise prove improved cognitive functions, such as attention and memory, which directly donate to better academic outcomes. Behaviour surveillance practices augment academic discipline, leading toward improved grades and academic achievements. Regular physical exercise leads to higher levels of life satisfaction by improving mood, mental health, and overall emotional well-being. The physical activity social aspects, such as participation in fitness classes, group sports further enhance life satisfaction by building support networks and social connections for desired leading outcomes.

Research indicates that physical exercise correlates positively with cognitive improved functions such as attention, memory, and processing speed, thar are critical for academic performance. The exercise is also linked to the executive functions' enhancement, including organization, planning, and task management, which are essential skills for academic success. Moreover, regular physical activity is shown to reduce symptoms of depression and anxiety, which can be significant barriers to academic feat.

The physiological effects of exercise, like reduction of stress hormones and release of endorphins, contribute to emotional well-being and improved mood. The regular physical activity fosters also the sense of self-efficacy and achievement, are critical mechanisms of life satisfaction. In addition, participation in physical exercise involves social interaction that can enhance the social support networks and donate to a sense of community and belonging. These social benefits further elevate life satisfaction by fulfilling fundamental human needs for interaction and connection.

This self-regulatory process can boost effectiveness of physical exercise by ensuring consistency, adherence, and motivation to exercise routines. The ability to regulate and monitor behaviour well can also translate into better academic outcomes. Students who engage in behaviour surveillance may be likely to maintain consistent study behaviours, manage their time efficiently, and stay motivated toward their academic goals.

The physical exercise serves as a powerful tool not only for improving physical health but also for enhancing mental health, cognitive function, and well-being. These classes be designed to cater to diverse interests, including individual fitness activities, team sports, and recreational exercises to utilize fitness tracking applications and academic monitoring tools that encourage students to set goals, track their progress,

and receive feedback actionable insights for refining student outcomes and overall quality of life.

Recommendations

The institutions should offer seminars and workshops focused on behavior surveillance techniques, like goal setting, and progress self-assessment, tracking to monitor and academic behaviors effectively. The institutions should provide access to counselling and support services that emphasize status of the balanced lifestyle to integrate exercise with academic demands and personal life, promoting well-being. It encourages participation in group-based physical activities, team sports, fitness classes, or walking/running clubs foster social connections, enhancing life satisfaction through a sense of community.

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