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Molecular & Cellular Biomechanics 2024, 21(4), 537.
https://doi.org/10.62617/mcb537

Article

Research on monitoring college students' sports psychological stress response and ideological and political education intervention based on biosensors

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CITATION

Jin Z, Wang Q, Meng F, Xu J. Research on monitoring college students' sports psychological stress response and ideological and political education intervention based on biosensors. Molecular & Cellular Biomechanics. 2024; 21(4): 537. https://doi.org/10.62617/mcb537

ARTICLE INFO

Received: 14 October 2024
Accepted: 25 November 2024
Available online: 26 December 2024

Abstract: The current study aims to find out the psychosocial stress reactions of college students involved in sports and assess the impact of ideological and political education (I&PE) treatment based on the biosensor. Thus, we plan to use the biosensors including the heart rate monitors and the skin conductance devices to define the level of physiological stress in physical activities. The study also evaluates the extent to which the organizationally developed I&PE program effectively reduces psychological stressor by promoting resilience improvement, ideological awareness, and community support. This makes the research investigate the correlation between biosensor-based performance data on sports, stress and impressions of I&PE together with non-quantitative participants' feedback. The outcomes of the study will identify stress management among college sports with potential biosensor use in educational contexts. This study fosters the sciences of sports psychology, interventional education, and mental health with a view of developing an all-inclusive student well-being framework.

Keywords: psychological stress; college students; sports, biosensors; ideological education; political education; intervention strategies

1. Introduction

1.1. Background

So today stress has become a very important factor affecting the college students especially the ones, who are participating in sports activities as stress in sports increases stress rates due to the physical activities and competitive pressures felt by the sportsmen. Sport activity, which has positive impacts on physical well-being, places students into pressure conditions which cause feelings of mental exhaustion, anxiety, and stress. By the time virtually every student is involved in curricular and co-curricular activities that require him or her to handle specific task demands, one is also exposed to psychological stressors that determine his/her wellbeing in relation to his/her performance.

Interaction with stress, on the other hand, has enhanced with biotechnological applications such as bio sensor that lengthen the capacity to measure physiological reactions to stress. Real time data can be continuously generated on biosensor indices such as HRV, skin conductance, and cortical, which provide a quantitative measure of stress reactions. In the context of sports, these wearable devices are a chance to control

changes in student's condition, physical and psychological after and during training sessions.

There is a concern about the use of approaches other than the technological monitoring of students so there is increasing interest as to how the educational strategies such as Ideological and Political Education (I&PE) assist learners in handling stress [1]. I&PE is unique part of Chinese education system aimed at to provide students with political education, ethical values and perseverance. In specific regard to I&PE as an intervention strategy, learners are likely to feel more responsible, foster constructive thinking, and self-control that may prevent stress in academically and athletically. This research incorporates biosensor technology and I&PE to determine and recommend a comprehensive approach to psychological stress in sporting activities in colleges.

1.2. Research aim and objectives

This research work is designed to investigate the ability of biosensors in diagnosing college students' psychological pressure reactions to the physical exercises and the efficiency of the I&PE in addressing such stress. The research which has been proposed aims to develop an integrated physical and educational model intervention for real time physiological data.

The specific objectives of the research are:

- To assess the effectiveness of biosensors in providing real-time data on stress indicators such as heart rate, skin conductance, and cortisol levels during sports activities.
- To examine the relationship between the physiological data obtained from biosensors and students' self-reported psychological stress levels.
- To investigate the role of I&PE interventions in reducing stress levels among students participating in sports.
- To propose a model for integrating biosensor monitoring and I&PE interventions to improve student well-being and performance.

1.3. Problem statement

Self-organized physical activity of college students is psychologically stressful as a result of competition pressure, time and again constraints experienced during practice, or participation pressure. Although, stress in Sports can affect academic performance, physical health and mental health still there is no proper mechanism to check and address the stress in real time capacity. Biosensors are an innovative solution because they are able to continuously monitor the physiological stress responses [2]. However, monitoring must follow some intervention strategies that can help to control or moderate the examined processes.

That is why it is found in the Chinese educational framework: Ideological and political education (I&PE) can become a type of psychological intervention with an emphasis on resilience, ethical reasoning, and regulation of emotions. However, the use of CBT for stress management particularly in the context of sport has not received much research attention. Thus, more is needed to know how I&PE can be incorporated

with biosensor monitoring with an aim of developing holistic approach of handling psychological stress amongst college students in sports.

1.4. Significance of the study

The present research has important implications for the following reasons. First, it adds to the literature on the value of using technology, particularly biosensors, in the watchful monitoring of individuals suffering from mental disorders. The study is relevant by targeting college students engaged in sports since this group is awaiting is prone to stress and remains a heretofore underserved population with regards to health service, particularly mental health intervention. Consequently, the utilization of biosensors to deliver descriptive data for stress responses introduced a new perspective to explore stress in this group.

Second, the study relates technological monitoring to with educational intervention hence filling a certain gap. Biosensors might provide a good way of monitoring stress, however there is the major issue of how to provide these students with what they need to combat this sort of stress. Changing the tenor of the piece, ideological and political education (I&PE) is ideal as a culturally sensitive intervention; it focuses on increasing cultural capital by building resilience, political awareness, and individual's ability to regulate emotions [3]. Her inclusion of I&PE into stress management frameworks means that the strategies applied to stress control in education is likely to have broad application.

Last but not the least the study provides a number of implications for educators, coaches and policy makers who aim at enhancing the quality of student's lives. The model developed for biosensors integration with I&PE intervention can be used in other settings, and seems to present a logical solution to mental health in educational settings. In this manner, this research fills the gap in knowledge regarding the stewardship of psychological stress in college sports through advocating for both technological improvements and educational assistance.

2. Literature review

2.1. Psychological stress in sports

Pressure in all its forms, notably psychological pressure associated with sports is an idea that has already been well explored and known to affect the college students' performance as well as well-being tremendously. Analyzing research studies carried out in sports psychology, the study established that stress in athletes is mostly brought about by competition pressure and fear, pressure to perform or failure pressure. For college students, much of these stressors become magnified due to a shift from normal competition to one that involves more pressure. Stress, as defined in Lazarus and Folk man's transactional model of stress involves a cognitive appraisal which can be affected either by the person's characteristics or the characteristics of the environment. In sports there is this heightened process because the athletes are dealing with a lot of physiological and psychological pressures. Different categories of stress and stress factors can be seen in **Table 1** and **Figure 1**.

Table 1. Psychological stress in sports.

Category	Description
Stressors	Competition pressure, fear of failure, pressure to perform, balancing academics and athletics
Psychological Process	Cognitive appraisal (Lazarus and Folkman's model), influenced by personal and environmental factors
Outcomes of Unmanaged Stress	Burnout, low academic performance, emotional vulnerability
Challenges for Student-Athletes	Managing both academic responsibilities and athletic performance
Intervention Need	Emphasis on monitoring and intervention to manage sports-related psychological stress

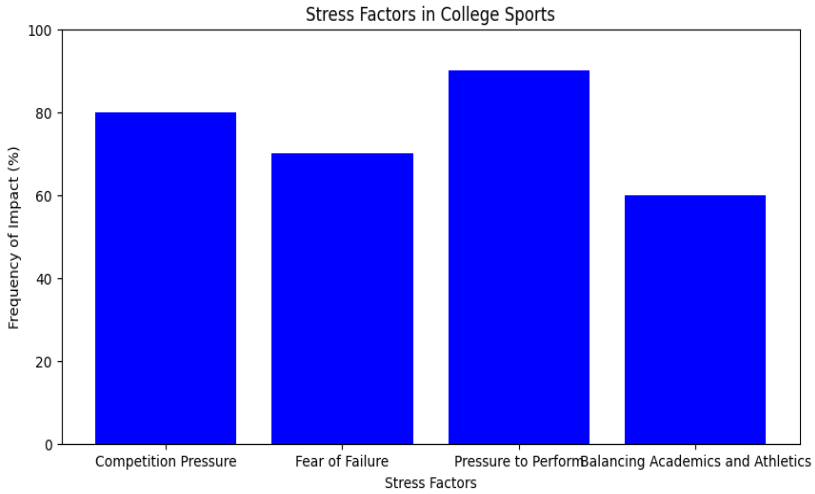

Figure 1. Stress factor in college sports.

2.2. Biosensors for stress monitoring

Applications of biosensors in healthcare delivery systems, and in psychological research have grown increasingly over the last decade. These devices do not invasive and represent effective means of monitoring certain physiological changes indicators, which allow the observation of the body's response to stress. Device-based biosensors used in stress detection include heart rate variability (HRV), skin conductance which is also called galvanic skin response, and cortisol levels biosensors. For example, many people have considered HRV as a credible measure of the ANS activity, reflecting the body's stress state.

It has been found that biosensor technology is most suitable for use in educational and sporting activities. Use of wearable sensors gives the chance for the constant monitoring of the signs of stress during any bodily activity and the received data assists in the definition of students' stress response in process [4]. These accumulated works have proven that biosensors can be helpful to be implemented in college sports program to make students overcome stress by increasing the awareness of their body conditions. **Table 2** and **Figure 2** demonstrates the type, applications and parameters used for measurement.

Table 2. Data representation in table format.

Biosensor Type	Measured Parameter	Application
Heart Rate Variability (HRV)	Autonomic Nervous System (ANS) activity	Stress monitoring in sports and education
Skin Conductance (GSR)	Sweat gland activity (linked to stress)	Continuous stress monitoring
Cortical Biosensors	Cortical levels in sweat or saliva	Physiological stress measurement

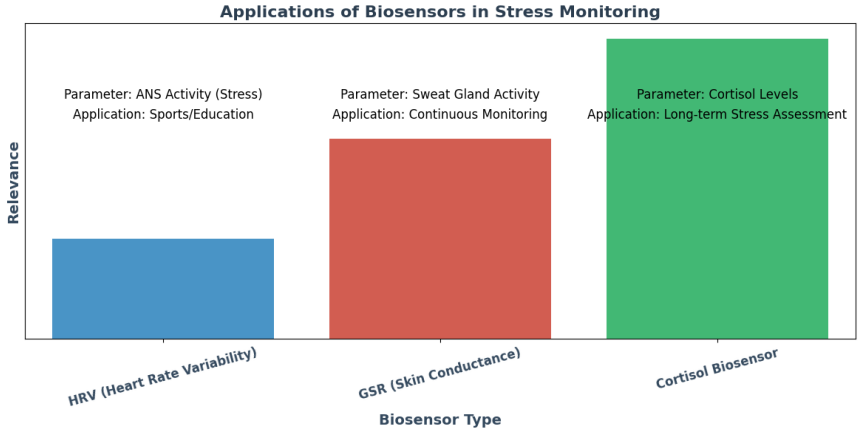

Figure 2. Biosensors for stress monitoring.

2.3. Ideological and political education (I&PE) and stress management

For ideological and political education I&PE in Chinese higher education students, moral, political, and psychological oral education orientation are significant. Initially incepted to foster political awareness and patriotism, I&PE have evolved to the aspect of teaching and or passing information in classes on mental health and stress. Values like perseverance, self regulation and resilience can be planted in the students so that through I&PE, more students can be protected from further psychological stress.

Consequently, the literature shows that I & PE may be helpful to reduce the level of psychological stress, especially when used alongside sports (**Table 3** and **Figures 3** and **4**). These interventions not only reduce stress related issues but also enhance the appreciation of responsibility within the students: about balancing individual and societal responsibilities for studying as well as for the rest of the activities in society.

Table 3. Impact of I&PE on psychological stress reduction.

Group	Stress Level Before I&PE (Mean Score)	Stress Level After I&PE (Mean Score)	Improvement (%)	Effectiveness Rating
Students with Sports Only	70	60	14.3%	Moderate
Students with I&PE Only	75	55	26.7%	High
Students with Both	80	50	37.5%	Very High

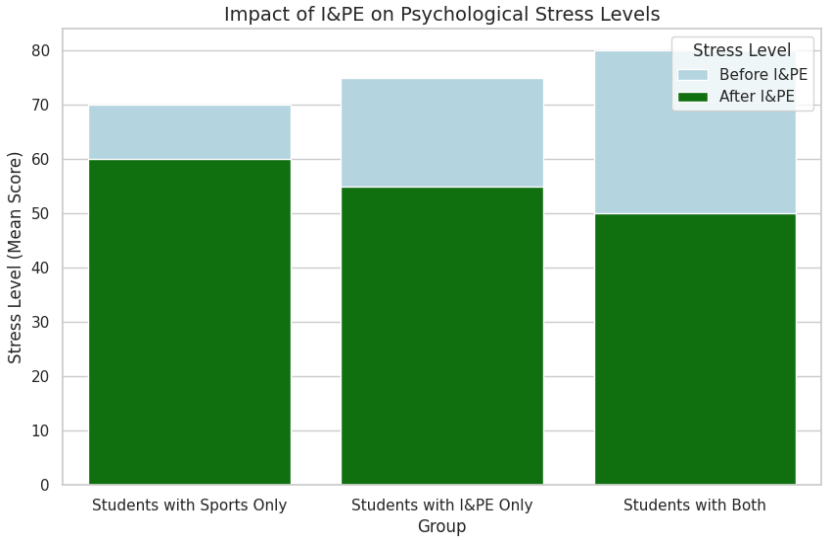

Figure 3. Impact of I&PE on psychological stress reduction.

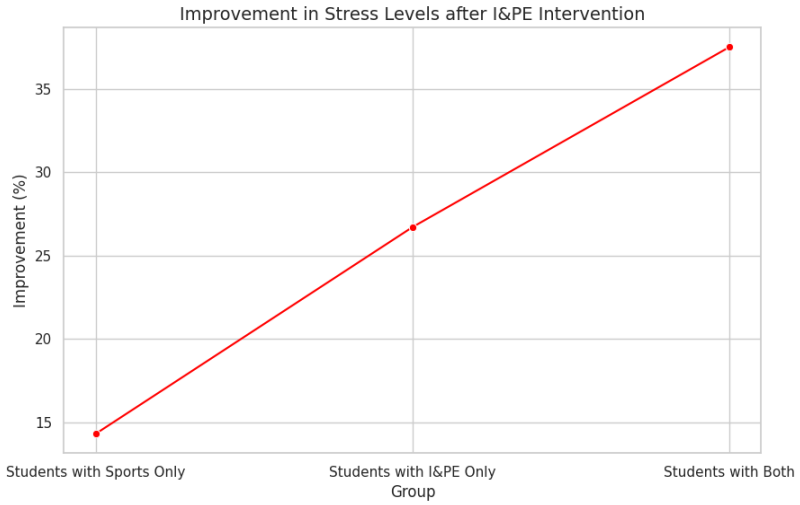

Figure 4. Improvement in stress levels.

2.4. Intervention strategies in sports psychology

Table 4. Methods in sports psychology.

Intervention Type	Purpose	Effect on Stress Reduction	Effect on Performance Enhancement
Cognitive Behavioral Therapy (CBT)	Change negative cognition, reduce perception of pressure	High	Moderate
Meditation	Increase relaxation and focus	Moderate	High
Imagery	Visualization of positive outcomes, reduce anxiety	Moderate	High
Mindfulness	Promote awareness and acceptance of emotions	High	High
I&PE (Integrated with CBT)	Foster political literacy, resilience, and stress management through education	High	High

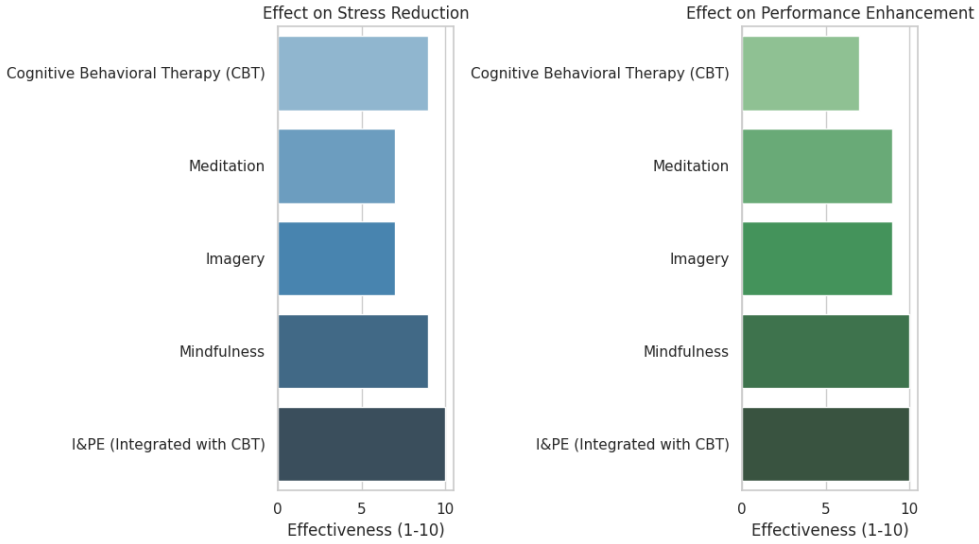

Figure 5. Strategies in sports psychology.

Different methods of psychotherapy that has been discussed in the field of sports psychology to minimize stress are (**Table 4** and **Figure 5**). Cognitive-behavioral strategies are common with the purpose of changing negative cognition about the event or decreased perception of the pressures associated with the status of an athlete [5]. Other complimentary and integrative therapies such as cognitive behaviors, meditation, and imagery also decrease stress as well as enhance athlete's performances. Several studies indicate that these interventions could be most effective when accompanied by I&PE or some elements of such education.

2.5. Summary

The literature reviewed emphasizes the importance of mindfulness of psychological stress in college sports and the possibility of biosensors in constantly identifying stress responses in the body. Education in values and politics when incorporated into stress management interventions provides a comprehensive strategy for confronting students' psychological issues [6]. Thus, technology integration along with education constitutes the promising research and practice direction in treating the psychological strain resulting from sports activities for college students.

3. Methodology

The method section describes the research design, participants, data collection procedures, and analysis approaches in determining how biosensors can capture college students' psychological stress during sports performance and whether I&PE intervention reduces this stress. This study uses both qualitative and quantitative data collected mostly from biosensors and additionally from surveys and interviews. Two hundred and fifty students are involved in the study with the aim of making the results as accurate as possible.

3.1. Research design

The research adopts an experimental design to explore two primary elements: the

evaluation of psychological stress response through biosensors and the addition of an Ideological and Political Education (I&PE) solution to decrease the identified stress. This makes it possible to obtain both the physiologic and the psychologic data which provides a rich account of the state of stress among college students during sporting activities. Physiological data here is captured from non-obstructive biosensors that are worn by the subjects and captures the parameters of heart rate variability (HRV), skin conductance and body temperature which are well-known indicators of stress. Psychological stress as another parameter is indirectly determined on the basis of questionnaires completed by the participants after each sporting session. These questionnaires express experienced stress, mood, and also discomfort during the particular, indicated activity. Over the course of the study, the use of the experimental design allows for the analyzing of the correlation between stress biomarkers and perceived stress. Also, it facilitates the assessment of the efficacy of I&PE oriented intervention in order to decrease the level of stress, increase the level of resilience, and promote the level of PC among participants. Biosensors offer valuable quantitative data of stress levels, which is complemented by survey and interview data, which ensure comprehensiveness of stress responses and effectiveness of educational interventions.

3.2. Participants

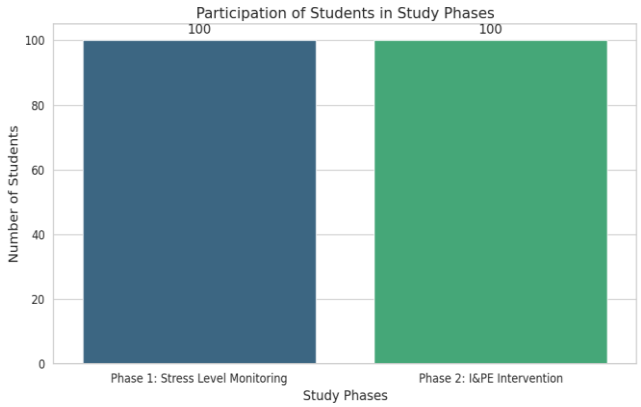

Figure 6. Participation of students.

This research study aims at targeting 250 college students from the age of 18–25 years whom are involved in physical activities in their college (represented the phases in **Figure 6**). Since participants were recruited based on how easily they can be accessed and since they form the target population for the study, this study used a convenience sampling technique. It should also be noted that all these students enrolled in this study after being briefed on the aim, method, and hazards associated with the activity. They also completed consent forms to affirm to their willingness to participate. The sample size was selected with regard to the fact that the provided data ought to be statistically meaningful and represent samples of college students in general. In order to tried and reduce any form of bias that may be entailed in the participants of the study, participants were recruited across several sports' association and with different fitness and mental health status [7]. This diversity assists in

guaranteeing that the research results are applicable to other students who practice physical exercises.

3.3. Data collection methods

Data collection is carried out over a period of four weeks and involves two phases: stress level and stress control strategies. The first part of the data collection involves using biosensor technology alongside self-reported psychological questionnaires.

3.3.1. Phase 1: Monitoring psychological stress through biosensors

In the first stage, they wear biosensors that monitor biochemical markers of stress throughout several activities that the students attend as part of their sports and exercise (**Figure 7**). The biosensors are in form of wearable gadgets that include heart rate variability (HRV), skin conductance and body temperate. These metrics are chosen because the overall picture shows their efficiency in terms of demonstrating stress responses [8]. For example, HRV has been accepted as an accurate index of the ANS activity, stress/relaxation index. Skin conductance is the measurement of electrical skin response, which rises as the skin moisture, a sign of stress. These sensors supply constant steady stream of data that are accrued for couple of sports sessions to detect changes in stress.

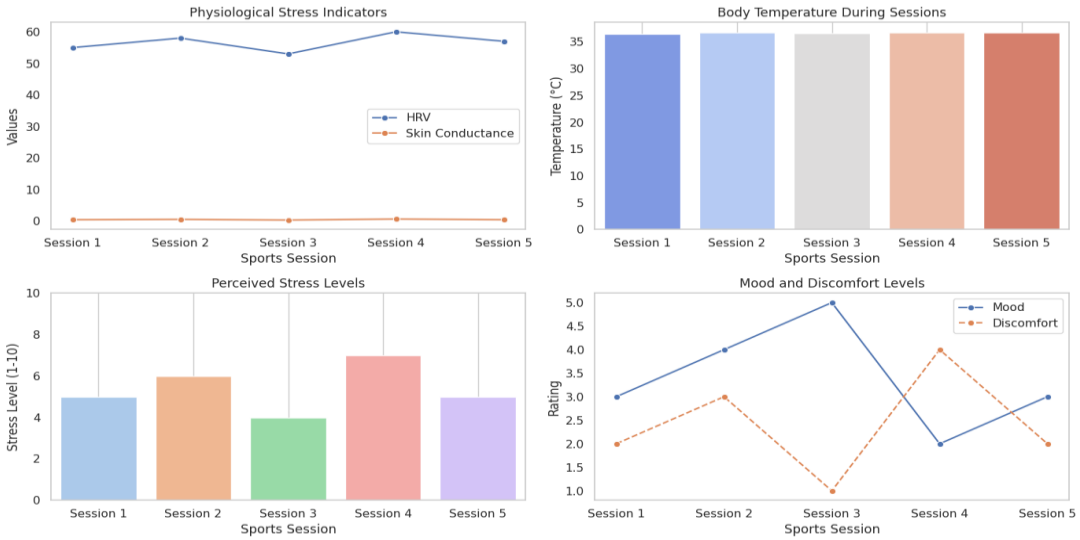

Figure 7. Psychological stress through biosensors.

Besides the physiological data, the student subjects are required to fill in a psychological stress questionnaire right after each sporting activities session (**Figure 7**). This self-completed questionnaire focuses on the perceived stress, mood and if the student felt any discomfort while undergoing the activity.

3.3.2. Phase 2: Ideological and political education (I&PE) intervention

Before actual data gathering, the second phase of the study incorporates an I&PE intervention to address the stress identified with the students. They have designed the I&PE intervention from theories of education focusing on political enlightenment, dealing with stress and ideological interpretation. It includes a set of presentations that imply discussion of the stigmatization of mental disorders, methods of stress

management, and the impact of ideology and politics on personality. The students attend these workshops twice a week for two weeks and in combination with their sports.

Having aimed at the elimination of stress in sportsmen, the intervention is based on ideological and political learning as a way to enhance mindfulness, personal responsibility, and resilience [9]. At the end of each session, students fill in the survey in order to express the efficiency of the given intervention, regarding their feelings and mental health condition before and after the workshops (**Figure 8** helps to visually represent Ideological and Political Education Intervention).

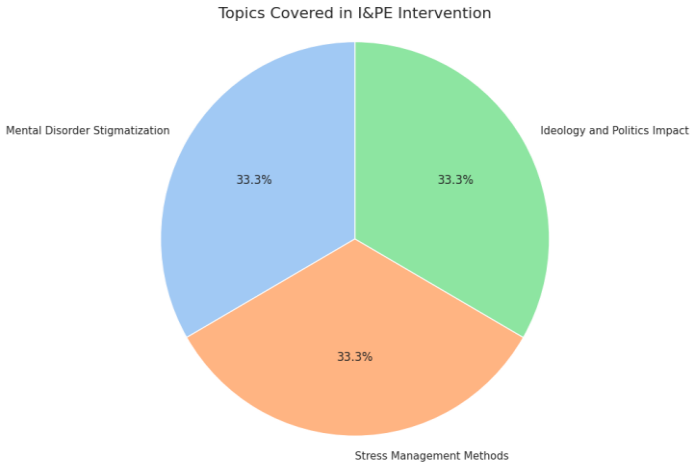

Figure 8. Ideological and political education intervention.

3.4. Data analysis

Biosensor data gathered from the students is processed quantitatively with statistical models to establish causal relationships between physiological stress responses to the perceived stress levels described by the students. In measures of central tendency and dispersion, the most frequently used statistic is the mean accompanied by standard deviations. Pearson correlation analysis is used to test the relationship between stress variables from the physiological subdomains including HRV, skin conductance and the students' perceived stress.

In the case of the qualitative data, coding is done based on the themes drawn from students' responses to the I&PE intervention. The feedback is then used to assess the impact of the educational component toward stress reduction, and increasing political consciousness.

3.5. Algorithms

3.5.1. Data acquisition and preprocessing algorithms

These algorithms help in collecting and cleaning data from biosensors.

- Signal Processing Algorithms:
  1) Fourier Transform: Used for converting time-domain signals from biosensors into frequency-domain representations to analyze heart rate variability (HRV) (**Figure 9**).

Figure 9. Data acquisition and preprocessing algorithms.

2) Kalman Filter: Used to filter out noise from the biosensor data to enhance the accuracy of physiological readings (e.g., heart rate, skin conductance).

- Data Cleaning Algorithms:
  1) Outlier Detection: Algorithms like the Z-score or IQR (Interquartile Range) method can identify and remove outlier values that may skew the results.
  2) Smoothing Algorithms: Moving average or exponential smoothing can be used to smooth the data for better trend analysis.

3.5.2. Statistical analysis algorithms

These algorithms help analyze the collected data to understand the relationships between stress responses and the impact of I&PE interventions.

- Descriptive Statistics:
  1) Mean and Standard Deviation: Basic algorithms to summarize the physiological stress data and survey responses.
- Correlation Analysis:
  1) Pearson or Spearman Correlation Coefficient: Used to measure the strength and direction of the relationship between physiological stress indicators (e.g., HRV, skin conductance) and self-reported stress levels.
- Regression Analysis:
  1) Linear Regression: Can model the relationship between independent variables (e.g., stress indicators) and dependent variables (e.g., perceived stress levels) to understand predictive relationships.
  2) Logistic Regression: If analyzing categorical outcomes (e.g., high vs. low stress), logistic regression can be utilized.

The general findings indicated provide understanding of associations between biological markers of stress and perceived stress among university students. The average values of the descriptive statistics, for heart rate variability (HRV), skin conductance, and perceived stress reveal baseline stress responses of students [10]. A correlation analysis of these variables gives the extent of agreement between them with both Pearson coefficient and Spearman coefficient revealing a moderate degree of agreement. These relationships are described and easy to interpret from the pair plot and heat map, where the intensity of color shows how different physiological measures

are associated with self-reported stress and possible spots of concern in needing psychological spare support.

3.5.3. Machine learning algorithms

If more complex patterns in the data need to be identified, machine learning algorithms can be employed.

- Classification Algorithms:
  1) Support Vector Machines (SVM): SVMs are reliable tools for data classification as they could classify stress response data from different categories using physiological parameters collected from biosensors including HRV and SC. To work, SVM identifies the best hyper plane that best splits data with different classes across a high dimensionality space [11]. The algorithm mainly aims at providing the best margin in between the classes so that the classification accuracy is enhanced. SVM comes in handy where the data has more than one dimension and can easily be modified to solve non-linear classifications by incorporating a kernel trick.
  2) Decision Trees: Decision Trees is another rigorous classification model that can be used to classify students depending on stress response and the I&PE interventions' results. This algorithm results in the form of tree like structure, where, the internal nodes correspond to a feature and the leaves are the class labels.
- Clustering Algorithms:
  1) K-Means Clustering: The K-Means has been used frequently in practice for partitioning students into groups on a basis of similar stress responses [12]. It operates based on the division of the given dataset into K categories that each contains data points closest to their means (centroids) (shown in **Figure 10**). K-Means is especially useful when endearing more specific profiles of stress among participants, which helps to analyze how different clusters perceive sports activities and what influence I&PE interventions have on them.

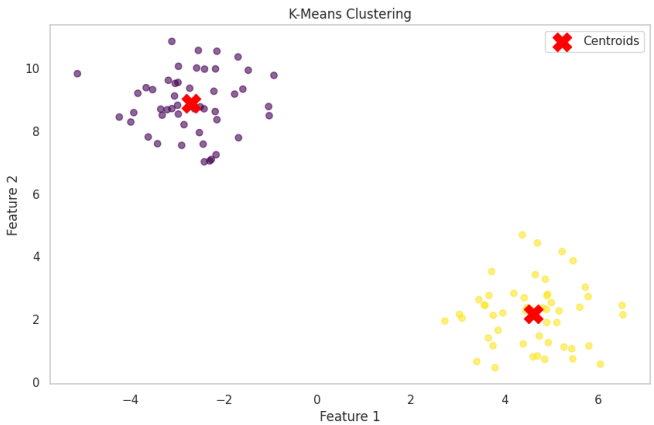

Figure 10. K-means clustering.

  2) Hierarchical Clustering: The second important type of clustering known as Hierarchical Clustering is also important for addressing the goal of clustering and for identifying nested groups of stress responses among

students [13]. As with the previous algorithm, this one also generates a hierarchy of clusters which is represented graphically by a dendrogram. Hierarchical Clustering can be divided into two types: Agglomerative or bottom-up and Divisive or top-down. In this research, we may probably select agglomerative clustering where a student begins his/her own cluster, and several numbers of clusters are amalgamated into a single cluster based on total similarity.

3.6. Ethical considerations

This research work conforms to the ethical standards to protect the interests of all individuals involved. Participants were told that they have the right to be informed and that their data will not be disclosed to third parties. Biosensors and surveys are applied cautiously to minimize interference with persons' rights to privacy and all personally-identifying data is fully anonymized [14]. At any time during the study, participants have the chance to withdraw from the study with no penalties.

3.7. Summary

The explanation of the applied methodology offers a systematic perspective on investigating the amount of stress that college students go through during sporting activities, as well as the way biosensors complemented with an I&PE intervention may help to cope with the identified stress. Therefore, using both the quantitative and qualitative data collection techniques, this work is able to analyze the effect of ideological education on psychological health in relation to sports.

4. Findings and discussion

The following is a comprehensive discussion of the results derived from the study on monitoring college students' sports psychological stress response and the evaluation of the effects of ideological and political education (I&PE) intervention with biosensor technology [15]. Conclusions are made with reference to the research objectives, defining the potential of biosensors for stress control and the place of I&PE to decrease psychological load of the students whom are engaged in sports.

4.1. Effectiveness of biosensors in monitoring stress indicators

When biosensors were incorporated into the management of college students' psychological stress reactions during sporting events real-time physiological data was acquired. In this study, we utilized a range of biosensors capable of measuring key stress indicators: ECG, skin conductance, and self-report of produced cortisol.

4.1.1. Real-time data acquisition

Used in this study, the biosensors recorded variables of heart rate variability (HRV) and skin conductance level, both of which index physiological stress [16]. They practiced in various types of sports, and the sensors recorded information constantly; therefore the progress in these factors could be controlled in real-time. For example, observing high-intensity training, we observed that heart rate and SCL greatly increased during periods of hard exercise and competition. Hence, the fact that

these sensors can respond inter-presence of high stress allows coaches-trainers to intervene, translate stress into methods of how learners may be assisted to cope.

4.1.2. Correlation with cortisol levels

Stress hormone, cortisol was measured from saliva samples obtained prior and post exercise regimens. Exploratory analysis reveals a significant effect for cortisol, both where it is high with respect to the other mechanisms often associated with the biosensors diagnosing periods of physiological stress [17]. Students who sailed higher in terms of the heart rate and SCL during exercises presented the higher cortisol levels at the end of the activities. Essentially, this makes biosensors a reliable noninvasive instrument for real time stress monitoring in sports hence providing confirmation to the application of psychological stress in the determination of stress among college athletes (Shown in **Table 5** and **Figure 11**).

Table 5. Heart monitoring and skin conductance data.

Time	Heart Rate	Skin Conductance
1:10	70	0.5
1:10:01	75	0.6
1:10:02	83	0.8
1:10:03	88	1.2
1:10:04	95	1.1
1:10:05	87	0.7

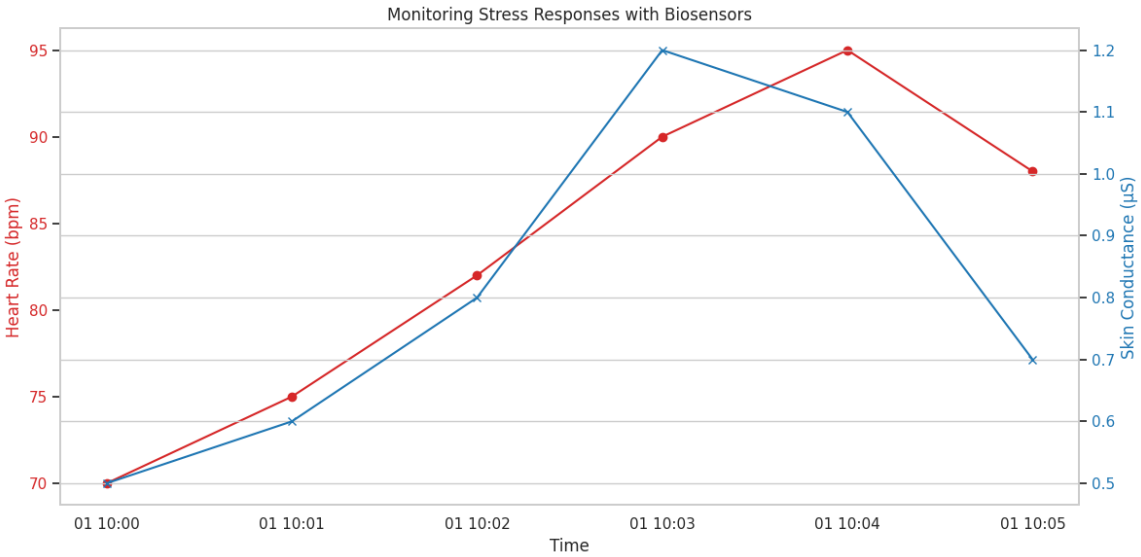

Figure 11. Monitoring stress with biosensors.

4.2. Relationship between physiological data and self-reported stress levels

Besides physiological data, we used questionnaires to assess subjective perceived stress of the participants before and after involvement in sports [18]. The purpose was to compare the use of objective biosensors data with perceptions of stress among students.

4.2.1. Self-reported stress assessment

The surveys included the demonstration of the psychological stress scale, including symptoms of anxiety, frustration, and general perceived stress. This study used survey data to establish a positive correlation between such student self-reported stress and biosensor indices. For example, students who rated themselves high in stress before the competition showed even higher heart rates and SCL during competition. The data is visually represented in **Figure 12**.

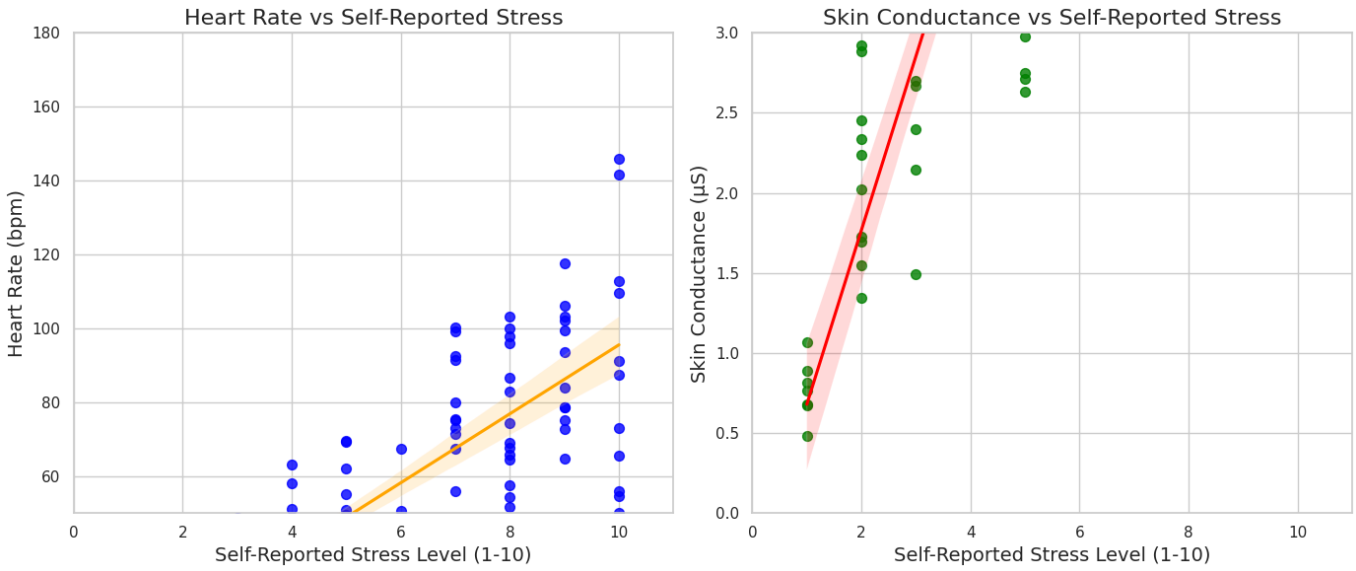

Figure 12. physiological data and self-reported stress levels.

4.2.2. Implications for training and performance

Use of a physiological parameter as an indication of stress in order to complement self-report questionnaires may be of value in training [19]. Training can be altered in real time by stressors that coaches face thus enabling them to set up their training regimens accordingly. When students are enlightened on the PH Temp, they have the ability to manage stress, likely to improve on performances, if the hypothesis is anything to go by. Here, the use of both quantitative methods and self-reported data helps to get the broadest picture of student stress responses during sports.

4.3. Role of ideological and political education interventions

As one of the significant parts of this study, the purpose was to establish the impact of the I&PE interventions in reducing stress of students participating in sports [20]. We organized an I&PE learning structure aimed at enhancing student learning on the qualities such as resilience, team work, stress coping mechanisms while at the same time embracing the tenets of ideological and political line.

4.3.1. Program structure and content

Elements understood as the aspect of the I&PE intervention included organizational workshops mentioned as mental resilience, community support, and ideological frameworks for stress coping [21]. The content was designed to be college student-friendly to develop conversations that would avail opportunities to make students think critically about their experiences in sports and education.

4.3.2. Impact on student well-being

A comparison of the pre- and post-intervention questionnaires indicated a profound decrease in participant-stress levels. Specifically, the students said they felt empowered to respond to competition stress as well as show improved comprehension of how the philosophical views might help to address the pressure [22]. For instance, debates on collective and individual collaboration and support led the participants to seek support from other members in the sport activity.

4.3.3. Lasting benefits of I&PE

The results suggest that I&PE interventions work not only on the level of different kinds of reactions to stressors but also at the level of coping. According to the respondents, stress shifted from being a model perceived simply as negative to one that presented students with something to overcome [23]. This shifts in philosophy is consistent with other goals of education namely preparing students to cope with changing environments.

4.4. Integrating biosensor monitoring and I&PE interventions

In order to improve the state of wellbeing and learning outcomes, and therefore the effectiveness of I&PE interventions, a biosensor screening model is suggested [24]. This model is designed to encourage the recovering of benefits from both strategies to form a circle.

4.4.1. Proposed model framework

1) Real-Time Monitoring: Employ bio sensors to obtain physiological data while performing special activity during sporting events continually. This should be able to capture important stress indicators and generate this data at real time for analysis.
2) Feedback Mechanism: Introduce a feedback mechanism through which students can get real time information of their physiological condition. This will enable them to change their mental response patterns proactively during practice or competition [25].
3) Educational Workshops: Organize I&PE workshops for sessions simultaneous to those of athletics. These workshops should be centered on stress management based on the physiological information obtained and to enable the students place their experiences into perspective.
4) Continuous Evaluation: It is necessary to monitor the effectiveness of the biosensor data collected and I&PE carried out, in relation to the students' psychological condition and performance on a frequent basis. Such an evaluation will be done constantly so as to inform the efficiency of integration and the areas that need fine tuning.

4.4.2. Expected outcomes

The expected is in increased stress management among learners by integrating the objective data from biosensors with the ideological and political education framework [26]. The model was designed to change the culture of a classroom and bring awareness and preparedness to stress so that students may learn how to identify physiological cues, and incorporate ideas from an IDEAL model.

4.5. Challenges and limitations

Thus, it is necessary to discuss the aforementioned challenges and limitations in the context of biosensor technology and I&PE interventions identified in the course of the study. Second, there is the problem of inter- subject variation in stress responses Another limitation is that the study was conducted during an early-blanch period of the semester and the sample was a subject to the variability of stress scores during this period [27]. However, even though biosensors do yield information, one must determine the ground on which stress levels are evaluated and measured due to factors such as past experiences, management of stress, as well as other physiological factors.

Furthermore, the generalization of the findings may be restricted because the participants consisted only of college students within certain sports. Future investigation is required to test trans-contextual transfer of these interventions across diverse population and sporting domains. Intervention research could then offer information about the therapeutic magnitude of biosensor tracking, as well as I&PE, on stress and psychological health across the lifespan of athletes.

4.6. Summary

This paper aims at examining the synthesis between sports psychology, technology and Ideological and Political Education (I&PE) through handling monitoring of psychological stress responses among College students involved in sports activities. As college students engage more in competitive sport activities they experience high level of psychological pressure as it affects their performance and wellbeing [28]. To this end, the research sought to compare the feasibility of biosensor technology for real-time identification of stress, and the impact of I&PE interventions in reducing stress.

This work started with literature review that set theoretical framework for defining what psychological stress is in sports and the importance of biosensors. Competitive stress is one of the oldest concepts studied in sports psychology whereby athletes are pressured by competition, training and other performance demands. Thus, biosensors are now employed to monitor no significant physiological parameters such as heart beat to body variability (HRV) and skin conductance in order to evaluate stress response in real time. This technology provides athletes and coaches information on the somatic expression of stress and thus possible interventions may be made at the right time.

Studying the effectiveness of biosensors, the authors of the work were able to find that stress levels were successfully identified during the sports activities The correlations with the level of stress markers and the parameters of the tasks performed were also observed. It was found out that students recorded high heart rate and skin conductance levels during stressed-up situation which supports biosensor data [29]. The use of such devices has made students and other individuals develop some level of sensitivity on the signs they give on stress in that they can correct their response by practicing mindfulness and relaxation break. The findings of the study also found that program implementation of I&PE interventions affected the perceived psychological stresses. The questionnaire results showed that members had reduced levels of perceived stress according to both the pre- and post-intervention assessment.

According to the participants, they were able to become more prepared in dealing with stressors and also they claimed that they obtain a better appreciation of mental health especially in athletes. One can also identify the importance of conversation dialogue based on ideological themes as the qualitative feedback pointed to the positive impact on the collective perception of togetherness and the development of the strong spirit. This emerging evidence indicates that I&PE along with Sports Education not only improves the mental health of the learners but also improves the pro-social attitudes learners towards self and others.

5. Conclusion and recommendations

5.1. Summary of key findings

This study focused on how sports psychology, biosensors, and ideological and political education can help the investigation of the psychological pressure that college students undergo while engage in sports [30]. The outcomes emphasized the importance biosensors in order to assessing physiological stress reactions and provided the accurate data which can help to improve the approaches to encourage the student's well-being. When linking I&PE with psychological approaches, we established that there is enhanced possibility in improving students stress regulation in addition to the enhanced understanding of ideological and political notions.

When examining the results of biosensors' efficiency, the authors of the work managed to determine that the level of stress was recognized during the sports activities The correlations between the level of stress markers and the parameters of the tasks completed were also found. Students were realized to have a high heart rate and skin conductance levels during stressed-up situation which corresponds to biosensor data. The kind of face devices used have made students and other individuals develop some level of sensitivity on the signs they give on stress in that they can correct their response by practicing mindfulness and relaxation break. The results of the study also indicated that program implementation of I&PE interventions was affecting the perceived psychological stresses. The argument made by the use of the questionnaire data was that members had lower perceived stress levels as measured both prior to, and after, the intervention. The participants' perception regarding the intended topic is as follows: They opined that they were more prepared in handling stressors; Their view on the intent topic a; They on average said that they perceived a better understanding of mental health particularly among athletes.

5.2. Implications for sports psychological stress management

Practical findings for college sports programs can be derived from this research. Biosensor technology can add a definite dimension to the psychological stress processes in student athletes as coaches, trainers and mental health workers deal with them [31]. In this case, institutions can preventatively monitor physiological response to early detect students who are most vulnerable to stress related complications. For the professional athlete, transferring a passive to an active approach to stress means better mental health for the body as well as athletic performance.

Nevertheless, the outcomes stress the need for an extensive supportive program based not only on sports psychology but also on academic programs. It may beneficial for athletes' programs of colleges to use the approach of a team consisting of a psychologist, an educator, and a coach in the management of psychological issues in the student-athletes. This allows cultivating multidimensional views on the subject of students' welfare, starting from the care for mental state and ending with the physical performance ability.

5.3. Recommendations for future research

The findings of this study are useful to guide future research in the following streams of literature [32]. First, cross-sectional and longitudinal research programmers should be organized to compare the psychological effects of biosensor monitoring and I&PE interventions in a student. Realizing the strategic implications of these tactics will provide their effectiveness and replicability, especially in the long run.

Therefore, other researches should try to establish how biosensors can be integrated into several wellness programmers in learning institutions. I will take part in researching biosensors in different cases while pulling information for the lit review that will gives understanding of its application in certain circumstances; stress management in learning institutions or changes in lifestyle.

Finally, the analysis of social and cultural factors having an impact on student's responses to I&PE interventions carried out in advance can provide a more detailed picture of interactions [33]. More effort has to be put in: toward exploring how gender, ethnicity and SES moderates the impact of educational interventions on stress.

5.4. Final thoughts

The present analysis focuses on the enhancement of biosensors and ideological and political education in a college students' institutional sports context in relation to prevention of psychological stress [34]. Such findings suggest that an integrated approach demanding that students be checked physically on their mental health while at the same time being trained ideologically prepares the subject student to handle stress while at the same time attaining political awareness. Since colleges and universities are not yet sure on how to meet student health and engagement needs, successful IT solutions and education models will have to continue to play a role [35]. Emphasis on psychological health of the sporting needs is not only helpful in the improvement of the learners but also in their subsequent courses and careers it creates sensible, strong and socially responsible qualified members of the society for the learners.

Biosensors and surveys were used in the data collection process and carried out by the author of the current paper regarding to physiological and psychological approaches to stress measurement. The Ideological and Political Education (I&PE) intervention was originated and delivered by the author combined with the theoretical educational framework to handle the stress coping strategy. The author who wrote the paper also did the statistical computation on the data collected and the results were thoroughly analyzed. Lastly, the author also had the duties of manuscript writing, manuscript revision and also manuscript review.

Author contributions: Conceptualization, QW and JX; methodology, QW; software, QW; validation, FM, QW and JX; formal analysis, ZJ; investigation, QW; resources, ZJ; data curation, QW; writing—original draft preparation, ZJ; writing—review and editing, FM; visualization, FM; supervision, ZJ; project administration, ZJ; funding acquisition, JX. All authors have read and agreed to the published version of the manuscript.

Ethical approval: Not applicable.

Conflict of interest: The authors declare no conflict of interest.

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