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Optimizing sports activities on students' mental health and motivation: a person-based framework-based mixed-methods approach

Fajar Raya Ferdinal Kusuma Bakti[1], Siti Nurrochmah[2], Lulut Gilang Saputra[3], Lalu Moh Yudha Isnaini[4]
[1,2,3,4] Universitas Negeri Malang, Indonesia
Email: fajar.raya.fik@um.ac.id[1], siti.nurrochmah.fik@um.ac.id[2], lulutgilang.fik@um.ac.id[3], lalu.isnaini.fik@um.ac.id[4]

ABSTRACT

Background. Mental health problems and declining academic motivation are increasingly prevalent among college students, while evidence regarding the role of physical activity in supporting psychological well-being remains limited. **Objectives.** This study examined the influence of physical activity on college students' mental health and academic motivation. **Method.** A sequential explanatory mixed-methods design was employed. Quantitative data were collected from 199 college students using the DASS-21, Academic Motivation Scale (AMS), and Positive and Negative Affect Schedule (PANAS), followed by semi-structured interviews. Quantitative data were analyzed using descriptive statistics, correlation, regression, and t-tests, while qualitative data were analyzed thematically. **Results.** Students reported low depression, moderate anxiety and stress, and high exercise motivation. Exercise motivation was significantly associated with lower psychological distress, whereas exercise frequency and duration did not significantly predict stress levels. Qualitative findings highlighted the importance of personal relevance, autonomy, and social support in maintaining physical activity and promoting psychological well-being. **Conclusion.** Exercise motivation plays a more important protective role than activity volume alone in supporting college students' mental health and academic motivation. These findings provide evidence for developing person-centered physical activity programs in higher education.

Key words: Sport activities; mental health; motivation.

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Correspondence Address:

Fajar Raya Ferdinal Kusuma Bakti
The Faculty of Public Health, University of Malang, Jl. Surabaya 09, Klojen, 65111 Malang, Indonesia.

INTRODUCTION

This study examines the relationship between sports activities and students' mental health during their daily lives. Student mental health is a crucial issue in higher education, directly related to the quality of learning, academic engagement, social pressures, environmental conditions, and lifestyle changes (Chmelík et al., 2023; Cocca et al., 2020; Idaiani & Suhardi, 2006; Liu et al., 2025). These factors often lead to stress and anxiety, which can negatively impact psychological well-being and reduce motivation to learn. Mental health and academic motivation are two key aspects that contribute to students' success in completing higher education (Balore et al., 2026; Gunawan et al., 2023; Yogi et al., 2023). In an increasingly dynamic and stressful environment, students are often faced with complex challenges, including academic demands, social issues, and significant life changes (Oktarizal, et al. 2023). These challenges can negatively impact mental health and hinder their motivation to

learn and develop optimally. Therefore, a holistic approach is needed to support mental well-being while motivating students (Yuliardi et al., 2024).

A study conducted by Setyanto (2023), published in Wacana, involved 227 active college students. The results showed that 26.9% (61 students) experienced mild depression, 18.5% (42 students) moderate depression, and 9.3% (21 students) severe or extreme depression. Furthermore, 86.8% (197 students) experienced high levels of anxiety. This data, from a single campus, serves as the initial basis for this research, as no research has previously examined the relationship between student sports activities and depression and anxiety levels in active college students. This study employed a mixed methods approach because the problem under study could not be optimally explained through either quantitative or qualitative data alone. Therefore, this study combined quantitative results from objective measurements of students' sports activity, mental health, and motivation. The qualitative data was collected through interviews based on their perceptions of the benefits of exercise and directly validated the quantitative results to determine whether there was a correlation (Khammassi et al., 2021).

This study used a person-based framework because it allowed concrete data from quantitative comparisons with qualitative data from respondent interviews. Therefore, this method was highly suitable for this study, ensuring that the questionnaire data aligned with the interviews (Ch et al., 2020; Moran, 2012). person-based framework approach emerged as a relevant strategy because it places individual needs, perspectives, and experiences at the center. By combining qualitative and quantitative data through mixed methods, this approach allows for a more in-depth exploration of students' specific needs. This method not only provides insight into factors influencing mental health and motivation but also helps design interventions tailored to individual and environmental contexts (Borowiec et al., 2019; Tossici et al., 2024).

In today's higher education context, the urgency of research on student mental health and motivation is increasingly concerning. Increasing Life and Academic Pressures: Students face increasingly complex challenges, including high academic demands, career competition, economic uncertainty, and social dynamics (Putri, 2024). This pressure often affects mental health, such as increasing levels of stress, anxiety and depression, which can hinder academic achievement and personal development (Borowiec et al., 2019; Tossici et al., 2024). The World Health Organization (WHO) reports that mental health disorders, particularly among adolescents and young adults, are on the rise significantly. This is also evident in higher education settings, where many students struggle to access effective mental health services. Increasing Levels of Stress and Mental Health Disorders in Students, Many students face high

levels of stress due to academic demands, social pressures, and uncertainty about the future (Rahmadi, 2024).

Studies show that 30% to 40% of students worldwide report experiencing anxiety and depression during their studies (Huang & Zhao, 2021). In Indonesia, data from the 2018 Basic Health Research (RISKESDAS) shows that 9.8% of the population aged 15 and over experience mental and emotional disorders. This issue creates an urgent need to find more effective support strategies. This research is relevant for providing a deeper understanding of how to improve student mental health and motivation through an innovative approach based on a person-based framework. The findings are expected to contribute to the development of more effective policies, programs, and interventions to support student well-being in today's higher education environment (Aydoğan & Hadi, 2020; Nuraini et al., 2024).

Much research on college students' mental health and motivation still uses a generic approach that doesn't consider the unique needs of individuals. The person-based framework offers novelty by placing individual experiences and needs at the center, providing deeper and more relevant insights. Much research on college student mental health originates from a global context but is less relevant to students in developing countries like Indonesia. This research will introduce novelty by exploring the dynamics of mental health and motivation within a more specific cultural and social context. Student mental health is currently a crucial issue in many universities, as academic, social, and financial pressures increase (Al-Jubouri & Hussein, 2022; Eigenschenk et al., 2019; Manurung & Dimyati, 2019). Several international and national studies have shown that exercise significantly reduces stress, anxiety, and depression. Meta-analyses conducted by the World Health Organization (WHO, 2023), and Biddle et al. (2019) According to a WHO fact sheet, physical activity is defined as any type of bodily movement produced by skeletal muscles that requires energy expenditure.

This activity is highly flexible because it can be performed with any skill level and encompasses a range of intensities, from moderate to high. Some concrete examples of this movement activity include daily activities and transportation such as walking, cycling, and using a manual wheelchair, especially when going to and from places of activity such as school, work, or the market. Furthermore, physical movement can also be realized through active recreation and play, which is especially important for children—leisure sports, outdoor recreation involving physical activity, and various structured sports tailored to everyone's interests and abilities.

METHOD

This research uses a mixed-methods approach with a sequential explanatory design, which consists of collecting quantitative data first followed by qualitative data exploration (Bowen, et al 2017). This study employed a mixed-methods sequential explanatory design, conducted in two sequential stages. The first stage consisted of quantitative research to identify the relationship between sports activities, mental health, and student motivation. The results of the quantitative analysis were then used as the basis for designing the second stage, a qualitative study aimed at more in-depth exploration of the experiences, needs, barriers, and contextual factors influencing student engagement in sports activities. This approach was chosen because it allowed researchers not only to identify patterns of relationships between variables but also to understand the reasons and mechanisms underlying these quantitative findings through the perspectives of participants. This approach aims to provide a deeper understanding of the relationship between mental health and student motivation, and how a person-based framework approach can be applied to support them.

Participants

A population of students from various study programs at a university with varying mental health and motivational conditions. Stratified random sampling technique for quantitative, ensuring representation based on age, gender, study program, or semester level (Yusuf, 2016). Purposive sampling for qualitative, selecting students with significant quantitative results from both high and low for in-depth interviews. Quantitative Sample Size 199 respondents. Qualitative 20 participants.

In the first phase, data was collected from students using a questionnaire that measured their level of exercise activity, mental health, and exercise motivation. Statistical analysis was conducted to identify patterns of relationships between variables and to group respondents based on specific characteristics, such as level of exercise activity (high, medium, low), level of mental health, and motivation. The results of the quantitative analysis were used to identify groups of students exhibiting distinct characteristics, thus providing a basis for selecting participants in the qualitative phase.

Semi-structured interviews were conducted to explore factors that could not be adequately explained through quantitative data, such as personal experiences with exercise, perceived benefits of exercise for mental health, barriers to participation, social support, and the need for interventions tailored to student characteristics. The interview guide was developed based on key findings from the quantitative phase, so each question was directed to explain the statistical results obtained previously.

Sampling Procedures

Quantitative data

Instrument. Depression Anxiety Stress Scale 21 (DASS-21) (Oei et al., 2013). Academic Motivation Scale: Academic Motivation Scale (AMS) based on Self-Determination theory (Nugraha et al., 2022). Respondents were 199 students active in campus sports programs, selected using stratified random sampling. Data were analyzed using descriptive statistics and inferential tests (linear regression) to identify the relationship between sports participation, mental health, and motivation. The survey used a 5- or 7-point Likert scale. Analysis included descriptive statistics (mean, standard deviation), and inferential statistics regression.

Qualitative data

For qualitative data, the researcher used in-depth interviews. Therefore, this data was collected using an interview guide instrument developed based on the results of the quantitative analysis. The data analysis used thematic analysis to identify key themes (Harahap, 2020). Validation through member checking and triangulation of data obtained from quantitative data will later be matched and connected with qualitative data and will also be discussed from the results of the literature review.

Procedures

The quantitative phase distributes a survey to gain an overview of the relationship between mental health and motivation. Analyzes the data to identify groups of students with extremes (e.g., very low mental health with high/low motivation).

The qualitative phase conducts interviews with students selected from the survey results. Explores individual needs, challenges they face, and potential interventions based on a person-centered framework. Data Integration: Connects quantitative and qualitative findings to provide a comprehensive picture.

Data Analysis

Quantitative data were analyzed using SPSS. Reliability was assessed using Cronbach's alpha. Descriptive statistics were used to summarize mental health, motivation, and affective variables. Pearson correlation analysis examined relationships among variables, while multiple linear regression tested the predictive role of exercise frequency and duration on stress. Independent samples t-tests were conducted to examine gender differences. Qualitative data were analyzed using thematic analysis following Braun and Clarke's six-step

approach. Integration of quantitative and qualitative findings was conducted during interpretation using a sequential explanatory mixed-methods strategy.

FINDINGS AND DISCUSSIONS

Findings

These findings will later explain the results of the description of respondents who are the research subjects, from explaining the respondent's gender, the average number of physical activities respondents do, the number of times they do physical activities in 1 week, and whether these respondents are active in sports-based organizational or club activities.

Table 1. Description of research results

Items	Gender		
	Men	Woman	Total
Population	157	42	199

Items	Average duration of each exercise			
	< 30 Minute	> 60 Minute	30-60 Minute	Total
Men	16	60	81	157
Woman	7	19	16	42
Grand Total	23	79	97	199

Items	Lots of Activities
	Total
>4/ Week	28
1-2/Week	74
3-4/ Week	97
Grand Total	199

Row Labels	Actively participate in structured sports programs (UKM, clubs, athletes)		
	Men	Woman	Total
No	62	12	74
Yes	95	30	125
Grand Total	157	42	199

Gender and sports participation

The descriptive results show that male respondents significantly outnumbered female respondents (78.9% compared to 21.1%). This reflects the male-dominated interest in and involvement in sports activities. This phenomenon aligns with previous research, which found that male sports participation is generally higher than female participation, particularly in moderate-to-vigorous physical activity. Cultural factors, social roles, and perceptions of sports also influence this trend.

However, the proportion of women actively participating in structured sports programs actually shows a positive trend. This indicates that when women have access to activity platforms such as sports groups or clubs, they have a high potential for participation.

Average duration of each exercise session

Most respondents exercised for 30-60 minutes per session. This duration falls within the ideal range according to the World Health Organization (WHO) recommended physical activity standards, which is a minimum of 150 minutes of moderate-intensity physical activity per week.

These results indicate that the majority of respondents have adopted physical activity patterns that support physical fitness. Men tend to have a longer distribution of exercise time than women, but the difference is not significant. Prolonged exercise can contribute to improved cardiorespiratory capacity, muscle strength, and mental health.

Frequency or amount of sports activities

Based on the data, the majority of respondents (48.7%) exercised 3–4 times a week, indicating an active level of participation. This pattern suggests that most respondents have a regular exercise habit, not just occasional activities.

A fairly regular exercise frequency plays a crucial role in maintaining physical fitness, motor coordination, and endurance. Respondents who exercised more than four times per week demonstrated a high commitment to a healthy lifestyle, although their numbers were relatively small (14.1%). On the other hand, the group who exercised one to two times per week (37.2%) still needed to increase their frequency to achieve optimal fitness benefits.

Actively participating in structured sports programs

A total of 62.8% of respondents actively participated in structured sports activities, such as Student Activity Units (UKM), sports clubs, or campus athletics. This indicates that the majority of respondents had a planned and systematic orientation to their activities.

Interestingly, despite the smaller number of women, a higher proportion (71.4%) are active in structured sports than men (60.5%). This suggests that women involved in sports tend to have strong intrinsic motivation and adequate social support from their campus or community environment.

Participation in structured sports activities is crucial because they enhance skills, fosters discipline and foster social identity through sport. Such programs can also be a means of developing students' potential for athletic achievement.

Table 2. Instrument reliability

Items	Reliability Statistics	
	Cronbach's Alpha	N of Items
DASS	.881	21
AMS	.952	12
PANAS	.839	20

Description: DASS (Depression, Anxiety, and Stress Scales); AMS (Academic Motivation Scale); PANAS (Positive Affect Negative Affect Schedule)

Reliability testing was conducted using Cronbach's Alpha to ensure the internal consistency of each research instrument. The analysis results showed that all instruments had excellent reliability.

The DASS-21 scale obtained an α of 0.881 (21 items), the AMS-12 obtained an α of 0.952 (12 items), and the PANAS-20 obtained an α of 0.839 (20 items). Based on the criteria of George and Mallery (2018) all instruments are classified as highly reliable (α > 0.80), so they are suitable for use in this study.

Table 3. Description of mental health

Variabel	N	Min	Max	Mean	SD	Kategori
Depression	199	0.00	2.29	0.33	0.41	Low
Anxiety	199	0.00	2.43	0.66	0.42	Medium
Stress	199	0.00	2.29	0.58	0.39	Medium
Intrinsic Motivation	199	1.00	7.00	5.72	1.15	High
Extrinsic Motivation	199	1.00	7.00	5.61	1.17	High
Amotivation	199	1.00	7.00	5.77	0.13	Low
PANAS+	199	1.70	5.00	2.99	0.51	Medium
PANAS−	199	1.50	5.00	2.88	0.48	Medium

Based on the results of descriptive analysis (Table 3), it is known that the level of student depression is in the low category with an average of 0.33 (SD = 0.41), while anxiety (M = 0.65, SD = 0.42) and stress (M = 0.58, SD = 0.39) are in the moderate category. In the motivation aspect, the average values of intrinsic motivation (M = 5.72, SD = 1.15), extrinsic motivation (M = 5.61, SD = 1.17), and amotivation (M = 5.77, SD = 0.13) indicate a low level of motivation. Meanwhile, for the emotional aspect, the positive affect scores (M = 2.99, SD = 0.51) and negative ffect (M = 2.88, SD = 0.48) indicate that students are in a relatively stable emotional condition. In general, these results indicate that students have high levels of motivation, with moderate levels of stress and anxiety, and low levels of depression, so that sports activities are thought to contribute positively to their psychological balance.

Table 4. Correlation between variables

Correlation	r	Sig. (p)	Interpretation
Depression ↔ Anxiety	0.626**	<0.001	Strong, significant
Depression ↔ Stres	0.754**	<0.001	Strong, significant
Anxiety ↔ Stres	0.708**	<0.001	Strong, significant

IM ↔ Depression	−0.205**	0.004	Negative, significant
EM ↔ Depression	−0.216**	0.002	Negative, significant
Am ↔ Depression	−0.217**	0.002	Negative, significant
IM ↔ EM	0.876**	<0.001	Very strong
IM ↔ Am	0.898**	<0.001	Very strong
EM ↔ Am	0.856**	<0.001	Very strong

Description: $p < 0.01$ (significant at 1% level), $p < 0.05$ (significant at 5% level)

Based on the results of the Pearson correlation analysis (Table 4), a strong and significant positive relationship was found between depression, anxiety, and stress ($r = 0.626–0.754$; $p < 0.001$), indicating that these three aspects of mental health are closely interrelated. Meanwhile, the dimensions of exercise motivation (MI, ME, AM) showed a significant negative relationship with depression ($r = −0.205$ to $−0.217$; $p < 0.01$), anxiety ($r = −0.142$ to $−0.199$; $p < 0.05$), and stress ($r = −0.194$ to $−0.207$; $p < 0.01$). This indicates that the higher a student's motivation to exercise, the lower their levels of stress, anxiety, and depression.

Furthermore, a strong positive correlation was found between motivational dimensions ($r = 0.856–0.898$; $p < 0.001$), indicating that intrinsic, extrinsic, and amotivational components are interrelated in the context of student sports activities. These results reinforce the hypothesis that sports activities play an important role in maintaining mental and emotional balance in students, in line with previous research findings (e.g., Ryan & Deci, 2017; Biddle et al., 2019).

Table 5. Regression of sports activity and duration of exercise

Components	Core Values	Results
R^2	0.003	Very low explanatory power
F (Sig.)	0.306 (0.737)	Model not significant
Sports Activities	B = -0.031; p = 0.475	Not statistically significant
Duration	B = -0.004; p = 0.933	Not statistically significant

Based on the results of the multiple linear regression analysis, it was found that exercise activity and duration of exercise did not significantly influence student stress. The coefficient of determination (R^2) of 0.003 indicates that only 0.3% of the variation in stress can be explained by these two independent variables. The F-test also showed the regression model was insignificant ($F = 0.306$; $p = 0.737$). Partially, neither exercise activity ($\beta = -0.031$; $p = 0.475$) nor exercise duration ($\beta = -0.004$; $p = 0.933$) had a significant effect on stress levels. Thus, it can be concluded that the frequency and duration of exercise activity were not significant predictors of student stress in this study.

Table 6. T-Test of differences between men and women

Variabels	Men (Mean)	Woman (Mean)	Sig. (2-tailed)	Description
Depression	0.3239	0.3571	> 0.05	Not significantly different

Anxiety	0.6615	0.6327	> 0.05	Not significantly different
Stres	0.5787	0.5816	> 0.05	Not significantly different
IM	5.7898	5.4524	< 0.05	Significantly different (Male ↑)
EM	5.6863	5.3393	< 0.05	Significantly different (Male ↑)
Am	5.8217	5.5774	> 0.05	Not significant
PANAS Plus	2.9669	3.1143	≈ 0.05	Almost significant
PANAS Minus	2.8662	2.9095	> 0.05	Not significant

Based on the results of the Independent Samples T-Test, no significant differences were found between male and female students in levels of depression ($p = 0.482$), anxiety ($p = 0.350$), or stress ($p = 0.821$). However, there were significant differences in intrinsic motivation ($p = 0.014$) and extrinsic motivation ($p = 0.033$), with male students having higher average scores than female students. Meanwhile, positive affect ($p = 0.068$) and negative affect ($p = 0.720$) did not show significant differences between the two groups.

Discussion

Descriptive analysis results indicate that the majority of students experienced low to moderate levels of depression, anxiety, and stress. However, a significant proportion of respondents still experienced relatively high levels of anxiety and stress. This finding aligns with research by Fruehwirth et al. (2023) and Nogueira et al. (2022) which explains that college students are an age group with high psychological vulnerability due to academic pressures and social transitions. From research conducted by Rahman et al. (2017) shows that recreational sports activities such as mountain climbing also motivate students to carry out physical activities. This situation indicates that psychological support and structured physical activity are necessary to maintain student mental stability, especially in the post-pandemic period, which has led to changes in learning and social behaviours (Bali, 2015; Fastame & Melis, 2020).

The results of this motivation data are in line with the qualitative results of interviews conducted with respondents where they felt happy and excited after doing sports activities, one respondent explained "If I have a lot of assignments, I usually go for a run in the evening. After that my mind feels lighter." (Participant: 7). This makes aligning the results of quantitative and qualitative data sustainable. Correlation analysis showed a strong positive relationship between depression, anxiety, and stress ($r = 0.626–0.754$, $p < 0.001$). This confirms that these three dimensions are interrelated and form a single entity within the spectrum of negative mental health. Students exhibiting symptoms of depression tend to also experience high levels of anxiety and stress (Dimyati et al., 2022; Goethals et al., 2020; Kuznetsova et al., 2022).

These results are consistent with the Tripartite Theory of Anxiety and Depression, which explains that depression and anxiety have overlapping affective components, particularly in negative affectivity (Barnes-Horowitz et al.

2024; Craske et al. 2024). Therefore, a decrease in one dimension (e.g., stress) has the potential to impact improvements in the other two.

"I often worry about my academic performance and future career. The constant worry makes it difficult to sleep, and over time I feel tired, unmotivated, and disconnected from daily activities." (Participant: 12). These narratives suggest that stress often acts as an initial trigger, exacerbating anxiety and ultimately contributing to depressive symptoms. Therefore, the qualitative findings provide a contextual explanation for the strong correlations observed in the quantitative analysis.

The dimensions of exercise motivation (intrinsic motivation/MI, extrinsic motivation/ME, and amotivation/AM) had a significant negative correlation with levels of depression, anxiety, and stress ($r = -0.142$ to -0.217, $p < 0.05$). This means that the higher a student's motivation in engaging in exercise, the lower their level of mental disorders. This is also in line with the theory of the role of physical education teachers who also provide examples and are tasked with forming the character of their students to increase their motivation in carrying out movement activities (Batiurat et al. 2024).

This finding supports Self-Determination Theory Ryan and Deci (2000), which states that intrinsic motivation—such as exercising for enjoyment, challenge, or personal satisfaction—contributes to improved psychological well-being. "When I feel stressed about assignments and examinations, I lose the desire to study. Even simple academic tasks feel overwhelming, and I tend to postpone my work" (Participant: 5). "I'm always experiencing stress that makes me anxious, and sometimes I even get sick. Exercising and having support from friends also helps me manage stress and stay motivated" (Participant: 8). Physical activity driven by intrinsic motivation can strengthen feelings of competence, autonomy, and social connectedness, all of which play a role in reducing symptoms of depression and stress (Aydoğan & Hadi, 2020; Nuraini et al., 2024). Furthermore, the strong correlation between motivational dimensions ($r = 0.856–0.898$, $p < 0.001$) indicates that despite having different orientations, the three motivational types operate synergistically in the context of student sports. Students with high intrinsic drive also tend to have a positive extrinsic orientation (e.g., for achievement or fitness).

The correlation between exercise motivation and positive/negative affect (PANAS) showed a statistically insignificant relationship, although the directional pattern of the relationship indicated a positive trend for positive affect. This suggests that exercise has a greater impact on long-term mental health stability than on momentary emotional fluctuations.

"When I skip exercise for several weeks, I become more easily irritated and less enthusiastic. Regular exercise helps me feel more positive throughout the day" (Participant: 9). This finding aligns with research by Pietsch et al. (2022),

which found that exercise has a strong impact on improving mood and reducing negative affect when performed regularly and based on intrinsic motivation. "After exercising, I usually feel happier and more refreshed. Even when I am stressed because of assignments, physical activity helps me clear my mind and improves my mood" (Participant). However, the direct affect on daily affect tends to vary depending on the duration, intensity, and social context of the exercise.

Implications

Theoretically, this research reinforces the Person-Based Framework model Willig et al. (2017), which emphasizes the importance of understanding individual experiences in behavior-based interventions. Students with high levels of exercise motivation demonstrate a balance between basic psychological needs and positive emotional experiences, ultimately improving mental health.

Practically, these results provide a foundation for developing personal motivation-based exercise activity programs on campus. This approach can be implemented in the form of integrated Physical Education activities, campus sports clubs, or gamification-based fitness interventions that foster students' intrinsic motivation.

CONCLUSION

Based on descriptive and correlational analysis of 199 students, we found that levels of depression, anxiety, and stress were generally low to moderate. However, some students still exhibited psychological symptoms that warrant attention. The correlation results showed a strong, positive relationship between the negative mental health dimensions (DASS-21), indicating that increased stress has the potential to increase depression and anxiety. Conversely, exercise motivation (AMS-12) showed a significant negative relationship with all three psychological variables, indicating that the higher the students' motivation to exercise, the lower their level of mental disorders. Furthermore, the strong relationships between intrinsic, extrinsic, and amotivation indicate that exercise motivation is a multidimensional construct that complements each other in the context of college students' physical activity. Although the correlation with emotional affect (PANAS-20) was not statistically significant, the positive direction of the relationship indicates the potential for increased positive affect through consistent physical activity. Given the cross-sectional and correlational nature of this study, these findings should be interpreted as associations rather than evidence of causality. Longitudinal and experimental studies are needed to further examine the direction of these relationships.

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AUTHOR CONTRIBUTION STATEMENT

All authors contributed to this research. FRFKB was responsible for the drafting of all manuscripts, from concept to implementation. SN and LGS assisted in the completion and development of the research concept and design. LMYI corrected and finalized the manuscripts and was involved in data analysis.

AI DISCLOSURE STATEMENT

The author states that no AI was used in the completion of this manuscript.

CONFLICTS OF INTEREST

No conflict of interest.

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