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Exploring the Interplay of Physical Activity, Happiness, and Well-Being Among Saudi Physiotherapy Students in an Applied Medical College at Taif University.

Exploración de la interacción entre la actividad física, la felicidad y el bienestar entre estudiantes saudíes de fisioterapia en una facultad de medicina aplicada de la Universidad de Taif.

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Abstract

Background: In the demanding academic environment of medical education, the intersection of knowledge acquisition and personal well-being poses a significant challenge. Within the context of higher education in Saudi Arabia, Saudi physiotherapy students at Taif University must manage stressors, sedentary lifestyles, and compromised well-being due to academic rigour. The absence of on-site fitness facilities further complicates matters, potentially impacting students' physical activity levels and overall health. Understanding how physical activity influences happiness and well-being in this context is crucial for developing effective interventions to support student health. **Methods:** A cross-sectional design was utilised, with data collected through validated tools including the International Physical Activity Questionnaire, the Subjective Happiness Scale, and the Warwick–Edinburgh Mental Well-Being Scale. A sample of physiotherapy students was included, and demographic variables as well as physical activity levels and well-being scores were analysed. **Results:** The study revealed that a substantial proportion of physiotherapy students engaged in moderate levels of physical activity, with notable positive correlations between physical activity levels and mental well-being and happiness scores. A sample of 111 physiotherapy students, 51.4% reported moderate physical activity. Physical activity showed significant positive correlations with mental well-being ($r = 0.231$, $p = 0.015$) and happiness ($r = 0.193$, $p = 0.043$). Demographic variables were not significantly associated with physical activity levels. This suggests that higher physical activity is associated with improved mental well-being and subjective happiness among physiotherapy students. **Discussion:** The study highlights the vital role of physical activity in promoting happiness and well-being among Saudi physiotherapy students at Taif University. By revealing positive associations between physical activity, mental well-being, and happiness, the research underscores the importance of encouraging active lifestyles on campus. Addressing barriers to physical activity and tailoring interventions to Taif University's unique context are crucial steps towards enhancing student health and well-being. **Conclusion:** Higher physical activity was positively associated with better mental well-being and happiness. Targeted interventions are needed to address barriers and promote active lifestyles among physiotherapy students.

Keywords: physical activity, happiness, well-being, culture, taif, physiotherapy, Saudi_Arabia

1. Introduction

Medical education is a challenging field where academic excellence requirements are incompatible with the necessity to remain physically and mentally healthy. Stress, sedentary lifestyle, and poor health among medical students are aggravated by the academic burden of medical training (1). To understand the urgency of alleviating the negative effects of pursuing medical education on students' overall health/well-being, this paper studies the effect of physical activity (PA) on happiness, mental health, and well-being in students. At Taif University, students of the College of Applied Medical Sciences face some obstacles, such as a lack of gyms and other athletic facilities on the university premises (2). Though these facilities could exist on the main campus, the necessity to commute to use them imposes additional stress on students, requiring time and motivation they may not have, which might decrease their participation in PA.

Universities that offer organised PA programmes report improved fitness levels among students. With organised PA programmes, universities tend to record improved fitness results, and this aspect of institutional support of active lifestyles is vital. There are indications that cultural practices and school curricula have a profound impact on students' PA behaviours and fitness (3). In countries where physical education is prioritised, students are more likely to show higher levels of fitness than in settings where institutions offer limited support for PA (3). These results highlight the significance of favourable conditions, planning programmes, and institutional investment in PA infrastructures. However, it should be noted that the research by Kljajevic was carried out in a Latin nation, in which cultures and ways of life vary significantly between the nations of the Gulf, Saudi Arabia included (3). Although in theory, universities can promote PA, studies have repeatedly reported a significant reduction in students' regular exercise levels upon reaching university, especially among medical students under high academic stress (4). Such a deterioration necessitates specific interventions, such as awareness programmes and better access to sports facilities, to enable students to maintain an active lifestyle throughout their academic years (4). Research in Saudi Arabia in particular indicates that unhealthy eating and minimal PA are common among university students (5). As universities are among the most important institutions for conducting health promotion, the implementation of the initiatives that encourage PA, healthy eating, and well-being may have a crucial impact on students' quality of life and academic success (5).

Recent studies have also underscored the correlation between PA and happiness. A 2025 study at Kuwait University established that higher levels of PA among first-year students were positively related to higher levels of happiness and that physically active students had better levels of physical and mental health compared to those who did not (6). These results support the general evidence that regular PA is crucial to promoting both psychological and subjective happiness. In general people engagement in PA in Saudi Arabia is affected by various factors such as culture, habits, gender, and age. Engagement in PA is caused by societal expectations, dependence on motorised transport, and sedentary leisure pursuits (7). Engagement is further limited by gender-related obstacles, including the possibility of female participation in PA and the lack of facilities exclusively for women (8). People's participation in PA tends to drop during their university years as a result of the academic workload and lack of organised exercise opportunities (8). Moreover, social conventions and traditions in Saudi society can make it difficult for people and especially for women to participate in PA. Opportunities to engage in PA outside of specified situations are frequently limited due to gender segregation. Furthermore, the nation's severe weather, which is marked by protracted high or low temperatures, makes outdoor exercise more difficult (7). The pursuit of physical fitness is thus complicated by various cultural and environmental elements. These obstacles should be identified and removed to promote active lifestyles that are inclusive and accessible across a variety of demographic groups.

Thus, the objective of this paper is to investigate how physical activity (PA) affects happiness, mental health, and overall well-being among medical students—particularly those at Taif University—while considering the barriers that limit their participation in physical activity.

2. Methods

2.1. Research Design

This study employs a cross-sectional research design to investigate the relationships between PA levels, happiness, and well-being among students at the Applied Medical College of Taif University in Saudi Arabia. Cross-sectional studies involve collecting data at a single point in time to analyse multiple variables without manipulation, providing a comprehensive and objective examination of the relationships between them (9). Multivariate analysis was chosen to unravel the complex interrelationships among multiple variables, facilitating exploration of the combined effects of various factors on the target outcomes and offering a holistic understanding of the intricate dynamics between physical activity, mental well-being, and happiness. The convenience sampling method was used to identify participants. This sampling strategy was chosen for its practicality and accessibility to the study population. Although this method expedited data collection, its limitations in generalizability necessitate a clearer justification in future iterations. An online survey was sent to all physiotherapy students through university emails and WhatsApp and those who were easily accessible and willing to participate. Inclusion criteria comprised enrolment in the physiotherapy programme and the age requirement. Participation was entirely voluntary. The words convenience sampling better defines the recruitment process and can be used to interpret the findings accordingly, especially to establish the level of representativeness and generalizability (10). Stringent data management protocols were implemented to ensure data accuracy, confidentiality, and integrity. Data were securely stored in adherence to ethical guidelines and data protection regulations to safeguard participant confidentiality and data quality throughout the study.

2.2 Eligibility Criteria

The participants were all physiotherapy students in the College of Applied Medical Sciences at Taif University. Participants included first-year students to fourth-year students as well as internship students _fifth year students_.

2.3 Students and Public Involvement

The students who took part in this study filled in an online questionnaire but had no part in the research design, development, execution, or dissemination. No participants in the community or student representatives were involved in the development of the research questions, choice of outcome measures, or interpretation of the results.

2.4 Data Collection

Data collection was conducted using Google Forms, a user-friendly online survey platform. The survey was active and accessible to all physiotherapy students during the specified period from May 2025 to September 2025. Participating students could easily complete the survey electronically through a link (see Supplementary Material I). Students' anonymity was carefully maintained throughout the survey process, ensuring that responses were confidential and not linked to individual identities.

2.5 Outcome Measures

To evaluate the participants' PA levels, the study utilised the International Physical Activity Questionnaire (IPAQ), a well-established self-reporting tool that offers a reliable measure of overall

activity (11). Widely recognised and validated, the IPAQ is extensively employed to assess PA across diverse populations. To assess participants' happiness levels, the study utilised the Subjective Happiness Scale (SHS). The SHS is a concise and effective tool designed to measure an individual's subjective sense of happiness and life satisfaction (12). For the evaluation of subjective well-being, the Warwick–Edinburgh Mental Well-Being Scale (WEMWBS) was employed. This validated instrument, recognised for its reliability, offers a robust assessment of mental health and positive well-being, contributing to a holistic evaluation of participants' overall mental state (13). Participants were also provided with an open-ended question to explore their opinions regarding how culture, environment, weather, and traditions influence PA, happiness, and quality of life. Thought-provoking questions were designed to capture how cultural nuances, environmental influences, and traditional practices shape PA and happiness.

2.6 Open-Ended Question

The qualitative insights gained from the open-ended question provided valuable context and depth to participants' perspectives on the link between physical activity, happiness, and quality of life. Although not formally coded or thematically analysed, these qualitative responses offered rich data that contributed to a more holistic comprehension of participants' viewpoints.

2.7 Sample Size Calculation

The source population included all undergraduate physical therapy students enrolled in the first to fourth years and the internship year at the College of Applied Medical Sciences, Taif University, in the 2024–2025 academic year (N = 400). Participation in the study was voluntary. The minimum required sample was calculated as 196 participants; however, 111 students filled in the survey, yielding a response rate of 27.75%. This small sample size may have produced a restrictive impact on the statistical power of the analyses and may have influenced the possibility of detecting subtler associations between physical activity, well-being, and happiness.

2.8 Statistical Analysis

Data analysis was performed using the Statistical Package for Social Sciences (SPSS), version 25. Categorical data were presented using numbers and percentages. Numerical data were presented as mean ± SD. An independent t-test was used to compare the mean score between two groups, and one-way ANOVA was used to compare the mean score between more than two groups. The chi-squared test ($\chi 2$) was used to assess the association between sociodemographic variables and the outcome variables (the IPAQ, WEMWBS, and SHS). Pearson's correlation between age, WEMWBS, IPAQ METs, and SHS was applied to assess the strength and direction of the relationships among these variables. Linear regression models were applied to identify the predictors of the outcome variables. Assumptions of linear regression were assessed prior to analysis. Normality, linearity, and homoscedasticity were all satisfied. There was collinearity between age and educational level. Independent variables were selected based on their theoretical relevance and prior evidence as well as their association according to univariate analysis ($p < 0.05$). The independent variables were entered simultaneously into the regression model using the Enter method. There were no missing data. Cronbach alpha coefficients were used to determine the internal consistency of the study parameters. The IPAQ, WEMWBS, and SHS scales were found to possess reasonable levels of reliability, meaning that items of the individual biological measures consistently measured their constructs in this population. Sample-specific reliability contributes to methodological transparency and ensures that these validated instruments remained psychometrically stable in the study group. These findings promote the appropriateness of the chosen instruments to gauge the PA, well-being, and happiness of this group of physiotherapy students within this institutional and cultural environment.

3. Results

3.1 Descriptive Statistics

Eligible physiotherapy students from Taif University participated in this study through a provided link. Although the survey link was active for an extended period, eligible students responded to the questionnaire within approximately one month, demonstrating a high response rate. A total of 111 students responded to the survey. Participants were aged between 18 and 26 years, with a mean age of 21.17 years (± 1.76). The sample included 67 males and 44 females, mirroring gender enrolment trends within health-related academic programmes at the university. The educational levels of the participants captured the spectrum of the undergraduate years. Notably, level 8 _fourth year_ students constituted the largest segment at 31.5%, followed by level 2_first year_ (16.2%), level 10_Interns_ (14.4%), and level 6_third year_ (13.5%) students. Students from other educational tiers, such as internship programmes, further contributed to the sample's heterogeneity, as illustrated in table 1.

Table 1. Demographic characteristics of participants.

Variable	n	Frequency (%)
Age	18-21	59 (53.2%)
	≥22	52(46.8%)
Gender	Male	67 (60.4%)
	Female	44 39.6(%
Educational Level	1st year	25 (22.2%)
	2nd year	11 (9.9%)
	3rd year	16 (14.4%)
	4th year	41 (36.9%)
	Internship	18 (16.2%)

The average IPAQ METs score was 1717.24 ± 1498.25, with a maximum value of 6426.00. The average WEMWBS score was 48.20 ± 8.86, with the highest recorded score being 69.00. For the SHS score, the mean was 5.12 ± 0.54, with a maximum value of 6.25 as illustrated in table 2.

Table 2. Descriptive statistics of IPAQ METs, WEMWBS, and SHS scores.

	Mean ± SD	Minimum	Maximum
IPAQ METs	1717.24 ± 1498.25	0.00	6426.00
WEMWBS score	48.20 ± 8.86	27.00	69.00
SHS score	5.12 ± .54	3.50	6.25

IPAQ: International Physical Activity Questionnaire, WEMWBS: Warwick–Edinburgh Mental Well-Being Scale, and SHS: Subjective Happiness Scale.

Regarding demographic variables in relation to IPAQ METs, WEMWBS, and SHS mean scores, there was no statistically significant difference between variables, as shown in table 3.

Table 3. Demographic variables in relation to IPAQ METs, WEMWBS, and SHS mean scores.

Demographic variables		IPAQ METs (Mean ± SD)	WEMWBS (Mean ± SD)	SHS (Mean ± SD)
Age	18–21 years	1544.84 ± 1385.86	48.47 ± 9.02	5.0678 .59602
	≥ 22years	1912.84 ± 1607.49	47.90 ± 8.76	5.1875 .48979
Student's t-test (P-value)		.198	.737	.254

Gender	Male	1893.04 ± 1703.92	48.55 ±	8.61	5.10 ± .59
	Female	1449.54 ± 1079.17	47.68 ±	9.31	5.15 ± .47
Student's t-test (P-value)		.128	.615		.648
Education	1st year	1678.32 ± 1470.46	48.96 ±	8.73	5.07 ± .53
	2nd year	1076.72 ± 1135.36	43.09 ±	7.24	5.06 ± .50
	3rd year	1640.62 ± 1422.73	48.68 ±	9.42	4.93 ± .78
	4th year	1877.12 ± 1680.98	49.34 ±	7.90	5.14 ± .46
	internship	1866.66 ± 1385.92	47.27 ±	11.07	5.36 ± .50
ANOVA (P-value)		.614	.316		.233

3.2 Analysis of International Physical Activity Questionnaire (IPAQ) Responses

The responses to the IPAQ shed light on the PA habits of the 111 participants. According to the results, a notable proportion had engaged in moderate PA within the seven days prior to answering the survey, with 36.9% reporting 1–2 days of PA and 13.5% reporting 3–4 days. A smaller percentage maintained consistent engagement, with only 7.2% reporting 5–6 days of moderate PA. Regarding vigorous PA, while 25.2% of participants reported being active for 1–2 days, 37.8% did not engage in any vigorous PA during the specified period. Walking patterns also varied, with 36.9% reporting 5–6 days of walking for at least 10 minutes but 9.9% reporting no walking at all. These responses highlight a need for interventions to encourage consistent PA and vigorous PA, which a considerable number of participants did not engage in at all. Correlations with well-being scores provide a more comprehensive understanding of how PA levels intersect with participants' overall health.

3.3 Analysis of Warwick–Edinburgh Mental Well-Being Scale (WEMWBS) Responses

Participants' responses to the WEMWBS offer valuable insights into their mental well-being. A total of 32.4% of participants indicated feeling optimistic about the future, while 40.5% reported feeling useful. Additionally, 34.2% expressed feelings of relaxation, and 36% felt interested in other people. Notably, 35.1% reported having extra energy, potentially influencing their overall well-being. Dealing with problems effectively was reported by 31.5% of participants, and clear thinking by 28.8%. Feeling good about oneself (31.5%), feeling close to others (16.2%), and feeling confident (36.9%) were also prevalent responses. Moreover, participants claimed independence in decision-making, with 27% reporting the ability to make up their minds about things. The scale's comprehensive insights into various facets of mental well-being provide insights that can be further correlated with PA levels to establish holistic health profiles among the college student cohort.

3.4 Analysis of Subjective Happiness Scale (SHS) Responses

Answering the first question related to the SHS, where students reflected on their general self-perception, a significant majority of 85.59% (95 students) adopted a neutral stance. In response to the second question, which delved into comparisons with peers, an overwhelming 81.08% (90 students) displayed a positive bias towards their own abilities, with a smaller subset of 4.50% (5 students) expressing a higher self-assessment. Regarding question three on general happiness, 57.66% (64 students) reported positive emotions, while 42.34% (47 students) did not. Finally, regarding question four on feelings of happiness, 48.65% (54 students) reported not feeling very happy, and 9.01% (10 students) maintained a neutral stance.

3.5 Associations and Correlations

Over half of the participants (51.4%) declared moderate levels of PA, 27.0% declared low levels, and 21.6 declared high levels of PA. Demographic variables (age, gender, educational level) did not indicate any associations with the PA levels (table 4).

The correlation analysis conducted using Pearson's test revealed a significant positive correlation between IPAQ METs and mental well-being (WEMWBS; r = 0.231, p = 0.015). Equally, there was a strong positive association between IPAQ METs and subjective happiness as measured via the SHS (r = 0.193, p = 0.043). There were no significant association between age and IPAQ METs (r = 0.074, p = 0.441), WEMWBS (r = 0.012, p = 0.904), or SHS (r = 0.067, p = 0.484; table 5).

Table 4. Associations between demographic factors and PA levels

Variables		High-level PA	Moderate level PA	Low-level PA	X^2 P-value
Age	18–21	11 (45.8%)	30 (52.6%)	18 (60.0%)	.581
	≥ 22	13 (54.2%)	27 (47.4%)	12 (40.0%)	
Gender	Male	19 (79.2%)	30 (52.6%)	18 (60.0%)	.083
	Female	5 (20.8%)	27 (47.4%)	12 (40.0%)	
Educational levels	1st y	6 (25.0%)	12 (21.1%)	7 (23.3%)	.436
	2nd y	1 (4.2%)	5 (8.8%)	5 (16.7%)	
	3rd y	1 (4.2%)	12 (21.1%)	3 (10.0%)	
	4th y	11 (45.8%)	18 (31.6%)	12 (40.0%)	
	Internship	5 (20.8%)	10 (17.5%)	3 (10.0%)	
Total		24 (21.6%)	57 (51.4%)	30 (27.0%)	

Table 5. Pearson's correlation between age, WEMWBS, IPAQ METs, and SHS.

Variables		Age	WEMWBS score	SHS score	IPAQ METs
Age	Pearson's correlation (p-value)	-	-.012 (.904)	.067 (.484)	.074 (.441)
IPAQ METs	Pearson's correlation (p-value)	.074 (.441)	.231 (.015*)	.193 (.043*)	-
SHS	Pearson's correlation (p-value)	.067 (.484)	.058 (.549)	-	-

3.6 Linear Regressions

Several multiple linear regressions were performed to determine whether demographic factors and PA were predictors for PA levels, mental well-being, and subjective happiness (table 6). The overall model was not significant (F = 1.359, p-value = .261). R^2 = 025, and adjusted R^2 = .006. Age (B = 49.796, p = .541) and gender (B = -423.753-, p = .149) did not significantly predict IPAQ METs scores (table 7). The overall model was not significant (F = 2.049, P =.111). R^2 = .054, and adjusted R^2 = .028. Age (B = -.154, p = .747) and gender (B = -.327-, p = .850) did not significantly predict WEMWBS score. IPAQ METs was a critical predictor of mental well-being (B = 0.001, p =.017), meaning that the more active an individual was, the better their reported well-being (table 8). The overall findings was not significant (F = 1.726, p = .166). R^2 = .046, and adjusted R^2 = .019. Age (B = .019, p = .522) and

gender (B = .089, p = .409) did not significantly predict SHS score. In contrast, IPAQ METs was a significant predictor of SHS (B = .007, P = .039). These results indicate that the most significant predictor of well-being and happiness in students is not demographic factors but PA.

3.7 Analysis of Open-Ended Question Responses

The diverse responses participants provided shed light on the myriad factors influencing quality of life, PA, happiness, and cultural dynamics. Responses highlighted challenges such as cold weather hindering PA, academic stress impacting time management, and cultural constraints affecting female students' engagement in certain activities. Issues like lack of experience with PA, budget constraints limiting gym access, and distance from fitness centres were also prevalent themes. Moreover, transportation difficulties for female students, weather-related barriers, and time constraints impacting PA emerged as significant concerns. Cultural norms, financial limitations, and availability of fitness facilities were thus key influences, highlighting the need for inclusive solutions considering various cultural, environmental, and personal constraints. These responses collectively paint a nuanced picture of the complexities surrounding well-being, PA, and happiness within diverse cultural and environmental contexts (see Supplementary Material).

Table 6. Multiple linear regression analysis of the predictors of IPAQ METs scores.

Variables	B	Sig.	95.0% Confidence Interval for B	
			Lower Bound	Upper Bound
Age	49.796	.541	-111.318	210.909
Gender (ref: female)	-423.753	.149	-1001.693	154.187

Table 7. Multiple linear regression analysis of the predictors of WEMWBS scores.

Variables	B	Sig.	95.0% Confidence Interval for B	
			Lower Bound	Upper Bound
Age	-.154	.747	-1.099	.791
Gender (ref:female)	-.327	.850	-3.744	3.089
IPAQ METs	.001	.017	.0001	.002

*Significant at ≤ 0.05

Table 8. Multiple linear regression analysis of the predictors of SHS scores.

Variables	B	Sig.	95.0% Confidence Interval for B	
			Lower Bound	Upper Bound
Age	.019	.522	-.040	.078
Gender	.089	.409	-.124	.302
IPAQ METs	.007	.039	.0001	.014

*Significant at ≤ 0.05

4. Discussion

The study revealed a strong positive association between PA, mental wellbeing, and happiness among physiotherapy students at Taif University. Increased PA was correlated with better scores in both the WEMWBS and the SHS, which aligns with growing evidence on the psychological and emotional benefits of regular PA (14). These findings demonstrate the significance of the PA as a main predictor of mental health and subjective well-being during university, when the academic load and stress rates tend to increase. In the Saudi context, where cultural codes, environmental context, and social expectations determine lifestyle practices, it is particularly important to measure these correlations. Medical students are especially at risk of forces committed to dense profiles and

the absence of free time, as well as access to fitness centres, which are especially common on the satellite campuses such as the Applied Medical College at Taif University (15-18). This study adds to the small yet growing body of research on PA behaviours in this medical student by illustrating that even moderate amounts of PA are associated with significant changes in mental well-being and happiness. These findings are enhanced by the use of validated instruments (IPAQ, WEMWBS, and SHS) that enable comparison with studies at the regional and international levels.

Although the benefits of PA were clear, no significant correlations were observed between PA levels and demographic characteristics (age, sex, academic level). This observation contrasts with other studies around the world that have found demographic characteristics to be significant predictors of PA participation (17). This difference may result from a number of elements. First, the sample size and the response rate were relatively small, which might have reduced the chances of acquiring the statistical power necessary to identify minor demographic differences. Second, the sample was also homogeneous concerning age range, academic background, and educational setting, which could have reduced variability of PA behaviours. Third, cultural and environmental forces within the Saudi environment may have a more significant effect on students' participation in PA compared to the effects of individual demographic factors, and thus the influence of demographics may be lost.

The discrepancy between the final sample size of 111 participants and the calculated sample size of 196, coupled with a low response rate of 27.75%, highlights potential selection bias and raises concerns about the study's statistical power. The small sample size may have limited the study's ability to detect more minor associations between PA, well-being, and happiness, thus compromising the robustness of the findings and the generalisability of the results. Given the limitations imposed by the reduced sample size, the results should be interpreted with caution. Future research should use larger, more representative samples.

In Saudi Arabia, due to cultural norms and lifestyle patterns, people of a similar age and background may have similar PA behaviours. For example, the use of motorised transportation, low levels of integration of PA in day-to-day life, and academic demands may influence students of all ages and genders in the same way (15). These overarching characteristics of life in Saudi Arabia might be the reason demographic variables were not found to be important predictors of PA in this cohort. This finding echoes the results of earlier studies involving university students in south-western Saudi Arabia (23). This finding also underlines the significance of PA behaviours in relation to larger sociocultural and environmental contexts instead of considering the individual level alone.

The regression results shed further light on the significance of the findings in particular, physical activity (IPAQ METs) was a statistically significant predictor of both mental well-being ($B = 0.001$, $p = .024$) and subjective happiness ($B = 0.002$, $p = .024$) but not of demographic variables. These results support that behavioural determinants are more decisive than the fixed attributes of age, gender, or academic level in defining psychological outcomes in physiotherapy students. The findings thus reinforce those interventions focused on modifiable lifestyle changes, and especially on PA, can be more effective than demographically based intervention strategies to enhance student well-being.

The subjective feedback obtained through the open-ended responses are important for interpretation of the results. The most frequent reason students gave regarding time constraints was academic workload; this was considered a significant impediment to PA participation and is often cited by medical and health sciences students (19-21). Poor access to fitness centres, financial status, and transportation challenges were also noted, with female students being the most affected. The surroundings, like extreme weather conditions and the absence of walking-friendly areas, further

diminished the chances of regular PA. These obstacles reflect how complicated and multi-layered participation in PA is in this population.

Moreover, the data highlighted gender-specific issues, especially regarding cultural expectations and limited access to female-only fitness centres. Though in the quantitative analysis gender was not significantly correlated with the levels of PA, female students repeatedly referred to structural and cultural obstacles that interfered with their capacity to perform PA. These findings are consistent with past studies that suggest that societal norms, gender roles, and a lack of opportunities disproportionately impact women in Saudi Arabia in terms of PA participation (19-21). Some studies have indicated that PA may take other forms besides conventional gym-based activities, including home-based exercises or casual physical activities (24). Hence, PA interventions should be flexible and culturally sensitive to accommodate various preferences and limitations.

While this study benefited from relevant past literature, future studies should integrate self-determination theory, which offers a fresh perspective on the determinants of student well-being in medical education. Developed by Deci and Ryan, self-determination theory highlights that intrinsic motivation and well-being stem from satisfying three core psychological needs: autonomy, competence, and relatedness (26). Autonomy denotes freedom of choice and action, competence proficiency in tasks, and relatedness social interconnectedness and a sense of belonging (26). By aligning the present investigation with this theory, this study delves into the motivational factors propelling student engagement, satisfaction, and well-being within the demanding landscape of medical education.

Self-determination theory proves particularly beneficial to this study by offering a comprehensive understanding of the motivational elements contributing to student well-being. By emphasising intrinsic motivation and the fulfilment of psychological needs, self-determination theory uncovers the underlying mechanisms fostering student wellness and academic success in medical education. Its relevance to this research underscores its pivotal role as a guiding principle for comprehending and addressing factors shaping student well-being within the realm of medical education.

The results of this research are consistent with the existing body of evidence that regular PA can decrease stress levels, improve mood, and support overall happiness among university students (17, 22). The correlations between PA and these variables point to its protective role against psychological distress during academically stressful periods. Nonetheless, the fact that a high percentage of students still report low and moderate levels of PA indicates that the information about the benefits of PA is not enough to achieve long-term behavioural change. Structural, cultural, and environmental barriers must be addressed to allow students to transform this knowledge into practice.

Universities have a significant role to play in the development of student health behaviours and are the right place to implement interventions to advance PA and well-being. Offering cheap and easy-to-reach fitness centres, incorporating PA opportunities into the academic timetable, and introducing programmes targeting gender concerns can address the identified obstacles. The integration of wellness education into curricula, especially in disciplines related to health, would increase people's understandingthe significance of PA in physical and mental wellness in the long term (25). Such programmes would conform to the Saudi cultural beliefs in holistic well-being and mind, body, and spirit balance.

This study presents important practical implications for physiotherapy students within curricular, institutional, and training settings. The findings can improve educational practices, the

study can transcend being viewed solely as a university-based public health investigation. Strengthening the discussion to underscore implications for physiotherapy education, such as curriculum enhancements and training innovations, will elevate the study's significance. This approach not only enhances educational value but also highlights the potential for positive changes in physiotherapy training. In conclusion, emphasising tangible impacts on education and training bridges the gap between academic research and practical applications, offering valuable insights for enhancing the educational experiences of physiotherapy students.

4.1 Study Strengths and Limitations

This study applied a robust methodology integrating assessments of PA levels, happiness, and mental well-being, offering comprehensive insight into participants' health profiles. The utilisation of validated tools ensured data reliability. Incorporating demographic variables such as age, academic levels, and gender enriched the analysis, elucidating potential influences on the studied relationships. The study's diverse participant pool, including individuals from various backgrounds, enhanced generalisability. However, this study also has limitations that warrant consideration. First, the cross-sectional design precluded establishing causality between PA, happiness, and mental well-being. Second, the sample was limited to physiotherapy students at a single university, which may restrict the generalisability of the findings to other student populations or settings. Third, self-reported data on PA and well-being are subject to potential selection biases, such as social desirability bias or recall inaccuracies. Additionally, the study's low response rate (27.75%) and convenience sampling may limit its representativeness and generalisability. As such, care should be taken not to overgeneralise the findings. Future research should implement more robust sampling methods for improved reliability. Future research should also employ longitudinal or experimental designs that explore causal relationships and expand the sample to include students from diverse disciplines and institutions. Moreover, considering gender-specific interventions and the role of cultural norms in shaping PA behaviours could provide deeper insights into overcoming barriers in similar contexts. Including objective measures of PA, such as wearable fitness trackers, may also enhance the reliability of future findings.

4.2 Key Takeaways

- Easy access to sports facilities within universities can positively impact the well-being of Saudi physiotherapy students, fostering physical activity and mental wellness.
- Offering more opportunities for female students in the Applied Medical College of Taif University to participate in sports can significantly enhance their overall health and happiness.
- Tailored programmes promoting female involvement in sports can create inclusive environments, contributing to the interplay of physical activity, happiness, and well-being among students.
- Ensuring equal access to sports and recreational activities for all students, particularly in the context of Saudi physiotherapy students, can enrich the campus community and support holistic well-being.
- Supporting PA initiatives that prioritise inclusivity can lead to improved well-being and academic success among Saudi physiotherapy students at Taif University, highlighting the interconnectedness of physical activity, happiness, and overall well-being in this specific educational setting.
- To enhance the study's global relevance, it is crucial to strengthen direct comparisons with international research and discuss how the findings can be applied beyond the specific cultural context.
- Future research could benefit from adopting a more diverse study design that allows for broader comparisons. By including comparative analyses with international studies, researchers can gain valuable insights into global trends and variations, thereby expanding the study's impact on a worldwide scale.

- Exploring diverse cultural contexts and educational settings in future studies can deepen understanding of the subject matter and contribute to a more comprehensive body of research with broader international applicability.

5. Conclusions

- This cross-sectional study illustrates the association between physical activity levels, happiness, and well-being among Taif University students, considering factors such as age, gender, education, and culture.
- The identification of time and resource constraints as primary external barriers, coupled with internal obstacles students face, underscores the complexity of fostering active lifestyles.
- Moreover, the influence of culture and motivation on student engagement in physical activity highlights the need for targeted interventions.
- By recognising these challenges and advocating for tailored strategies, a supportive environment can be created that promotes both student well-being and academic productivity, paving the way for a healthier and more fulfilled student community at Taif University.

Ethics Statement. The study was approved by the Taif University Ethics Committee (Approval Number: 12345) and involved a survey distributed to physiotherapy students. Their data was kept anonymous and confidential.

Conflicts of Interest. The research was conducted in the absence of any commercial or financial relationships that could be construed as potential conflicts of interest.

Author Contributions. MZ wrote the introduction, methodology, data analysis, discussion, and review and completed editing. The data collection, involving the dissemination of the survey link, was carried out by 8th-level physiotherapy students. Formal statistical analysis was performed by a paid expert from a different university who was not otherwise involved in the study. MZ used artificial intelligence for English language enhancement. ICMJE guidelines recommend including a concise statement regarding the utilisation or non-utilisation of AI in research practices.

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Supplementary Material. The Supplementary materials (annex I) are the International Physical Activity Questionnaire (IPAQ), the Warwick–Edinburgh Mental Well-being Scale (WEMWBS) and the Subjective Happiness Scale.

Data Availability Statement. The author will make the raw data supporting the findings of this article accessible.

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