

A Study of the Relationship Between Sports Cognition, Physical Activity and Physical Fitness of Ningbo University Instructors

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Abstract

This article aimed to investigate the relationships between sports cognition, physical activity, and physical fitness among instructors at Ningbo University, focusing on differences by gender, age, and job position. A cross-sectional study was conducted using a sample of 430 faculty members selected from a population of 3,098. Data were collected using the Exercise Benefits and Barriers Scale (EBBS-CN), the International Physical Activity Questionnaire (IPAQ), and standardized physical fitness tests. Reliability and validity of the instruments were confirmed (Cronbach's alpha > 0.85; KMO > 0.83, $p < 0.001$). Data analysis included descriptive statistics, Pearson's and Spearman's correlation coefficients, and regression modeling using SPSS and AMOS. The results indicated that 1) faculty exhibited moderate to high levels of sports cognition but low engagement in physical activity. 2) Physical activity levels showed significant negative correlations with several cognitive domains, including psychological perspectives ($r = -0.255$, $p < 0.01$), physical function ($r = -0.247$, $p < 0.01$), and life enhancement ($r = -0.180$, $p < 0.01$). 3) A positive correlation was found between physical activity and physical fitness ($r = 0.167$, $p < 0.01$). 4) Gender, age, and job position significantly influenced both activity and fitness levels ($p < 0.05$). Despite high awareness of exercise benefits, actual participation in physical activity among faculty remained low, influenced by demographic and occupational factors. These findings indicated that it is necessary to implement targeted health promotion strategies and institutional support to bridge the gap between cognition and behavior, ultimately improving faculty well-being.

Keywords: Sports cognition; Physical activity; Physical fitness; University instructors

Introduction

In recent years, China has implemented several key national initiatives aimed at enhancing public health and physical well-being. Notably, the National Fitness Plan (2021–2025) set a target to increase the rate of regular physical exercise participation to 38.5% by 2025. Likewise, the 14th Five-Year Plan for National Health, issued in 2022, emphasized the importance of comprehensive public health protection throughout the life course. These policies collectively demonstrate the country's commitment to promoting physical fitness as a pillar of national development.

While these policies highlight the importance of fitness among all citizens, their implications for specific occupational groups—particularly university instructors—have received limited academic attention. Faculty members often serve as role models and influencers of student health behavior, yet paradoxically, many struggle with physical inactivity, high stress levels, and deteriorating health conditions. Prior studies (López-Bueno et al., 2020) have identified concerning trends such as sedentary behavior, subhealth, and limited engagement in exercise among educators. These issues are exacerbated by occupational demands, aging populations, and a lack of institutional support systems.

Globally and locally, research has investigated the health benefits of physical activity and the risks of sedentary behavior (Safi et al., 2021; WHO, 2020). However, a critical gap remains: few studies have comprehensively explored how sports cognition—the knowledge, beliefs, and attitudes about physical activity—influences actual behavior and physical outcomes among university staff. Moreover, there is a lack of integration between empirical findings and psychological theories that explain behavior change.

To address this, the present study adopts Social Cognitive Theory (Bandura, 1986) as a conceptual framework. This theory posits that human behavior is shaped by the dynamic interplay between cognitive processes, environmental influences, and behavioral patterns. Applying this framework allows us to investigate not only the current levels of physical activity and fitness among faculty but also how instructors' beliefs and perceptions influence their engagement in health-promoting behavior.

Despite the recognized role of educators in health promotion, there is insufficient empirical evidence on the interrelationship between sports cognition, physical activity, and physical fitness among university instructors in China. This research aims to fill this gap by investigating these

variables within the context of Ningbo University, offering insight into demographic and occupational influences such as gender, age, and job position.

By examining these factors, the study seeks to inform the design of tailored interventions that enhance physical fitness, support healthy behaviors, and align with national health objectives in the higher education sector.

Research Objectives

1. To examine gender-based differences in the relationships among physical activity, physical fitness indicators, and sports cognition.
2. To analyze how age influences the relationship between physical activity, fitness indicators, and sports cognition.
3. To investigate the effects of job position on the correlation among physical activity, physical fitness, and sports cognition.

Literature Review

Physical Activity: Global and Occupational Perspectives

The global discourse on physical activity has evolved significantly over the past few decades. Traditionally, physical activity was associated with structured exercise routines, often within athletic or rehabilitation contexts. However, since the late 1990s, the concept of Health-Enhancing Physical Activity (HEPA) has gained prominence. As WHO Regional Office for Europe (2021) noted, physical activity is now widely recognized as encompassing not only formal exercise but also informal, daily movement such as walking, cycling, gardening, and even household chores. This perspective, reinforced by WHO (2020), emphasizes the health value of any movement that increases energy expenditure and contributes to physical and mental well-being.

Despite this broadened understanding, disparities in physical activity remain—particularly among specific occupational groups. University instructors, for instance, are often overlooked in national fitness campaigns. Studies in China, such as by Zhao et al. (2024), revealed low levels of physical activity among academic staff due to heavy workloads, sedentary teaching environments, and limited institutional support. Although educators are generally well-informed about health, the demands of academia—extended hours, research pressure, and administrative duties—create conditions that discourage consistent engagement in physical activity. These findings suggest that

awareness alone may be insufficient to promote healthy behavior and that other factors, such as cognitive beliefs and workplace context, warrant deeper exploration.

Sports Cognition and Behavioral Determinants

Cognitive factors have long been considered central to behavior change models in health psychology. Sports cognition—defined as an individual's perception of the benefits, barriers, and value of engaging in physical activity—has proven to be a strong predictor of actual behavior. One of the most widely used instruments to assess this dimension is the Exercise Benefits and Barriers Scale (EBBS), developed by Sechrist et al. (1987). The scale identifies domains such as perceived physical performance, psychological benefits, social interaction, and environmental factors that may either encourage or hinder physical activity.

Building upon this, Liu et al. (2018) applied the Trans-Theoretical Model (TTM) to explore how self-efficacy and stage of change mediate the relationship between cognition and behavior. Their findings highlighted the importance of internal readiness and motivational processes. Similarly, Bandura's Social Cognitive Theory (1986) provides a robust theoretical lens to understand how behavior results from reciprocal interactions between cognitive, behavioral, and environmental influences. In this model, knowledge alone does not guarantee action; rather, action is shaped by beliefs in one's ability (self-efficacy), perceived support, and outcome expectations.

However, a review of recent literature reveals that such cognitive frameworks are frequently applied in studies involving students, athletes, or clinical populations, with limited application to educators. Academic staff are a unique demographic—they are highly educated and influential in promoting health knowledge to students, yet often fail to adopt health-promoting behaviors themselves. This paradox underscores the need to explore the cognitive-behavioral gap among faculty, using validated instruments such as the EBBS and theoretical foundations like Social Cognitive Theory.

Linking Physical Activity, Cognition, and Fitness Outcomes

A considerable body of evidence supports the physiological benefits of regular physical activity. Blair et al. (1996), Haskell et al. (2009) and Booth et al. (2012) emphasized the correlation between physical fitness and reduced risk of chronic diseases such as cardiovascular conditions, diabetes, and obesity. Empirical findings also show that consistent physical activity improves measurable indicators such as body mass index (BMI), grip strength, aerobic endurance, and lower limb power. Nonetheless, the link between sports cognition and these physical outcomes is still underexplored, particularly in occupational populations.

While many studies confirm that individuals with more positive attitudes toward exercise are more likely to be active, few have examined whether this cognitive advantage translates into better physical fitness—especially in settings where job constraints may limit opportunities for exercise. Moreover, demographic variables such as gender, age, and job position may moderate this relationship. For example, WHO (2020) reports that women tend to be more responsive to perceived benefits and social influences, whereas men may engage more in performance-driven activities. Gavin et al. (2014) suggests that younger professionals tend to value stress relief and social interaction through exercise, while older individuals may be more concerned with disease prevention and fatigue management.

Despite these insights, there remains a lack of integrated research that brings together cognition, behavior, and physical outcomes in a single analytical framework. Particularly absent are studies that apply Social Cognitive Theory to examine how academic staff perceive and act upon their health knowledge, and how those perceptions correlate with actual physical health indicators.

This study aims to address these gaps by investigating the interrelationships between sports cognition, physical activity behavior, and physical fitness among university instructors in China. By applying a well-established behavioral theory and using validated tools, the research contributes to both theoretical understanding and practical recommendations for improving faculty health.

Conceptual Framework



Figure 1 Conceptual Framework

This conceptual framework illustrates the hypothesized relationships among three core constructs: sports cognition, physical activity, and physical fitness. In this model, sports cognition which includes individuals' beliefs, perceptions, and attitudes about exercise is proposed to influence physical activity participation. In turn, physical activity is expected to directly affect physical fitness outcomes, such as strength, endurance, and body composition.

Research Methodology

Participants

This study focuses on the faculty and staff of Ningbo University as the research subjects. The total number of faculty and staff at Ningbo University is 3,098, from which 430 teachers were selected as the research sample. Based on the Krejcie and Morgan scale, the required sample size is 2,200, which corresponds to a determined sample size of 346. Therefore, selecting 430 faculty and staff as the research sample meets the criteria for sample size selection.

Questionnaire survey method

1. Basic Information Questionnaire

A questionnaire will be administered to gather information regarding participants' college, department, name, gender, date of birth, job position, and other relevant details.

2. Physical Cognition (Questionnaire using EBBS–CN)

The Exercise Benefits and Barriers Scale–Chinese Version (EBBS–CN) will be utilized to conduct the questionnaire. Reliability test: SPSS 26.0 was used for reliability analysis, and the results showed that the Cronbach's Alpha coefficients of the benefit part and the barrier part of EBBS were 0.972 and 0.854, respectively, as shown in Table 1.

Table 1 Internal consistency reliability test of EBBS scale

EBBS	Cronbach's Alpha	Number of items
Benefits Section	0.972	29
Barrier Section	0.854	14

The Cronbach's Alpha coefficients were all higher than 0.8, indicating that the scale has high reliability.

Validity test: The results of factor analysis of the scale data showed that the KMO values of the benefit part and the barrier part of EBBS were 0.966 and 0.838, respectively, both greater than 0.6, and the Bartlett test P value was less than 0.001. It passed the KMO and Bartlett tests, indicating that the scale has a good level of structural validity.

Table 2 KMO and Bartlett test of EBBS scale

KMO and Bartlett's test		EBBS Benefits	EBBS Barrier
		Section	Section
KMO sampling suitability measure		0.966	0.838
Bartlett's test of sphericity	Approximate Chi-Square	10731.362	1962.207
	Degrees of Freedom	406	91
	Significance	0.000	0.000

Physical Activity Survey

The International Physical Activity Questionnaire (IPAQ) will be employed to assess participants' demographic characteristics and lifestyle factors, including smoking habits, alcohol consumption, physical exercise routines, additional physical fitness indicators, and medical history.

Testing Protocols

Postural assessment was conducted using the Vis body 3D body scanner. The physical fitness testing included several components: body composition parameters, specifically Body Mass Index (BMI) and fat percentage, were measured through bioelectrical impedance analysis utilizing the MC-780MA analyzer. Maximal handgrip strength was evaluated using a CAMRY EH101 dynamometer, with three trials conducted for each hand. Cardiorespiratory fitness was assessed via a submaximal cycling test performed on an EC-1200 cycle ergometer. Additionally, dynamic balance capacity was quantified using a force plate system during standardized weight-shift tasks, while agility performance was determined through directional change speed measurements obtained from the Pavigym 3.0 reactive training system. Finally, lower-body explosive power was calculated during vertical jumps using the Keiser A420 resistance system.

Static analysis

This study used SPSS Statistics (Version 28.0, IBM Corp.) for comprehensive data analysis. Descriptive statistics, including means and standard deviations, were computed to quantify the levels of sports cognition across various sub-dimensions among university instructors. The bivariate relationships between sports cognition, physical activity categories, and fitness parameters were examined using Pearson correlation coefficients, with statistical significance assessed through SPSS's two-tailed hypothesis testing module ($\alpha=0.05$).

Research Results

1. Correlation Between Physical Activity, Physical Fitness Indicators, and Exercise Cognition

To explore the associations between physical activity levels and both exercise cognition and physical fitness indicators, correlation analysis was conducted using Pearson's and Spearman's coefficients. Physical activity was examined in relation to cognitive domains such as perceived benefits, psychological perspectives, social support, and physical exertion, as well as physical metrics including body fat percentage, grip strength, BMI, lower limb explosive power, and balance index.

Table 3 Correlation coefficients between physical activity amount, different physical fitness indicators and exercise cognition

variable	Body fat percentage (%)	Cardiopulmonary endurance (met)	Upper limb reaction time (every 20 seconds)	Grip strength (kg)	Balance index	BMI	Total physical strength (Met-m/w)	Lower limb explosive power (w)
Cognitive benefits	0.058	-0.005	0.043	-0.023	0.004	-0.015	-0.226**	-0.079
Life enhancement	0.062	-0.019	0.031	0.031	0.028	0.011	-0.154**	-0.038
Physical function	0.027	-0.038	0.038	-0.013	-0.007	-0.017	-0.186**	-0.074
Psychological perspectives	0.053	0.012	0.042	-0.014	0.002	-0.011	-0.251**	-0.072
Social interaction	0.064	-0.033	0.040	-0.017	-0.023	-0.008	-0.157**	-0.071
Preventive care	0.051	-0.034	0.033	-0.021	0.012	-0.014	-0.196**	-0.082
Cognitive impairment	-0.049	0.031	-0.059	-0.001	-0.060	-0.069	0.149**	-0.005
Exercise environment	-0.027	0.035	-0.067	0.007	0.016	-0.027	-0.158**	0.021
Time allocation	0.018	-0.009	-0.007	-0.005	-0.095	-0.070	0.037	-0.057
Physical exertion	-0.126*	0.021	-0.025	0.065	-0.034	-0.048	-0.157**	0.017
Family support	0.063	0.010	-0.064	-0.080	-0.068	-0.054	-0.132**	-0.046

Table 3 summarizes the correlation coefficients. Several statistically significant relationships were observed between total physical activity and cognitive variables. Notably, total physical strength showed significant negative correlations with most cognitive components, including cognitive benefits ($r = -0.226$, $p < 0.01$), psychological perspectives ($r = -0.251$, $p < 0.01$), and preventive care ($r = -0.196$, $p < 0.01$). While these correlations were statistically significant, the

effect sizes were relatively weak ($|r| < 0.30$), suggesting that the practical influence of sports cognition on physical activity behavior may be limited or influenced by external barriers (e.g., time constraints or workload).

Interestingly, cognitive impairment—reflecting awareness of personal limitations—was positively correlated with total physical strength ($r = 0.149$, $p < 0.01$). Although counterintuitive, this finding may indicate compensatory motivation among those who acknowledge cognitive challenges. However, this correlation remains weak and requires cautious interpretation.

In terms of physical fitness indicators, body fat percentage was weakly but significantly negatively correlated with physical exertion ($r = -0.126$, $p < 0.05$), indicating that individuals who perceive exercise as demanding may tend to have higher body fat. Other physical metrics, such as grip strength, balance index, BMI, and lower limb power, showed no statistically significant correlations with cognition ($p > 0.05$), suggesting that sports cognition may not directly reflect physical capacity in this population.

Overall, while the statistical correlations indicate associations between sports cognition and physical activity, their practical significance remains limited. These results highlight the complexity of translating cognitive awareness into behavioral outcomes and underscore the need for contextual or institutional support to facilitate physical engagement among university instructors.

2. Correlation Analysis Between Sports Cognition, Physical Activity, and Physical Fitness

To further examine the relationships among the key variables' sports cognition, physical activity, and physical fitness a correlation analysis was conducted. Pearson's and Spearman's correlation coefficients were used to assess the strength and direction of associations between different subcomponents of sports cognition and both physical activity levels and physical fitness outcomes.

Table 4 Correlation analysis of various variables in the relationship model between physical education cognition and physical activity and physical fitness of teachers at Ningbo University

Variable	Physical Fitness	physical activities	Life Promotion	Body Function	Psychological Concepts	Social interaction	Preventive health care	Exercise environment	Time management	Physical Exertion	Family support
Physical Fitness	1	-	-	-	-	-	-	-	-	-	-
Physical activities	.167**	1	-	-	-	-	-	-	-	-	-
Life Promotion	-0.011	-.180**	1	-	-	-	-	-	-	-	-
Body Function	-0.024	-.247**	.854**	1	-	-	-	-	-	-	-
Psychological Concepts	-0.018	-.255**	.723**	.698**	1	-	-	-	-	-	-
Social interaction	-0.045	-.204**	.817**	.729**	.673**	1	-	-	-	-	-
Preventive health care	-0.009	-.191**	.778**	.808**	.657**	.614**	1	-	-	-	-
Exercise environment	0.036	.116*	-.250**	-.231**	-.195**	-.186**	-.199**	1	-	-	-
Time management	-0.052	0.021	-.147**	-.129**	-0.093	-.165**	-0.093	.452**	1	-	-
Physical Exertion	0.013	.106*	-.302**	-.245**	-.301**	-.289**	-.212**	.422**	.484**	1	-
Family support	-0.074	.127*	-.219**	-.257**	-.169**	-.135**	-.234**	.488**	.458**	.292**	1

The results, summarized in Table 4, show a statistically significant positive correlation between physical activity and physical fitness ($r = 0.167$, $p < 0.01$), although the effect size is small. This indicates that, while related, higher levels of physical activity among faculty members are only weakly associated with improved fitness outcomes.

Several negative correlations were observed between cognitive domains and physical activity. Notably, life promotion ($r = -0.180$), physical function ($r = -0.247$), psychological concept ($r = -0.255$), social interaction ($r = -0.204$), and preventive health care ($r = -0.191$) were all inversely associated with physical activity ($p < 0.01$). These results may appear counterintuitive, as positive perceptions of exercise would typically be expected to correspond with greater engagement in physical activity. One possible explanation is that individuals who recognize the importance of health benefits may also be more aware of their own inactivity or limitations—creating a cognitive dissonance that leads to negative statistical associations.

In contrast, several environmental and behavioral factors demonstrated positive correlations with physical activity: exercise environment ($r = 0.166$, $p < 0.05$), physical consumption ($r = 0.106$, $p < 0.05$), and family support ($r = 0.127$, $p < 0.05$). These findings underscore the importance of supportive surroundings and social reinforcement in promoting actual exercise behavior. Meanwhile, time allocation showed no statistically significant correlation with

physical activity, suggesting that simply having time does not necessarily lead to higher activity levels without motivational or structural support.

In summary, while some correlations were statistically significant, their weak magnitudes limit their practical impact. These patterns highlight the complex and sometimes paradoxical nature of exercise behavior, particularly in academic settings where awareness of health does not always translate into action.

Discussions

This study aimed to explore the relationships between sports cognition, physical activity, and physical fitness among university instructors. The findings revealed several statistically significant but often weak correlations between cognitive domains and actual physical activity levels. While these results provide insight into the cognitive-behavioral dynamics of health behavior, they also highlight important contradictions and areas for further reflection.

One of the most notable findings was the inverse relationship between several positive cognitive dimensions (e.g., life promotion, psychological perspectives, social interaction) and physical activity participation. While previous research has shown that positive attitudes and beliefs often promote active behavior, the present findings suggest that in certain occupational populations, such as university faculty, this relationship may not hold. These discrepancies may be explained by the intention-behavior gap often discussed in health psychology, where individuals hold strong cognitive beliefs but face environmental or structural barriers (e.g., time constraints, stress, lack of institutional support) that inhibit behavioral execution.

Moreover, the positive relationship between physical activity and physical fitness, although statistically significant ($r = 0.167$), was weak in magnitude. This may be due to inconsistent activity patterns or the limitations of self-reported data. While instructors may engage in some physical activity, it may not be of sufficient intensity or frequency to yield measurable fitness gains. These findings echo research by Liu et al. (2018), who noted that awareness alone is insufficient to improve physical outcomes without sustained behavior.

Interestingly, “cognitive impairment” was positively correlated with physical activity, which may reflect compensatory motivation—where individuals who acknowledge their limitations become more proactive. Alternatively, this may indicate a methodological artifact or an overestimation in self-reported responses. Such nuances highlight the importance of using mixed methods or objective measurement tools in future studies.

The findings reinforce the relevance of Social Cognitive Theory (Bandura, 1986), particularly the importance of environmental and personal factors in shaping behavior. While self-efficacy and perceived benefits are important, this study suggests that contextual variables—such as institutional policies, workload, and social norms—may override individual motivation. The results also align with the Transtheoretical Model, which posits that individuals may fluctuate across stages of change, particularly if external barriers persist.

Several limitations must be acknowledged. First, the cross-sectional design precludes causal inference. Second, most variables—particularly physical activity levels and sports cognition—were assessed using self-reported questionnaires, which may introduce response bias or social desirability effects. Third, the sample was drawn from a single university, potentially limiting generalizability. Future research should include longitudinal or experimental designs, and incorporate objective fitness measures such as accelerometers or performance-based testing.

Given the cognitive-behavioral gap identified, institutions should consider implementing peer-led physical activity programs, providing incentives for wellness participation, or integrating movement into academic schedules. These strategies may help translate cognitive awareness into consistent action. Additionally, health education campaigns tailored for educators should focus not only on knowledge, but on overcoming practical barriers to participation.

Knowledge from Research

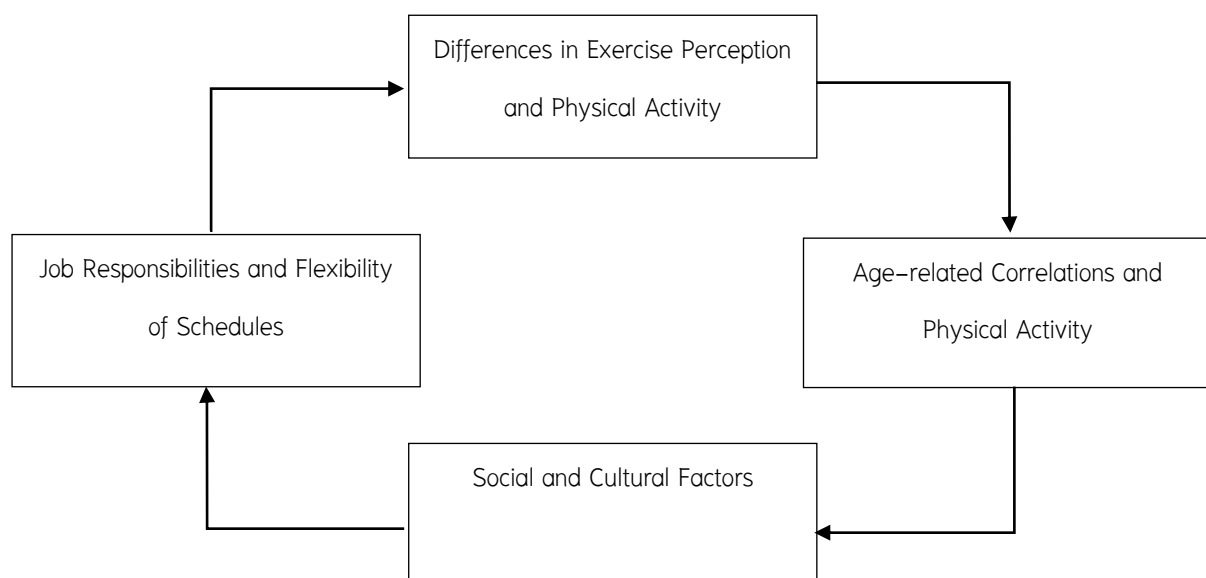


Figure 3 Knowledge from Research

Although Ningbo University instructors exhibit high health awareness, their physical activity levels are low due to time constraints, job demands, and perceived barriers. Differences in occupation, gender, and age influence how sports cognition translates into behavior. While sports cognition is positively associated with activity and fitness, contextual factors moderate this relationship. Targeted, context-specific interventions are essential to bridge the gap between awareness and action.

Conclusion

This study explored the complex relationships among sports cognition, physical activity, and physical fitness in the context of university instructors. The findings indicate that while instructors generally exhibit a high degree of health awareness, their actual levels of physical activity remain insufficient. This gap is largely attributed to occupational responsibilities, time constraints, and other contextual factors that interfere with the translation of knowledge into action. Although sports cognition is positively associated with both physical activity and physical fitness, the degree to which this cognitive awareness manifests in behavior is significantly moderated by demographic and occupational variables, such as age, gender, and job roles. These insights underscore the need to go beyond individual-level understanding and consider the broader institutional and social environment in which health behaviors are enacted.

From a theoretical standpoint, the study extends the applicability of Social Cognitive Theory to the academic workplace by illustrating how behavioral outcomes are shaped through the dynamic interaction of personal beliefs, environmental influences, and social roles. While cognitive factors—such as perceived benefits and self-efficacy—are important, they are not, on their own, sufficient to drive consistent physical activity. The study affirms the relevance of the intention-behavior gap, a widely recognized concept in health psychology, showing that even individuals with high awareness may fail to act due to structural limitations. These findings contribute to future theoretical modeling of health-related behaviors in knowledge-based professions and offer a basis for further comparative studies in similar institutional settings.

In practical terms, the results highlight the importance of developing targeted and context-sensitive interventions that directly address the barriers faced by faculty members. Health promotion strategies should not be generic; rather, they must be tailored to the specific challenges encountered by different staff groups—particularly administrative personnel and older instructors who face heightened obstacles to regular physical activity. The study provides valuable insights for

policy development by identifying key points of intervention and enabling institutions to focus their resources on supporting behavioral change. Ultimately, promoting sustainable health behavior in universities will require the alignment of cognitive awareness, supportive environments, and institutional commitment.

Suggestions

To translate findings into meaningful change, universities should adopt a multi-level and time-phased approach:

1. Short-Term Recommendations

Implement peer-led physical activity groups within departments.

Offer flexible wellness hours to support physical activity during the workday.

Provide targeted health education campaigns that account for gender- and age-related motivations.

2. Long-Term Strategic Recommendations

Develop institution-wide wellness frameworks that integrate physical activity into academic culture.

Create incentive-based programs (e.g., point systems, recognition awards) to sustain long-term participation.

Establish monitoring and evaluation systems such as annual wellness audits or digital tracking tools to assess behavioral trends and program effectiveness.

3. Generalizable Principles

Health promotion must address both individual motivation and structural barriers.

Context-specific interventions, grounded in behavioral theory, are essential for sustainable health change.

Institutions can replicate this approach by aligning policies with cognitive and demographic insights to improve workforce well-being.

References

- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. New Jersey: Prentice–Hall.
- Blair, S. N., Kampert, J. B., Kohl, H. W. III, Barlow, C. E., Macera, C. A., Paffenbarger, R. S. Jr., & Gibbons, L. W. (1996). Influences of cardiorespiratory fitness and other precursors on cardiovascular disease and all–cause mortality in men and women. *JAMA*, 276(3), 205–210. <https://doi.org/10.1001/jama.276.3.205>
- Booth, F. W., Roberts, C. K., & Laye, M. J. (2012). Lack of exercise is a major cause of chronic diseases. *Comprehensive Physiology*, 2(2), 1143–1211. <https://doi.org/10.1002/cphy.c110025>
- Gavin, J., Keough, M., Abravanel, M., Moudrakovski, T., & McBrearty, M. (2014). Motivations for participation in physical activity across the lifespan. *International Journal of Wellbeing*, 4(1), 46–61. <https://doi.org/10.5502/ijw.v4i1.3>
- Haskell, W. L., Blair, S. N., & Hill, J. O. (2009). Physical activity: health outcomes and importance for public health policy. *Preventive Medicine*, 49(4), 280–282. <https://doi.org/10.1016/j.ypmed.2009.05.002>
- Liu, K. T., Kueh, Y. C., Arifin, W. N., Kim, Y., & Kuan, G. (2018). Application of the transtheoretical model on behavioral changes, and amount of physical activity among university's students. *Frontiers in Psychology*, 9, 2402. <https://doi.org/10.3389/fpsyg.2018.02402>
- López–Bueno, R., Andersen, L. L., Smith, L., López–Sánchez, G. F., Mompel, J., Casedas, L., & Casajús, J. A. (2020). Physical activity and perceived stress at work in university workers: A cross–sectional study. *The Journal of Sports Medicine and Physical Fitness*, 60(2), 314–319. <https://doi.org/10.23736/S0022–4707.19.10259–9>
- Safi, A., Cole, M., Kelly, A., & Walker, N. (2021). An evaluation of physical activity levels amongst university employees. *Advances in Physical Education*, 11(2), 158–171. <https://doi.org/10.4236/ape.2021.112012>
- Sechrist, K. R., Walker, S. N., & Pender, N. J. (1987). Development and psychometric evaluation of the Exercise Benefits/Barriers Scale. *Research in Nursing & Health*, 10(6), 357–365. <https://doi.org/10.1002/nur.4770100603>
- World Health Organization Regional Office for Europe. (2021). *2021 physical activity factsheets for the European Union Member States in the WHO European Region*. Copenhagen: WHO Regional Office for Europe.

World Health Organization. (2020). *WHO guidelines on physical activity and sedentary behaviour*.

World Health Organization. <https://doi.org/10.1136/bjsports-2020-102955>

Zhao, M., Yu, Y., & Sin, K. F. (2024). The moderating effect of physical exercises on job stress, emotional intelligence, and teaching satisfaction among Chinese university teachers.

Humanities and Social Sciences Communications, 11(1), 108.

<https://doi.org/10.1057/s41599-024-03108-z>