INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN PROGRESSIVE EDUCATION & DEVELOPMENT

OPEN ACCESS JOURNAL

Vol 13, Issue 3, (2024) E-ISSN: 2226-6348

The Status and Related Factors of Customized Physical Education for Physical Health Promotion among Chinese College Students: A Cross-Sectional Investigation

Ning Li

Faculty of Sports Science and Recreation, Universiti Teknologi MARA (UiTM), Shah Alam, Selangor, Malaysia

Email: 2021470534@student.uitm.edu.my

Mohamad Nizam Mohamed Shapie

Faculty of Sports Science and Recreation, Universiti Teknologi MARA (UiTM), Shah Alam, Selangor, Malaysia

Email: nizam7907@uitm.edu.my

Chao Gu

Department of Physical Education, Suzhou Vocational University, Suzhou Jiangsu， China

Corresponding Author Email: 92425@jssvc.edu.cn

To Link this Article: http://dx.doi.org/10.6007/IJARPED/v13-i3/22663 DOI:10.6007/IJARPED/v13-i3/22663

Published Online: 18 September 2024

Abstract

This study examines the status and influencing factors of Customized Physical Education (CPE) among Chinese college students. This cross-sectional study was conducted in Chinese universities and utilised the multistage stratified, cluster random sampling method. The research instrument comprises the International Physical Activity Questionnaire (IPAQ) and the Exercise Motivation Inventory-2 (EMI-2). The related factors influencing CPE were analysed by a multivariate logistic regression model. The results suggest that CPE for physical health promotion among Chinese college students is suboptimal and warrants greater attention. Key factors influencing CPE performance include gender, annual family per capita income, place of residence, and the usage of tobacco and alcohol. Notably, students with higher health and physical consciousness and stronger sports and performance goals are more likely to get the high performance in CPE, highlighting the role of intrinsic motivation in driving participation. However, the study also uncovers significant gaps in current CPE, particularly the lack of emphasis on psychological and emotional well-being, suggesting a need for more holistic and inclusive CPE strategies. These findings contribute to a deeper understanding of the complexities surrounding CPE engagement and underscore the necessity for tailored interventions to enhance physical health promotion among college students.

Keywords: Customized Physical Education, Physical Health Promotion, Education Science, Cross-Sectional Investigation

Introduction

Physical activity is instrumental in promoting health and reducing the risk of chronic diseases (Lobelo et al., 2018; Carbone ET AL., 2019; Angulo et al., 2020). Consequently, the World Health Organization (WHO) has identified the encouragement of physical activity participation as a global public health priority, especially for young people (WTO, 2019). Most young individuals generally hold positive attitudes towards sports (Säfvenbom et al., 2015), and are considered to be a relatively healthy population (Andersson & Vasan, 2018). However, longitudinal surveys indicate a concerning trend: the physical fitness levels of Chinese college students are progressively declining (Wang, 2019; Ding & Jiang, 2020; Wang et al., 2020). Numerous studies have revealed that the growth indicators related to college students' body composition are on the rise, yet key quality indicators such as strength, speed, and endurance are predominantly decreasing (Wu et al., 2019; Zhang et al., 2019).

Due to the heavy academic workload and associated anxiety, many university students do not maintain regular eating habits, sufficient sleep, or adequate physical exercise (Zeng et al., 2019). Compared to the past decades, there has been a marked reduction in the physical activity levels, exercise duration, and exercise volume among college students (Dong et al., 2019; Wang, 2019). Consequently, they may experience symptoms such as headaches, insomnia, fatigue, or forgetfulness (Li et al., 2022). Meanwhile, the time spent on sedentary activities like watching dramas and playing games has significantly increased (Bai et al., 2023). Therefore, it is imperative to encourage college students to engage in more health-promoting physical activities (Wang, 2019; Zhang et al., 2019).

Physical education (PE) is a crucial component of college students' physical activities and the important way to promote the physical health of college students (Liu et al., 2017; Behzadnia et al., 2018). However, due to variations in students' physical conditions and athletic skills, the standard PE courses often fail to fully meet the physical health needs of all students (Nichols et al., 2019). Consequently, customized physical education (CPE) has emerged as an increasingly popular solution, which emphasizes the importance of considering both the characteristics of the course and the diverse qualities of students during the teaching process (Gainullin et al., 2019; Sum et al., 2021). This educational strategy aims to maximize the physical health and overall well-being of students by providing personalized physical activity plans and interventions (Gainullin et al., 2019). On one hand, this method highlights the unique appeal of each course; on the other hand, it enhances guidance for students of varying levels, ensuring that each student receives the most suitable development opportunities (Sum et al., 2021; Zea et al., 2021).

Existing research indicates a positive correlation between CPE and physical health promotion. For example, Gainullin et al (2019), argues that CPE courses can effectively enhance students' physical fitness and health levels. Specifically, through personalized physical education, participants can choose sports activities that align with their interests and physical condition, thereby increasing their motivation and enthusiasm for exercise (Huang et al., 2016). Moreover, CPE courses can better account for individual differences among students, offering more targeted guidance and training plans that help them achieve optimal exercise outcomes

safely (Sum et al., 2021). Personalized training programs lead to significant improvements in students' cardiovascular function, muscle strength, and flexibility (Görner & Reineke, 2020).

Despite the significant advantages of CPE in promoting students' physical health, research on its current status and dissemination in Chinese universities is relatively limited (Zhang & Min, 2020). Specifically, the performance and participation rates of Chinese university students in CPE, as well as their motivations and expectations for engaging in such courses, remain unclear (Deng et al., 2022). The lack of advanced research in this area is one of the primary obstacles to developing strategies that emphasize the importance of physical activities in improving China's physical activity levels (Zhang & Min, 2020; Wang et al., 2024). To address this research gap, this study seeks to fill this gap by investigating the current status and influencing factors of customized PE programs aimed at promoting physical health among college students. It explores how CPE can more effectively promote students' CPE performance.

The primary motivation behind this study is twofold: first, to provide empirical evidence on the effectiveness of individualized PE interventions in enhancing students' physical health; second, to address the lack of targeted strategies in traditional PE curricula, which often fail to accommodate the diverse health conditions and fitness levels of students. By examining the relationship between customized PE and health outcomes, this study contributes to the growing body of literature on personalized education approaches and offers practical insights for educators and policymakers striving to reform physical education in higher education.

By gaining an in-depth understanding of students' needs and expectations, this research can provide valuable insights for policymakers in formulating more scientifically sound PE policies and for educators in designing curricula. Moreover, it can significantly contribute to the physical health promotion and activity performance of students, holding substantial public health implications. By focusing on tailored interventions, the findings have the potential to inform future educational practices, promote more effective health initiatives, and ultimately contribute to the holistic development of college students.

Methods

Samples and Data Collection

This cross-sectional study was conducted in Chinese universities to investigate the current status and associated factors of college students' CPE for physical health promotion. First, we employed convenience sampling to select three regions in China: a developing area in the central part (Lanzhou, Gansu), a developed area in the eastern part (Qingdao, Shandong), and a remote area in the western part (Urumqi, Xinjiang). Then, we used random sampling to choose two sample schools from each region. In each selected school, we randomly selected two classes from each grade level using stratified cluster sampling. The students from these classes were invited to participate in the questionnaire survey.

Before the formal survey, we conducted a pilot study using convenience sampling among second-year students at a university in Qingdao. Based on the feedback from the pilot study, we refined the survey questions and related scales to finalize the questionnaire. Data for this study were collected through anonymous self-administered questionnaires. At the beginning of each survey session, interviewers explained the purpose of the study. Each participant was

required to sign an informed consent form, indicating that participation was voluntary. Those who declined to participate were excluded from the survey.

Each student completed the questionnaire within 30 minutes. Participants who refused to complete the survey were excluded from the analysis. After completion, the questionnaires were collected on-site by the survey staff. All respondent data were kept strictly confidential. Ultimately, 1,771 university students participated in the survey. After excluding questionnaires with more than 10% missing responses, 1,771 valid responses were obtained, resulting in a response rate of 99.16%, which meets the sample size requirements for this study.

Data Measurement

Basic Sociodemographic Characteristics

The questionnaire was divided into three sections: student characteristics, CPE status and performance and motivations. Following Ma et al. (20218), the student characteristics section was self-designed. It focused on gender, age, annual family per capita income, place of residence, usage of tobacco, usage of alcohol and health status.

The CPE Status and Performance

To assess CPE among college students, a short version of the International Physical Activity Questionnaire (IPAQ) translated into Chinese was used (Hagströmer et al., 2006). The IPAQ is a validated and reliable tool for determining physical activity levels (Lee et al., 2011; Bayraktar et al., 2021). We also categorised CPE into exercise, sports, and recreational physical activity (RPA) according to the type of physical activity and provided clear definitions. In addition to the definitions, specific examples were provided to illustrate various categories of physical activities. These examples encompass a range of sports, including basketball, badminton, tennis, table tennis, football, golf, racquetball, and soccer. Furthermore, examples of exercises were listed, such as jogging, running, cycling, hiking, aerobics, water aerobics, and weightlifting training. Additionally, RPAs were exemplified by activities like dance, tai chi (太极), wushu (武术).

Then participants were asked if they were a member of any physical activity clubs or if they were involved in any customised sports courses or competitions. In addition, they were asked to identify their main type of CPE (exercise, sport and RPA) based on the categorisation provided. They were also asked to provide information about their weekly CPE activities.The amount of physical activity corresponding to low-intensity, moderate-intensity, and high-intensity is calculated by a formula, and the whole-body activity amount (Metabolic Equivalent of Task, MET-minute/week) is calculated (Table 1) (Mendes et al., 2018). Then, the MET-minutes/week for all participating CPE activities were summed to obtain a CPE performance for each participant. Based on CPE performance, participants are divided into high group (above or equal to the average score) and low group (below average score).

Table 1
Formula of customized physical education

Physical Activity Level	Formula
Low Intensity(MET-min/week)	3.3 MET×time(minute/week)× frequency (days/week)
Moderate Intensity(MET-min/week)	4.0 MET× time (minute/week)× frequency (days/week)
High Intensity(MET-min/week)	8.0 MET× time (minute/week)× frequency (days/week)
Total amount of physical activity(MET-min/week)	Low intensity+ Moderate intensity+ High intensity= total amount of physical activity

CPE Motivation Questionnaire

In the third section, we adapted the Exercise Motivation Inventory-2 (EMI-2) (Ednie & Stibor, 2017; Kim & Cho, 2022), originally developed by Markland and Ingledew (1997). The EMI-2 was originally designed to assess exercise motivation; therefore, our study uses it to evaluate motivations for CPE. The EMI-2 consists of 51 questions measuring 14 distinct subscales: Affiliation (AF), Appearance (AP), Challenge (CH), Competition (COM), Enjoyment (EN), Health Pressures (HP), Ill-Health Avoidance (IHA), Nimbleness (NI), Positive Health (PH), Revitalization (RE), Social Recognition (SR), Strength and Endurance (SE), Stress Management (SM), and Weight Management (WM).

Based on these 14 distinct subscales, we identified three motivations: Psychological and Emotional (AF, EN, ER, SR, SM), Health and Physical (HP, IHA, PH, SE, WM) and Sports and Performance (AP, CH, COM, NI), which explained 15.26%, 14.60%, and 23.69% of the total variance, respectively. The final questionnaire achieves a Cronbach's α of 0.87, which using a 5-point Likert scale with choices ranging from not at all true for me = 0 to very true for me = 4. The confirmatory factor analysis of this three-factor model indicated an acceptable model fit, with a Tucker–Lewis Index of 0.91, a Comparative Fit Index of 0.93, a Normed Fit Index of 0.95, an Expected Cross-Validation Index of 0.39, and a Root-Mean-Square Error of Approximation of 0.072. The item loadings ranged from 0.76 to 0.85, and the correlation coefficients among the three factors varied from 0.59 to 0.78.

Ethics

Ethical approval for this study was granted by the Universiti Teknologi MARA Ethics Committee in Malaysia (Approval No. HR 325-2024). Since the participants were university students over the age of 18, and the questionnaire focused solely on their routine physical activities, the requirement for parental consent was waived. This study was conducted in strict accordance with the Helsinki Declaration. Prior to data collection, the first author obtained consent from the sample schools through negotiation. A formal letter of permission to conduct the research was signed by the head of the physical education department on behalf of the students.

Statistical Analysis

In this study, the database was constructed using Microsoft Access 2021. Data were recorded twice and compared to ensure integrity and accuracy. We employed SPSS 29.0.2.0 for data analysis. The independent variables included individual-level factors such as gender (male/female), age (＜20/≥20), annual family per capita income (＜10,000/10,000-20,000/＞20,000), place of residence (urban/rural), usage of tobacco (yes/no) and usage of alcohol (yes/no). These variables were summarized using descriptive statistics. Between-group comparisons of measured data were performed using analysis of variance (ANOVA) or t-tests. All tests were two-sided, with a significance level set at $\alpha = 0.05$.

A multivariate logistic regression model was utilized to identify factors associated with Chinese college students' CPE performance for physical health promotion. The dependent variable was the CPE performance. Independent variables for the multivariate logistic regression were selected based on their significance in univariate analysis and included gender, age, annual family per capita income, place of residence, usage of tobacco, usage of alcohol and the three components of EMI-2: Psychological and Emotional, Health and Physical and Sports and Performance. Results were reported as adjusted odds ratios (ORs) with 95% confidence intervals (CIs).

Results

Respondents' Basic Characteristics

In this study, a total of 1,786 questionnaires were distributed, and 1,771 valid responses were received. Fifteen participants were excluded due to incomplete or missing information, resulting in a response rate of 99.2%. As shown in Table 2, the basic characteristics of the respondents indicate that 46.3% (820 individuals) were male, and 53.7% (951 individuals) were female, with an average age of 20.70 years. The proportions of students from Shandong Province, Gansu Province, and Xinjiang Province were 41.7% (739 individuals), 32.7% (579 individuals), and 25.6% (453 individuals), respectively. Additionally, 65.5% of the respondents were from urban areas. Among the participants, 14.6% had smoked, and 46.4% had consumed alcohol.

Table 2
Characteristics of participating students in the survey (n = 1771)[a]

Participant Characteristics	n (%) or mean ± SD
Age	21.4 ± 3.8
Gender	
Male	820 (46.7)
Female	951 (55.3)
Province	
Shandong	739 (41.7)
Gansu	579 (32.7)
Xinjiang	453 (25.6)
Area	
Urban	1089 (61.5)
Rural	682 (38.5)
Annual family per capita income (CNY)	
< 10,000	682 (38.5)
10,000-20,000	568 (33.1)
> 20,000	503 (28.4)
Usage of Tobacco	
Yes	259 (14.6)
No	1512 (85.4)
Usage of Alcohol	
Yes	821 (46.4)
No	950 (53.6)

Customized Physical Education Status

As demonstrated in Table 3, there are differences and variations in CPE among sports, exercise, and RPAs. Among the respondents in this study, 53.0% (n = 939) participated in RPAs, followed by 31.0% (n = 549) in sports, and 16.0% (n = 283) in exercise. Descriptive statistics for CPE participation indicate that The data reveals that the majority of participants engaged in Sports (46.3%, n=254) and RCAs (27.4%, n=257) for 3-4 hours per week. In contrast, Exercises showed a more even distribution between the 3-4 hours (33.9%, n=96) and 5-6 hours (27.2%, n=77) intervals. Notably, participation in CPE exceeding 9 hours per week was relatively low across all categories, with fewer than 10% of participants reporting such levels of engagement. Furthermore, it is worth noting that moderate-intensity engagement is predominant, particularly in Sports and RCAs, while high-intensity participation remains limited. Correlation assessments exposed Cronbach's alpha (α) values for sports (α= 0.81), exercise (α= 0.84), and RPAs (α= 0.87) in this study, which suggests that the reliability of the results of this study has been confirmed.

Table 3
The levels of CPE per week (n = 1771)[a]

Hours/week	Sports (n= 549)	Exercise (n= 283)	RCAs (n= 939)
1-2	127	51	170
3-4	254	96	257
5-6	98	77	285
7-8	47	41	149
9-10	16	11	55
＞10	7	7	22
α	0.81	0.84	0.87

Correlation Analysis

Table 4 presents the different sociodemographic factors on CPE under low and high performance groups. The results showed that students with an annual family per capita income greater than 20,000 (CNY) exhibited higher levels of CPE. Urban students showed higher performance in CPE compared to their rural counterparts. The study also found that male students who used tobacco and alcohol were less likely to high performance in CPE. Furthermore, The data presented in Table 5 reveals that the three motivations of EMI-2 are correlated with the performance of CPE, indicating that psychological and emotional, health and physical and sports and performance motivations play crucial roles in influencing CPE performance. Of these motivations, health and physical motivation demonstrates the strongest correlation with RCAs, while psychological and emotional motivation shows the weakest correlation.

Table 4
The sociodemographic factors on CPE under low and high performance groups (n = 1771)[a]

Characteristics	CPE performance		P-Value
	High group	Low group	
Age Group (years)			0.834
15-19	376 (48.0%)	408 (52.0%)	
20-24	358 (47.6%)	394 (52.4%)	
25 and above	110 (46.8%)	125 (53.2%)	
Gender			0.031
Male	380 (46.3%)	440 (53.7%)	
Female	457 (48.1%)	494 (51.9%)	
Area			<0.001
Urban	495 (45.5%)	594 (54.5%)	
Rural	368 (55.2%)	314 (44.8%)	
Annual Family Per Capita Income (CNY)			0.012
< 10,000	253 (37.1%)	429 (62.9%)	
10,000-20,000	309 (54.4%)	259 (45.6%)	
> 20,000	342 (68.0%)	161 (32.0%)	
Usage of Tobacco			<0.001
Yes	121 (48.4%)	129 (51.6%)	
No	834 (55.2%)	678 (44.8%)	
Usage of Alcohol			
Yes	377 (45.9%)	444 (54.1%)	<0.001
No	551 (58.0%)	399 (42.0%)	

Table 5
Correlation analysis of motivaton factors and CPE performance (n = 1771)[a]

Variables	Sports	Exercise	RCA	CPE
Psychological and Emotional Motivation	0.05	0.03	0.07*	0.05*
Health and Physical Motivation	0.31***	0.27**	0.20*	0.24**
Sports and Performance Motivation	0.42**	0.38**	0.32**	0.37**

Note: ***, **, * represent P < 0.01, P < 0.05, and P < 0.1, respectively.

Multivariate Logistic Regression Analyses of CPE

The results of the multivariable logistic regression analysis for CPE are presented in Table 6. The findings indicate that the independent factors influencing CPE include gender, annual family per capita income, smoking, alcohol consumption, health status, health and physical factors, and sports and performance factors. These results reveal that female gender (OR = 2.554, 95%CI: 2.342-2.766), Urban (OR = 0.742, 95%CI: 2.642-2.946) and annual family per capita income greater than 20,000 (CNY) (OR = 1.544, 95%CI: 1.266-2.173) are statistically significant correlates of performance of CPE. Additionally, smoking (OR = 0.764, 95%CI: 0.287-0.936) and drinking (OR = 0.973, 95%CI: 0.784-0.998) are identified as risk factors for CPE. Students with high health and physical status (OR = 0.388, 95%CI: 0.075-0.419), and high sports and performance intention (OR = 0.227, 95%CI: 0.147-0.286) are more likely to get high CPE performance.

Table 6
Logistic regression analysis of relevant factors affecting the CPE performance

Variables	Reference group	Estimate	P	OR	95%CI	
					Lower	Upper
Gender						
Female	Male	0.342	0.016	2.554	2.342	2.766
Area						
Urban	Rural	0.261	<0.001	2.742	2.642	2.946
Annual family per capita income						
> 20,000	< 10,000	0.864	<0.001	1.544	1.266	2.173
10,000-20,000		0.541	0.231	2.089	1.554	3.275
Usage of Tobacco						
Yes	No	-0.587	0.004	0.764	0.287	0.936
Usage of Alcohol						
Yes	No	-0.238	<0.001	0.973	0.784	0.998
Psychological and Emotional Motivation						
Low group	High group	−0.687	0.867	0.084	0.075	0.213
Health and Physical Motivation						
Low group	High group	−1.228	0.004	0.388	0.244	0.419
Sports and Performance Motivation						
Low group	High group	−1.335	0.003	0.227	0.147	0.286

Discussion

The objective of this study is to gain a better understanding of the current state of CPE among Chinese university students and to analyze the influence of various factors and motivations on the CPE performance. Our findings reveal that the performance of CPE among Chinese college students is not excellent. While this result is consistent with other studies conducted in China, it is nevertheless surprising given the increasing emphasis on health and fitness in the current educational environment (Wu et al., 2019; Zhang, 2019). It appears that university students may still be more drawn to sedentary activities, such as online gaming and social media, rather than physical exercise, even when customized to their needs.

The study found that RPA is the most commonly chosen form of CPE among college students, with a participation rate of 53%. In contrast, only 31% of students opted for sports, and a mere 16% engaged in exercise. These findings suggest that university students are more inclined to participate in RPA, likely due to its lower physical demands, greater flexibility, and entertainment value. For instance, many RPAs, such as walking, leisurely cycling, or social sports, are better suited to meet college students' social needs (Titze et al., 2007). On the other hand, the low participation rate in exercise may be attributed to its higher intensity and lack of immediate entertainment (Russell et al., 2008; Smeddinck et al., 2019). This trend aligns with other research, indicating that students prioritize convenience and enjoyment over purely health-related goals when selecting physical activities (Ferkel et al., 2017; Rabaya et al., 2024).

Our study also revealed significant variances in CPE among college students with different characteristics. First, we found that female students generally have higher participation rates in CPE than their male counterparts, and they are more likely to choose RPAs as their primary form of physical engagement. This may be due to the higher social needs of females in physical activities (Nosek et al., 2006; Coleman et al., 2008), coupled with a lower interest in highly competitive sports (Deaner et al., 2016). In contrast, male students tend to engage more in high-intensity sports and exercise, likely reflecting their preference for physical challenges and competitiveness (Zafeiridis et al., 2005; Deaner et al., 2016). Cultural and social norms may also influence the choices female students make regarding CPE participation (Walseth et al., 2017). As Krane (2001) argues, societal expectations surrounding female image or the lack of support for women in competitive sports. That may could suppress their participation in more competitive forms of CPE.

Additionally, the impact of annual family per capita income on CPE participation is also significant. Students from higher-income families ($>$20,000 (CNY)) show notably higher levels of participation in CPE, particularly in RPAs. This finding is consistent with resource-based view (RBV), which suggests that families with better economic conditions can provide more sports-related resources and support, thereby offering these students greater opportunities and motivation to engage in various physical activities (Smart & Wolfe, 2000; Madhani, 2010). Meanwhile, urban students exhibit significantly higher participation in CPE compared to their rural counterparts, reflecting the disparities in sports resources between urban and rural areas (Kuhn et al., 2021).

The results of this study indicate that participation in CPE is influenced by health and physical factors, as well as by sports and performance intentions. The significance of health and

physical factors underscores the importance students place on maintaining physical health and fitness when choosing to participate in CPE. This finding aligns with the core concept of competence in self-determination theory, which posits that individuals engage in physical activities to gain a sense of control and improvement over their physical abilities (Standage et al., 2005; Ryan & Patrick, 2009). College students may perceive regular participation in CPE as an effective means to enhance physical fitness, build strength, and prevent illness, ultimately leading to a higher quality of life and greater satisfaction with their physical well-being (Herbert et al., 2020). Therefore, students with a strong health consciousness are more likely to view CPE as a vital avenue for achieving and maintaining good physical health.

The significance of sports and performance factors further highlights the role of intrinsic motivation in physical activity participation (Molanorouzi et al., 2015; Hamm & Yun, 2018). College students with strong sports and performance intentions are often highly enthusiastic about challenging themselves, improving their athletic skills, and achieving excellence in physical activities (Issurin, 2017). This motivation not only drives their performence in CPE but also inspires them to pursue higher athletic goals and achievements. Indeed, the significance of sports and performance intentions suggests that CPE serves not only as a means for health and social interaction but also as a critical avenue for self-realization and personal growth. This aligns closely with the concept of competence, indicating that individual performance and the sense of achievement in sports are key drivers of student engagement in CPE (Buekers et al., 2015; Fransen et al., 2018).

However, it is surprising that psychological and emotional factors did not show a significant correlation with the CPE performance, a finding that contradicts earlier studies (Nicaise et al., 2007; Siskos et al., 2012; Fenanlampir & Mutohir, 2021). Theoretically, psychological and emotional factors are expected to play a crucial role in sports participation, particularly in providing emotional support and alleviating stress (Chang et al., 2020). Yet, the findings of this study suggest that these factors may not influence university students' performance in CPE. One possible explanation is that in a highly competitive academic environment with considerable pressure, students might prioritize activities that directly enhance physical health and improve athletic performance, potentially overlooking the emotional benefits that CPE could offer (Kerrigan et al., 2017). Moreover, the psychological and emotional needs of students may be more effectively addressed through alternative channels, such as social media, psychological counseling, or social activities, thereby diminishing their impact on CPE (Modecki et al., 2017).

This finding also highlights potential limitations in the current design of physical activity programs. Traditional CPE initiatives may have been overly focused on physical training and competitive performance, with insufficient attention given to addressing psychological and emotional needs. This suggests that educational institutions, when designing and promoting CPE, should place greater emphasis on the diversity and inclusivity of activities, ensuring that they not only meet students' physical and performance needs but also provide psychological and emotional support. For instance, introducing a broader range of physical activities, such as yoga or team-based cooperative sports, might more effectively engage students who are less motivated by physical performance but place higher value on psychological and emotional fulfillment.

Limitations of this Study

While this study provides valuable insights into the status and related factors of customized physical education for physical health promotion among Chinese college students, several limitations should be acknowledged. First, the reliance on self-reported data may introduce response biases, such as social desirability bias, which could affect the accuracy of the findings. Participants may have over- or under-reported their levels of participation in physical activities or their motivations, potentially leading to skewed results. Future research could benefit from incorporating objective measures of physical activity, such as wearable fitness trackers, to complement self-reported data. Second, the sample of this study is limited to Chinese college students, which may limit the generalizability of the findings to other populations. Cultural, social, and institutional differences in other regions or countries might influence the factors associated with CPE participation differently. Expanding the scope of research to include diverse populations would provide a more comprehensive understanding of the factors influencing CPE. Finally, while this study identified several significant factors related to the CPE peformance, it did not explore all potential variables that could impact students' performance in CPE, such as psychological barriers, peer influence, or institutional support. Future research should consider a broader range of factors to gain a more holistic understanding of what drives or hinders performance in CPE.

Conclusion

This study finds that the status of CPE among Chinese college students is not outstanding and needs to be taken attention. Our findings reveal that the CPE performance is influenced by a range of factors, including gender, annual family per capita income, place of residence, usage of tobacco and usage of alcohol. Notably, students with higher health and physical consciousness and stronger sports and performance goals are more likely to get the high performance in CPE, highlighting the role of intrinsic motivation in driving participation.

Furthermore, the study also identifies significant gaps in current CPE, particularly in addressing psychological and emotional factors. Despite the well-documented benefits of physical activity for mental well-being, these factors did not emerge as significant predictors of CPE, suggesting that existing programs may be overly focused on physical and performance outcomes. This underscores the need for more inclusive and diverse CPE offerings that cater to the holistic well-being of students. These insights not only deepen our understanding of the motivations behind CPE participation but also highlight the complexity of college students' engagement in physical activities.

References

Andersson, C., & Vasan, R. S. (2018). Epidemiology of cardiovascular disease in young individuals. *Nature Reviews Cardiology*, 15(4), 230-240.

Angulo, J., El Assar, M., Álvarez-Bustos, A., & Rodríguez-Mañas, L. (2020). Physical activity and exercise: Strategies to manage frailty. *Redox Biology*, 35, 101513.

Bai, S., Yin, Y., & Chen, S. (2023). The impact of physical activity on electronic media use among chinese adolescents and urban-rural differences. *BMC Public Health*, 23(1), 1264.

Bayraktar, D., Karsli, T. Y., Kaya, D. O., Sarac, D. C., Gucenmez, S., Gercik, O., ... & Akar, S. (2021). Is the international physical activity questionnaire (IPAQ) a valid assessment tool for measuring physical activity of patients with axial spondyloartritis?. *Musculoskeletal Science and Practice*, 55, 102418.

Behzadnia, B., Adachi, P. J., Deci, E. L., & Mohammadzadeh, H. (2018). Associations between students' perceptions of physical education teachers' interpersonal styles and students' wellness, knowledge, performance, and intentions to persist at physical activity: A self-determination theory approach. *Psychology of Sport and Exercise*, 39, 10-19.

Buekers, M., Borry, P., & Rowe, P. (2015). Talent in sports. Some reflections about the search for future champions. *Movement & Sport Sciences-Science & Motricité*, (88), 3-12.

Carbone, S., Del Buono, M. G., Ozemek, C., & Lavie, C. J. (2019). Obesity, risk of diabetes and role of physical activity, exercise training and cardiorespiratory fitness. *Progress in Cardiovascular Diseases*, 62(4), 327-333.

Chang, C. J., Putukian, M., Aerni, G., Diamond, A. B., Hong, E. S., Ingram, Y. M., ... & Wolanin, A. T. (2020). Mental health issues and psychological factors in athletes: detection, management, effect on performance, and prevention: American medical society for sports medicine position statement. *Clinical Journal of Sport Medicine*, 30(2), e61-e87.

Coleman, L., Cox, L., & Roker, D. (2008). Girls and young women's participation in physical activity: psychological and social influences. Health education research, 23(4), 633-647.

Deaner, R. O., Balish, S. M., & Lombardo, M. P. (2016). Sex differences in sports interest and motivation: An evolutionary perspective. *Evolutionary Behavioral Sciences*, 10(2), 73.

Deng, C., Yu, Q., Luo, G., Zhao, Z., & Li, Y. (2022). Big data-driven intelligent governance of college students' physical health: System and strategy. *Frontiers in Public Health*, 10, 924025.

Ding, C., & Jiang, Y. (2020). The relationship between body mass index and physical fitness among chinese university students: Results of a longitudinal study. *Healthcare*, 8(4), 570.

Dong, Y., Lau, P. W., Dong, B., Zou, Z., Yang, Y., Wen, B., ... & Patton, G. C. (2019). Trends in physical fitness, growth, and nutritional status of Chinese children and adolescents: a retrospective analysis of 1.5 million students from six successive national surveys between 1985 and 2014. *The Lancet Child & Adolescent Health*, 3(12), 871-880.

Ednie, A., & Stibor, M. (2017). Influence and interpretation of intrinsic and extrinsic exercise motives. *Journal of Human Sport and Exercise*, 12(2), 414-425.

Fenanlampir, A., & Mutohir, T. C. (2021). Emotional intelligence and learning outcomes: Study in physical education. *Journal Sport Area*, 6(3), 304-314.

Ferkel, R. C., Razon, S., Judge, L. W., & True, L. (2017). Beyond "fun": The real need in physical education. *The Physical Educator*, 74(2).

Fransen, K., Boen, F., Vansteenkiste, M., Mertens, N., & Vande Broek, G. (2018). The power of competence support: The impact of coaches and athlete leaders on intrinsic motivation and performance. *Scandinavian Journal of Medicine & Science in Sports*, 28(2), 725-745.

Gainullin, R. A., Isaev, A. P., & Abzalilov, R. Y. (2019). Physical education customizable to students' total body dimensions, functionality, physicality and physical activity. *Theory and Practice of Physical Culture*, (6), 21-21.

Görner, K., & Reineke, A. (2020). The influence of endurance and strength training on body composition and physical fitness in female students. *Journal of Physical Education and Sport*, 20, 2013-2020.

Hagströmer, M., Oja, P., & Sjöström, M. (2006). The International Physical Activity Questionnaire (IPAQ): a study of concurrent and construct validity. *Public Health Nutrition*, 9(6), 755-762.

Hamm, J., & Yun, J. (2018). The motivational process for physical activity in young adults with autism spectrum disorder. *Disability and Health Journal*, 11(4), 644-649.

Herbert, C., Meixner, F., Wiebking, C., & Gilg, V. (2020). Regular physical activity, short-term exercise, mental health, and well-being among university students: the results of an online and a laboratory study. *Frontiers in Psychology*, 11, 509.

Huang, C. C., Liu, H. M., & Huang, C. L. (2016). Intelligent diagnosis and prescription for a customized physical fitness and healthcare system. *Technology and Health Care*, 24(s1), S213-S222.

Issurin, V. B. (2017). Evidence-based prerequisites and precursors of athletic talent: a review. *Sports Medicine*, 47(10), 1993-2010.

Kerrigan, D., Chau, V., King, M., Holman, E., Joffe, A., & Sibinga, E. (2017). There is no performance, there is just this moment: The role of mindfulness instruction in promoting health and well-being among students at a highly-ranked university in the United States. *Journal of Evidence-Based Complementary & Alternative Medicine*, 22(4), 909-918.

Kim, S. H., & Cho, D. (2022). Validation of exercise motivations inventory–2 (EMI-2) scale for college students. *Journal of American College Health*, 70(1), 114-121.

Krane, V. (2001). We can be athletic and feminine, but do we want to? Challenging hegemonic femininity in women's sport. *Quest*, 53(1), 115-133.

Kuhn, A. W., Grusky, A. Z., Cash, C. R., Churchwell, A. L., & Diamond, A. B. (2021). Disparities and inequities in youth sports. *Current Sports Medicine Reports*, 20(9), 494-498.

Lee, P. H., Macfarlane, D. J., Lam, T. H., & Stewart, S. M. (2011). Validity of the international physical activity questionnaire short form (IPAQ-SF): A systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, 8, 1-11.

Li, W., Chen, J., Li, M., Smith, A. P., & Fan, J. (2022). The effect of exercise on academic fatigue and sleep quality among university students. *Frontiers in Psychology*, 13, 1025280.

Liu, J., Shangguan, R., Keating, X. D., Leitner, J., & Wu, Y. (2017). A conceptual physical education course and college freshmen's health-related fitness. *Health Education*, 117(1), 53-68.

Liu, Q., Huang, S., Qu, X., & Yin, A. (2021). The status of health promotion lifestyle and its related factors in Shandong Province, China. *BMC Public Health*, 21, 1-9.

Lobelo, F., Rohm Young, D., Sallis, R., Garber, M. D., Billinger, S. A., Duperly, J., ... & Joy, E. A. (2018). Routine assessment and promotion of physical activity in healthcare settings: a scientific statement from the American Heart Association. *Circulation*, 137(18), e495-e522.

Ma, C., Xu, W., Zhou, L., Ma, S., & Wang, Y. (2018). Association between lifestyle factors and suboptimal health status among Chinese college freshmen: a cross-sectional study. *BMC Public Health*, 18, 1-9.

Madhani, P. M. (2010). Resource based view (RBV) of competitive advantage: an overview. Resource based view: concepts and practices, *Pankaj Madhan*i, ed, 3-22.

Markland, D., & Ingledew, D. K. (1997). The measurement of exercise motives: Factorial validity and invariance across gender of a revised Exercise Motivations Inventory. *British Journal of Health Psychology*, 2(4), 361-376.

Mendes, M. D. A., Da Silva, I., Ramires, V., Reichert, F., Martins, R., Ferreira, R., & Tomasi, E. (2018). Metabolic equivalent of task (METs) thresholds as an indicator of physical activity intensity. *PloS One*, 13(7), e0200701.

Modecki, K. L., Zimmer-Gembeck, M. J., & Guerra, N. (2017). Emotion regulation, coping, and decision making: Three linked skills for preventing externalizing problems in adolescence. *Child Development*, 88(2), 417-426.

Molanorouzi, K., Khoo, S., & Morris, T. (2015). Motives for adult participation in physical activity: type of activity, age, and gender. *BMC Public Health*, 15, 1-12.

Nicaise, V., Bois, J. E., Fairclough, S. J., Amorose, A. J., & Cogérino, G. (2007). Girls' and boys' perceptions of physical education teachers' feedback: Effects on performance and psychological responses. *Journal of Sports Sciences*, 25(8), 915-926.

Nichols, C., Block, M. E., & Wilson, W. J. (2019). Analysis of graduate programs in adapted physical education in the United States. *International Journal of Kinesiology in Higher Education*, 3(2), 47-57.

Nosek, M. A., Hughes, R. B., Robinson-Whelen, S., Taylor, H. B., & Howland, C. A. (2006). Physical activity and nutritional behaviors of women with physical disabilities: physical, psychological, social, and environmental influences. *Women's Health Issues*, 16(6), 323-333.

Rabaya, R. R., Mejarito, C., Esmael, N., & Eligue, J. (2024). Physical Fitness Exercise: Student's Attitude and Engagement. *Psychology and Education: A Multidisciplinary Journal*, 20(6), 766-786.

Russell, W. D., & Newton, M. (2008). Short-term psychological effects of interactive video game technology exercise on mood and attention. *Journal of Educational Technology & Society*, 11(2), 294-308.

Ryan, R. M., & Patrick, H. (2009). Self-determination theory and physical. *Hellenic Journal of Psychology*, 6(2), 107-124.

Säfvenbom, R., Haugen, T., & Bulie, M. (2015). Attitudes toward and motivation for PE. Who collects the benefits of the subject?. *Physical Education and Sport Pedagogy*, 20(6), 629-646.

Siskos, B., Proios, M., & Lykesas, G. (2012). Relationships between emotional intelligence and psychological factors in physical education. *Studies in Physical Culture & Tourism*, 19(3).

Smart, D. L., & Wolfe, R. A. (2000). Examining sustainable competitive advantage in intercollegiate athletics: A resource-based view. *Journal of Sport Management*, 14(2), 133-153.

Smeddinck, J. D., Herrlich, M., Wang, X., Zhang, G., & Malaka, R. (2019). Work hard, play hard: How linking rewards in games to prior exercise performance improves motivation and exercise intensity. *Entertainment Computing*, 29, 20-30.

Standage, M., Duda, J. L., & Ntoumanis, N. (2005). A test of self-determination theory in school physical education. *British Journal of Educational Psychology*, 75(3), 411-433.

Sum, R. K. W., Morgan, K., Ma, M. M. S., & Choi, S. M. (2021). The influence of a customized continuing professional development programme on physical education teachers' perceived physical literacy and efficacy beliefs. *Prospects*, 50(1), 87-106.

Titze, S., Stronegger, W. J., Janschitz, S., & Oja, P. (2007). Environmental, social, and personal correlates of cycling for transportation in a student population. *Journal of Physical Activity and Health*, 4(1), 66-79.

Walseth, K., Aartun, I., & Engelsrud, G. (2017). Girls' bodily activities in physical education How current fitness and sport discourses influence girls' identity construction. *Sport, Education and Society*, 22(4), 442-459.

Wang, J. (2019). The association between physical fitness and physical activity among Chinese college students. *Journal of American College Health*, 67(6), 602-609.

Wang, J., Yang, Y., Liu, H., & Jiang, L. (2024). Enhancing the college and university physical education teaching and learning experience using virtual reality and particle swarm optimization. *Soft Computing*, 28(2), 1277-1294.

World Health Organization. Global action plan on physical activity 2018-2030: more active people for a healthier world. *World Health Organization*, 2019.

Wu, L., Ma, X., Shi, Y., Tao, S., Yu, Y., Wang, S., ... & Li, Y. (2019). China national assessment of education quality-physical education & health (CNAEQ-PEH) 2015: an introduction. *Research Quarterly for Exercise and Sport*, 90(2), 105-112.

Zafeiridis, A., Dalamitros, A., Dipla, K., Manou, V., Galanis, N., & Kellis, S. (2005). Recovery during high-intensity intermittent anaerobic exercise in boys, teens, and men. Medicine & *Science in Sports & Exercise*, 37(3), 505-512.

Zea, E., Valez-Balderas, M., & Uribe-Quevedo, A. (2021). Serious games and multiple intelligences for customized learning: a discussion. *Recent Advances in Technologies for Inclusive Well-Being: Virtual Patients, Gamification and Simulation*, 177-189.

Zeng, Y., Wang, G., Xie, C., Hu, X., & Reinhardt, J. D. (2019). Prevalence and correlates of depression, anxiety and symptoms of stress in vocational college nursing students from Sichuan, China: a cross-sectional study. *Psychology, Health & Medicine*, 24(7), 798-811.

Zhang, Y., Liu, S., Li, Y., Li, X., Ren, P., & Luo, F. (2019). The relationships between weight status and physical fitness among Chinese children and youth. Research *Quarterly for Exercise and Sport*, 90(2), 113-122.

Zhang, Y., Zhang, H., Ma, X., & Di, Q. (2020). Mental health problems during the COVID-19 pandemics and the mitigation effects of exercise: a longitudinal study of college students in China. *International Journal of Environmental Research and Public Health*, 17(10), 3722.

Zhang, Z., & Min, H. (2020). [Retracted] Analysis on the Construction of Personalized Physical Education Teaching System Based on a Cloud Computing Platform. *Wireless Communications and Mobile Computing*, 2020(1), 8854811.