Associations between physical activity, desk-bound time, and physical fitness in Chinese female institute students

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Abstract. This study's objective is to look into how PA, ST, and PF relate to one another in Chinese female college students. This study included 512 Chinese female college students. Physical activity (PA) and sedentary time of participants (ST), and level of fitness were evaluated utilizing the Chinese National Student Physical Fitness Test and the International Physical Activity Questionnaire (PF). The findings indicated that compared to inactive participants, active participants had considerably greater levels of cardiorespiratory fitness and total fitness. Compared to inactive people with high sedentary time, active persons with low ST or high ST also have greater cardiorespiratory fitness. Furthermore, compared to inactive participants with high sedentary time, active participants with high ST and inactive participants with low ST have less flexibility. Positive correlations between PA and cardiorespiratory

Keywords: Chinese students, physical health, sedentary behavior, and physical activity

1 Introduction

Physical activity (PA) is the term used to describe the energy-draining behavior brought on by the skeletal muscle action within the human body [1]. Sitting, lying down, or sleeping when awake is referred to as sedentary behavior (SB), which often involves decreased energy use [2]. Regular PA has favorable impacts on mental health and overall health and is protective in the treatment of non-communicable diseases such cancer, type 2 diabetes, and cardiovascular disease [3]. High levels of SB, in contrast to PA, are associated with danger to human health and all-cause mortality [3]. An adult who does not engage in 150 minutes of moderate-intensity physical activity (MPA) or 75 minutes of vigorous physical activity (VPA) each week is deemed physically inactive by the World Health Organization (WHO). 27.5% of adults globally are physically inactive, according to a 2016 survey [4]. SB spends more than 8 hours a day sitting down, according to study, and the trend is rising [5].

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These conflicting results from previously published studies, that PA and PF levels in women are significantly lower than in men, and available studies examining populations of female students Eastern background and culture influences We should research the association between PA and ST. PF among Eastern schoolgirls to inform policy and practice, given that it is limited.

2 Materials and Methods

2.1 Study design and participants

From February to May 2022, a single cross-sectional study was carried out at East China Normal University in Shanghai, China. At East China Normal University, 512 first- and second-year students collected snowball samples as part of this study.

2.2 Procedure

Participants accept recruited through campus notices and online advertisements. Each graduate completed her contract and signed her informed approval form in front of the class. The participant was then instructed to complete an online questionnaire that requested information about her recent PA and ST as well as her name, contact details, physical education class, and name. After gathering participant data through surveys, the study's two authors approached the teachers of physical education and requested their assistance in managing and gathering the PF data. To guarantee test consistency, the original author of this study participated in and oversaw all data gathering procedures. The first author was then given the data to analyze.

2.3 Physical fitness measurements

The participants in this study was consistent adopting the Chinese Ministry of Education test system, CNSPFT [18]. CNSFT has seven elements.

Prevalence of obesity (BMI, kg/m2), aerobic capacity (ml), rising pole vault (m), one minute stomach muscle (times), and 800-meter dash (sec) indicate, in that order, body composition, cardiorespiratory fitness, speed, flexibility, muscle burst, muscular endurance, and cardiorespiratory endurance. Each test's precise objective and the proper way to administer it have already been covered in another study [19]. It is recommended that readers consult it for more details. According to the CNSFT standard's scoring methodology [18], the results for each item were converted to percentage scores for scoring. The following formula from the CNSPFT criteria was then used to determine an overall fitness score based on the results for each item. [18]:

Total fitness score = body composition * 0.15 + cardio score * 0.15 + speed score * 0.20 + flexibility score * 0.10 + muscle burst score * 0.10 + muscle endurance score * 0.10 + cardio endurance score * 0.20.

The scores for each item and the overall fitness score were categorized into four levels:

accordance to the CNSFT criteria, Fail, Pass, Good, or Excellent. The appropriate group for each element was defined as the participants who achieved excellent and good levels in that element as well as overall fitness, while the inappropriate group was defined as the participants

who did not achieve excellent and good levels (i.e., failed students and failing students). assemble for this thing.

2.4 Statistical analyses

Data that had been removed was taken illegally with research participants. The mean and standard deviation of descriptive data for PA, ST, and each PF element were reported. The long-term strength of links between active and inactive associations as well as between desk and sedentary groups were examined using independent-samples t-tests to identify significant differences between the mean scores for each PF item. figured out if there is The likelihood that the active moderately sedentary group would be disqualified in comparison to the inactive sedentary group was calculated using binary logistic regression for each PF item. Tested. For each PF item, the active/slightly sedentary, active/severely sedentary, and inactive/lowly sedentary groups were contrasted with the inactive/severely deprived group using multinomial logistic regression. compared. We are taking into account the prospect of getting rejected.

3 Results

After removing data with missing PF indices (11) or out-of-range PA data (495 participants), the final analysis included 495 participants (6). Table 1 provides descriptive statistics for each item's MVPA, ST, and PF scores. A total of 62% (n = 305) of individuals met WHO-PA recommendations, spending 431.52 183.75 minutes per day on ST and 233.35 219.63 minutes on MVPA each week (at least 150 minutes overall). week) [3]. MVPA or at least 75 minutes of VPA. Spirit capacity (p 0.05) and total fitness (p 0.01) were considerably higher in the active group than in the inactive group. 43% of individuals (n=213) were classified as sedentary and less sedentary, with a median ST (420 minutes per day). No discernible differences existed between the sedentary

Table 1 Participants' physical activity, sedentary time, and level of fitness are described in descriptive statistics.

Variable	All (495)	Active (305)	Inactive (190)	*p*	Low Sedentary (213)	High Sedentary (282)	*p*
PA/ST							
MVPA (mins/week)	233.35 ± 219.63	333.61 ± 225.25	72.42 ± 47.08	0.000**	254.37 ± 218.31	217.48 ± 219.67	0.06
ST (mins/day)	431.52 ± 183.75	425.02 ± 182.76	441.95 ± 185.35	0.319	256.69 ± 96.95	563.56 ± 107.71	0.00**
Fitness							
BMI (kg/m2)	20.02 ± 1.77	20.11 ± 1.83	19.88 ± 1.68	0.161	20.07 ± 1.67	19.99 ± 1.85	0.621

Vital capacity (ml)	2819.18 ± 426.16	2857.10 ± 438.66	2758.31 ± 398.92	0.012*	2861.91 ± 405.43	2786.91 ± 439.13	0.052
800 m (seconds)	213.78 ± 18.4	213.43 ± 18.52	214.35 ± 18.26	0.591	213.29 ± 18.94	214.16 ± 18.01	0.605
Sit-up (times)	45.77 ± 8.58	46.27 ± 8.89	44.97 ± 8.02	0.103	45.22 ± 8.22	46.19 ± 8.84	0.215
Sit and reach (cm)	19.72 ± 5.45	19.74 ± 5.54	19.68 ± 5.31	0.900	19.65 ± 5.28	19.77 ± 5.57	0.806
Standing long jump (m)	1.79 ± 0.14	1.79 ± 0.14	1.79 ± 0.14	0.874	1.77 ± 0.13	1.81 ± 0.14	0.008
50 m run (seconds)	8.33 ± 0.46	8.34 ± 0.46	8.31 ± 0.47	0.459	8.31 ± 0.48	8.34 ± 0.45	0.519
Overall fitness	83.48 ± 2.93	83.74 ± 3.17	83.05 ± 2.44	0.007**	83.38 ± 2.82	83.55 ± 3.02	0.525

The mapping between the PA, ST, and PF elements is shown in Table 2. The active group had a higher likelihood of being cardiopulmonaryly ineligible as compared to the inactive group (spirit capacity; odds ratio (OR), 0.566; 95% confidence interval (CI), 0.381-0.842; p0.01 poor rating). The active group was nevertheless considerably less likely than the inactive groups to be labeled as lacking in cardiorespiratory fitness (spiritual capacity; OR 0.572; 95% CI 0.384-0.852; p0.05). This finding suggests a beneficial relationship between PA and cardiopulmonary function..

Table 2 Physical activity and sedentary time groups are correlated with classifications of physical fitness (n = 495).

	PA Group (Using the inactive group as reference)		ST Group (Using the high sedentary group as reference)	
	Active	Active [a]	Low Sedentary	Low Sedentary [a]
BMI				
fit	1.00	1.00	1.00	1.00
unfit	1.352(0.541~3.380)	1.386(0.554-3.472)	0.605(0.242-1.511)	0.596(0.238-1.490)
Vital capacity				
fit	1.00	1.00	1.00	1.00
unfit	0.566 (0.381-0.842)**	0.572 (0.384-0.852)**	0.754(0.518-1.097)	0.771(0.528-1.124)
800 m				
fit	1.00	1.00	1.00	1.00
unfit	0.724(0.489-1.073)	0.720(0.486-1.068)	1.090(0.738-1.609)	1.108(0.749-1.638)

Sit-up				
fit	1.00	1.00	1.00	1.00
unfit	0.817(0.569-1.175)	0.813(0.565-1.169)	1.109(0.777-1.583)	1.120(0.784-1.601)
Sit and reach				
fit	1.00	1.00	1.00	1.00
unfit	0.927(0.643-1.338)	0.932(0.646-1.346)	0.888(0.619-1.274)	0.891(0.621-1.279)
Standing long jump				
fit	1.00	1.00	1.00	1.00
unfit	0.915(0.637-1.316)	0.900(0.625-1.296)	1.372(0.960-1.963)	1.380(0.964-1.974)
50 m run				
fit	1.00	1.00	1.00	1.00
unfit	1.023(0.712-1.469)	1.028(0.715-1.477)	0.906(0.635-1.293)	0.905(0.633-1.292)
Overall fitness				
fit	1.00	1.00	1.00	1.00
unfit	0.416(0.136-1.272)	0.419(0.137-1.282)	0.833(0.333-2.088)	0.863(0.343-2.169)

Data are OR and 95% CI.

a PA is additionally adjusted for ST, and ST is mutually adjusted for PA.

* indicates $p < 0.05$.

4 Discussion

This study's purpose is to examine how PA, ST, and PF relate to one another in Chinese female students. Our findings indicated that 62% of the candidates adhered to the adult PA WHO standards. WHO assignments for adults only call for at least 150 minutes of MVPA or 75 minutes of VPA per week, as opposed to PA advice for children and minors, which demands at least 60 minutes of MVPA daily. [3]. However, only 62% of study participants complied with this criterion. This is somewhat in line with high-income nations in the West (63.2%) and the Asia-Pacific region (64.3%), but substantially lower in East Asian nations (82.7%). [Four]. Chinese university students' lower PA could be the cause. [Four]. Chinese university students may have less PA connected to job, housework, or commuting than adults who are already employed, which could be the cause. Furthermore, females are not supposed to speak out or move around much in traditional Chinese society [20]. Instead, they are expected to be peaceful and well-behaved. Environment and culture are significant influences on people's thinking and behavior, according to Bandura's theory of social cognition [21]. We think that the unique cultural and social environment in China may have an impact on female students' attitudes, routines, and actions when they perceive and participate in PA, ST, and PF in ways that are different from Western countries. There, I contend, is. In fact, according to recent cross-cultural

study, the majority of sports programs intended to impart values in Western nations really take cultural differences into account in terms of how children learn and practice as well as the values they prioritize. have demonstrated that it is not always implemented successfully in Asian cultures. them [22]. Understanding the values and belief systems of female college students that are pertinent to their engagement in PA and how they shape their behavior would be a nice place to start for future research..

The term "sit and reach" refers to the both noted decreased flexibility and started to increase flexibility by increasing PA or lowering ST. is one explanation for this phenomena. As a result, they can initially be less flexible than the group that is sedentary or inactive. It is plausible to infer that for girls with high or low ST, boosting PA vs decreasing ST does not, or even might, do much. More flexibility exacerbates the current situation (that is, less flexible). To increase our understanding, more study on the connection between PA, ST, and flexibility is required.

BMI, abdominal strength, standing long jump, and 50-meter sprint are the participants' separate measures of body balance, muscular endurance, explosive power, and speed. A significant correlation between PA and ST and body composition, muscular endurance, explosive power, or speed was not found in the current study. The findings indicate a favorable relationship between PA and body composition [35], muscular stamina [36], and speed [12]. The points cited in this study are often women [39] or adults from the same group as our study [12], and previous studies have not found a correlation between PA and ST. In studies involving kids, teens, or mixed-sex students, relationships between PA. This study is the first to our knowledge to look at the relationship between PA, ST, and PF among Chinese female college students. The findings of this study will give administrators at government or academic institutions information they may use to create policies or initiatives that will support the health of female college students. This study's sample was taken from a sizable number of female college students, a group that is underrepresented in the literature, which is one of its strengths. The relationship between each PF component and PA or ST was also examined in this study.

These contributions notwithstanding, this study has some significant flaws. First off, because the sample was taken from a single university in Shanghai, it is possible that it is not sufficiently representative of all Chinese female college students. Participants from other states' universities should be included in future studies. The majority of the participants were also in her first or second grade, with only a small number in her third or fourth. As a result, the outcomes do not accurately reflect the academic achievement of all Chinese university students. To close this disparity, future research should include more college juniors and her seniors. Thirdly, rather of using a triaxial accelerometer or another objective measurement tool, participants' PA was assessed using a subjective questionnaire that might have been influenced by recall bias. Objective accelerometers should be used in future investigations to close this gap. Finally, more research should be done to determine the connection between various PF indicators, various PA categories (work, housework, mobility, etc.), and his ST (learning, screen time, etc.). result.

5 Conclusion

In this study, we found a strong relationship between PA, cardiorespiratory health, and general physical health. The findings of this study also suggest that greater cardiorespiratory health and lower flexibility are connected to more PA and less ST. According to these data, each PA and ST may have a different impact on Chinese woman university students' own PF objects. These findings minimize the necessity for fitness pro-movement movements or fitness education to be directed according to gender or age when evaluated from the standpoint of public fitness and fitness education. They instead highlight the significant and unique roles that PA and ST play.

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