

Article

Longitudinal dynamic study on minority college students' physique using physical fitness systems

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CITATION

Xu S, Qiao Y, Guo C, et al.
Longitudinal dynamic study on minority college students' physique using physical fitness systems . *Molecular & Cellular Biomechanics*. 2024; 21(1): 276.
<https://doi.org/10.62617/mcb.v21i1.276>

ARTICLE INFO

Received: 4 August 2024

Accepted: 11 September 2024

Available online: 26 September 2024

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Abstract: The physical health of Chinese ethnic minority college students is often concerned, but there is limited research on continuously and effectively monitoring physical health and screening out groups with inadequate physique. This study mainly proves an effective method for screening out normal and unqualified physique groups through longitudinal and dynamic physique investigation. This study tracked Chinese college students' physique changes during a 4-year physical-fitness system. Using body mass index combined with test results of lung capacity, standing long jump, Sit and Reach, and the 50-m run to evaluate the physical health of students. Calculate the proportion of individuals of different BMI (Body Mass Index) types to the total number of sampled individuals. Using SPSS 22.0 and T-test to examine the differences in physique among 3314 senior students. The quantitative data were expressed as mean \pm standard deviation. Physical health is a dynamic process of change. The BMI combinations of 772 minority senior students were divided into four types. Type 1 ($n = 117$): normal as freshmen but unqualified as seniors. Type 2 ($n = 149$) was unqualified in both freshmen and seniors. The items with decreased physical fitness for Type 1 and Type 2 were: boys' lung capacity and 50-m run. Type 3 ($n = 72$) was unqualified in freshmen and normal in seniors. The items with decreased physical fitness were girl' 50-m run. Type 4 ($n = 434$) was normal in both freshmen and seniors. The items with decreased physical fitness were: boys' lung capacity and 50-m run. A four-year longitudinal dynamic survey combining BMI with physique can effectively monitor students' physical health. Minority students' proportion of normal BMI has been declining, the main contributors are boys. Girls pay attention to weight management, their physique approaches that of the Han, even surpassing Han in Sit and Reach, and 50-m run. However, boys neglected weight management and their BMI significantly increased year by year. Their overall physical fitness is lower than that of the Han, especially with lung capacity far lower than Han, and their physical health is a key focus of physique monitoring.

Keywords: minority college student; BMI; physique; data

1. Objective

In recent years, university students' annual decline in physical health has caused social concern. Physical health is not only an important indicator of the comprehensive development of personality among college students, but also the foundation of national and economic and social development [1,2]. There are many unfavorable factors in today's society that are affecting the physical health of college students, especially abnormal weight. The physique level of college students who are underweight or overweight and those with obesity is lower than that of normal-weight students [3,4].

For example, college students are susceptible to unhealthy habits and obesity, which can lead to a risk factor for noncommunicable diseases [5]. Both high or low BMI (Body Mass Index) can lead to poor sleep quality and affect health [6]. Adjusting bedtime to improve BMI can affect not only BMI but also waist circumference and blood pressure indicators, thus reducing the risk of metabolic syndrome [7]. The college environment affects students' self-esteem, prompting them to consciously control their weight based on their BMI in order to achieve a healthy body shape [8]. Female college students, high BMI, and high monthly living expenses are risk factors for poor dietary behavior and decreased physical health among college students [9]. Healthy development of physique, especially among ethnic minority college students in China's western region, is important because higher education needs to provide a new, physically sound generation to achieve the dream of a strong country. For example, Guangxi college students are mainly from Han and Zhuang minority groups within the region. They integrate with students from other regions and ethnic groups to create campus cultures with local characteristics that significantly impact minority college students' physical health and development.

Universities in China have attached great importance to monitoring students' physical health. In recent years, many universities have introduced fitness systems to monitor the physical health status of college students. A large number of researchers have evaluated the level of physical health from three dimensions: morphology, function (sports ability), and physique [10–12]. This study attempts to use BMI that reflects body shape, lung capacity that reflects body function, and combined with changes in physique to effectively evaluate the physical health status of college students [13], and seeks the main influencing factors in their physical health. After the concept of "Healthy China" was proposed, health has received increasing attention, and a health management model is being established in minority areas [14]. Schools in ethnic regions conduct routine physique tests every year to grasp the differences in physical development among students from different ethnic groups [15]. Fully utilizing the physique monitor system of universities and creating a healthy and civilized campus culture is an important measure to improve the health level of college students, promote national unity and common prosperity [16–18]. This study aims at applying a physique system to comprehensively analyze physique test data through a combination of BMI index and physique. It advocates the construction of a multi-ethnic integrated campus culture of physical health, cultivating a good lifestyle, and providing effective methods for monitoring the physical health of minority college students. Integrating this effective evaluation method into the social health management system, creating a civilized and healthy concept, and targeting different ethnic, gender, and age groups can effectively monitor the physical health of ethnic minority populations, thereby improving the overall physical health level of society.

2. Methods

2.1. Participants

The participants were 22 years old senior students from Guangxi University of Science and Technology who achieved complete 4-year physique test results from 2015 to 2018. Randomly select 3314 individuals, with 1942 boys and 1372 girls. There

were 2542 Han students, 1542 boys, and 1000 girls; There were 772 minority students, including 400 boys and 372 girls. Han students come from 27 provinces across the country. Minority students mainly come from 20 ethnic minorities, including Zhuang, Yao, and Miao, in southwestern regions such as Guangxi, Guizhou, and Yunnan [19]. Broad national distribution of student origins and the high number of ethnic groups made the survey samples a certain representative of minority college students' physique [20]. The research data does not involve privacy and the students were informed during the testing, which meets ethical requirements. The specific number of testers is shown in **Table 1**.

Table 1. Characteristics of senior students with complete 4-year physique test scores ($n = 3314$).

Nationality	<i>N</i>	Percentage	Boys	Girls	Origin Of Students
Han	2542	76.70%	1542	1000	27 provinces including Guangxi, Fujian, Henan, Guangdong, Yunnan, etc.
Minorities	772	23.30%	400	372	Guangxi, Guangdong, Hunan and other regions 20 ethnic minorities including Zhuang, Yao, Miao, etc.

2.2. Research methods

The data come from a physique test of students at Guangxi University of Science and Technology. The test is organized and implemented by the Chinese Ministry of Education. There are some differences in the test items according to the different regions and universities of students. Our university conducts a complete physique test once a year based on actual conditions to investigate the physical condition of students in the school. All participants provided written Safety Notice consent to ensure the smooth progress of the test.

2.2.1. Study design

We compared both BMI index changes and physical-fitness test data to evaluate physical health. From 2015 to 2018, for four consecutive years, according to the National Student Physical Health Standards (2014 Edition), we used a physique system (Adult GMCS-II Type) to monitor the physique test data of 3314 senior students, including height and weight (BMI), lung capacity (VC), standing long jump (SLJ), Sit and Reach, and the 50-m run [21]. Combining relevant derived BMI indicators, we conducted a longitudinal comparative study on the 4-year physique data of minority students, and conducted a horizontal comparative analysis on the physique data of Han and minority students [22].

Many studies have confirmed that both low and overweight individuals have a significant decrease in physique [23,24]. Therefore, the study divided BMI into two categories: normal $18.5 \leq \text{BMI} < 24$; and unqualified (low BMI < 18.5 , overweight $24 \leq \text{BMI} < 28$, and obese $\text{BMI} \geq 28$), and analyzed in conjunction with physique [25]. Similarly, the BMI of freshmen and seniors is also divided into two types: normal and unqualified. The changes in BMI index can be divided into four types of combinations: Type 1: Normal in freshmen, unqualified in seniors; Type 2: Unqualified in both freshmen and seniors; Type 3: Unqualified in freshmen, normal in seniors; Type 4: Normal for freshmen and seniors. For the two types in which both freshmen and seniors were normal or unqualified, the BMI remains unchanged, with a focus on analyzing physique. For the two types of BMI index with changes, which is normal in

freshmen and unqualified in seniors, and unqualified in freshmen and normal in seniors, combined with physique, compare and analyze the physical health status [26]. The BMI of sophomores and juniors, combined with the BMI types of freshmen and seniors mentioned above, is divided into four subtypes, showing the combination of BMI changes from freshmen to seniors, providing more detailed data for the above related analysis. In this way, it is possible to more accurately identify the types of students with normal and unqualified BMI and focus on them. Then use bar distribution chart to visually display various types of BMI that is normal and unqualified.

2.2.2. Statistical analysis

BMI comparison statistics

Using Excel software, we selected students who have achieved complete results in the 4-year physical-fitness tests and calculated each student's BMI: weight (kg)/[height (m)]² [27]. Firstly, calculate the proportion of individuals of different types to the total number of sampled individuals and the intra group proportion of each subtype, and use the one-sample Kolmogorov Smirnov test to test the normality of variables in each group. The results showed that all variables in each group followed a normal distribution ($p > 0.05$). Then use a bar distribution chart to display intragroup proportion of BMI unqualified and normal subtypes. Finally, analyze the average height, weight, and BMI of minority students over the past 4 years, and visually display the development trend of height, weight, and BMI of minority students with age using a bar distribution figure.

Comparative statistics of BMI combined with physique testing

Using SPSS 22.0 to conducted a follow-up survey on college students' physical condition over the past four years [28]. Compare and analyze the changes in physique of freshmen and seniors within and between groups, and jointly evaluate the physical health status of minority college students [29]. Using T-test to examine the differences in physique test data between the freshman and senior groups of students [30]. Quantitative data were expressed as mean \pm standard deviation ($\bar{X} \pm s$), with $P < 0.05$ indicating statistically significant differences. Analyze the two types of BMI indices with changes, seek the subtype with the highest number of unqualified and normal, and combine physique test data to analyze the trend of physical health. For the two types of BMI indices that have not changed, focus on analyzing the physique of ethnic minority students.

3. Results

3.1. Changes in students' BMI over four years

For this study, the four types of BMI variation combinations for students in their freshman and senior years are: Type 1: normal in the freshman year and unqualified in the senior year; Type 2: unqualified in freshman and senior years; Type 3: unqualified in the freshman year and normal in the senior year; and Type 4: normal in both freshmen and senior years (Table 2).

Table 2. Types of BMI combinations for students in their freshman and senior years ($n = 3314$).

Type of BMI	Type 1, normal: freshmen; unqualified: seniors		Type 2, unqualified: freshmen, seniors		Type 3, unqualified: freshmen, normal: seniors		Type 4, normal: freshmen, seniors	
	Number/%	Number/%	Number/%	Number/%	Number/%	Number/%	Number/%	
1 Han (2542)	362	10.93	548	16.54	269	8.12	1363	41.13
2 Minority (772)	117	3.53	149	4.49	72	2.17	434	13.09
3 Total (3314)	479	14.46	697	21.03	341	10.29	1797	54.22

3.1.1. Type 1 analysis

Type 1: 117 ethnic minority students' BMI ranged from normal in their freshman year and unqualified in their senior year, 3.53% of the total and 15.16% of the group, higher than the 14.24% in the Han group (**Table 2**). In descending order, subtype (4) was normal in freshman, sophomore, and junior years but then unqualified in the senior year: 44 people, 37.61% of the group. Subtype (1) was normal in the freshman year, but unqualified in the sophomore, junior, and senior years: 34 people, 29.06% of the group. Subtype (2) was normal for freshmen and sophomore years, but unqualified in junior and senior years: 26 people, 22.22% of the group. Subtype (3) was normal in freshmen and junior years, but unqualified in sophomore and senior years: 13 people, 11.11% of the group (**Table 3**). According to the analysis with a P -value of 0.010, Han male students and minority male students differed significantly in BMI ($P < 0.05$).

Table 3. Four years changes in BMI of subtypes of Type 1 ($n = 479$).

Type of BMI	(1) Normal: freshmen; unqualified: sophomores, juniors, seniors		(2) Normal: freshmen, sophomores; unqualified: juniors, seniors		(3) Normal: freshmen, juniors; unqualified: sophomores, seniors		(4) Normal: freshmen, juniors, sophomores; unqualified: seniors		P
	Number/%	Number/%	Number/%	Number/%	Number/%	Number/%			
1 Han boys (261)	97	37.16	60	22.99	38	14.56	66	25.29	0.010
2 Minority boys (74)	28	37.84	16	21.62	10	13.51	20	27.03	
3 Han girls (101)	11	10.89	31	30.69	7	6.93	52	51.49	0.248
4 Minority girls (43)	6	13.95	10	23.26	3	6.98	24	55.81	
Total (479)	142		117		58		162		

Subtype (1) had the highest number of unqualified male students, and subtype (4) had the highest number of unqualified female students. As **Figure 1** shows, results were the same for the Han and the ethnic minorities.

For Type 1, the physique test scores of ethnic minority freshmen and seniors are compared in **Table 4**. Differences in Sit and Reach and 50-m running performance between the male groups and differences in VC, SLJ, Sit and Reach, and 50-m running between the female groups were statistically significant ($P < 0.05$).

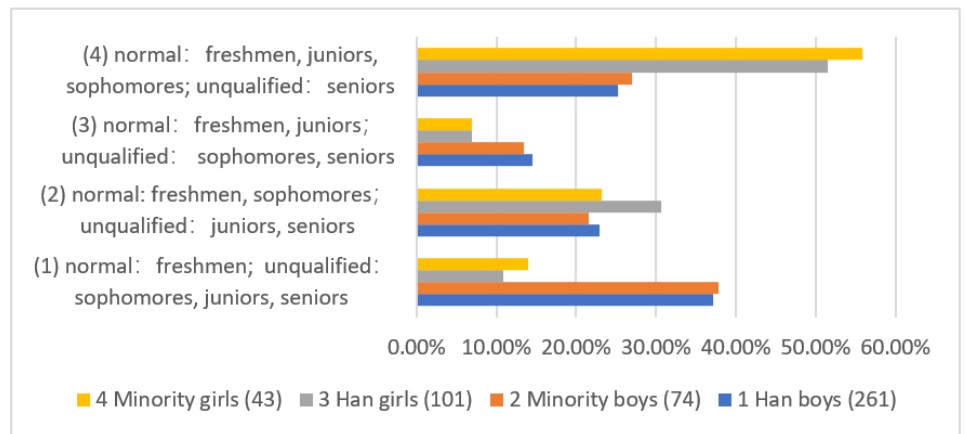


Figure 1. Intragroup proportion of BMI unqualified subtypes.

Table 4. Comparison of physique test scores for minority students of Type 1.

Type/Number	COUNT	VC/mL	SLJ/m	Sit And Reach/cm	50 m/s
Male freshman/74		3801.45 ± 721.31	2.15 ± 0.17	16.40 ± 5.70	7.93 ± 0.48
Male senior/74		3591.15 ± 809.52	2.17 ± 0.17	21.05 ± 7.79	8.29 ± 0.86
	<i>F</i> value	0.544	0.151	2.072	18.096
	<i>P</i> value	0.187	0.675	0.001	0.015
Female freshman/43		2421.11 ± 509.83	1.64 ± 0.15	16.87 ± 4.57	9.38 ± 0.43
Female senior/43		2648.44 ± 717.59	1.85 ± 0.25	23.70 ± 6.21	8.95 ± 1.23
	<i>F</i> value	5.391	18.236	6.432	33.023
	<i>P</i> value	0.031	0.000	0.000	0.006

3.1.2. Type 2

Type 2 was unqualified in freshman and senior years: 149 minority students, 4.49% of the total and 19.30% of the group, lower than the 21.56% of Han students. **Table 5** compares minority students' fitness for Type 2. Differences in Sit and Reach and 50-m running performance among the boys and differences in VC, SLJ, Sit and Reach and 50-m running performance among the girls were statistically significant ($P < 0.05$).

Table 5. Comparison of physique test scores for minority students of Type 2.

Type/Number	COUNT	VC/mL	SLJ/m	Sit And Reach/cm	50 m/s
Male freshman/75		3748.45 ± 786.93	2.16 ± 0.19	14.32 ± 5.35	8.08 ± 0.64
Male senior/75		3635.37 ± 790.04	2.19 ± 0.21	22.02 ± 9.19	8.59 ± 1.27
	<i>F</i> value	0.007	0.886	15.022	14.235
	<i>P</i> value	0.758	0.311	0.000	0.002
Female freshman/74		2353.38 ± 482.11	1.64 ± 0.16	16.72 ± 5.24	9.35 ± 0.51
Female senior/74		2645.96 ± 694.49	1.82 ± 0.21	23.35 ± 7.80	9.07 ± 1.06
	<i>F</i> value	3.536	1.511	3.451	38.563
	<i>P</i> value	0.003	0.000	0.000	0.045

3.1.3. Type 3

Type 3 was unqualified in the freshman year and normal in senior year: 72 minority students, 2.17% of the total and 9.33% of the group, lower than the 10.58% of Han students (Table 2). As displayed in Table 6, Minority students' BMI, from high to low, was as follows: Subtype (5) was unqualified in freshman, sophomore, and junior years, but normal in senior year: 30 people, 40.54% of the group. Subtype (8) was unqualified in the freshman year, but normal in sophomore, junior, and senior years: 20 people, 27.03% of the group. Subtype (6) was unqualified in freshmen and sophomore years, normal in junior and senior years: 16 people, 21.62% of the group. Subtype (7) was unqualified in freshmen and junior years, but normal in sophomore and senior years: 6 people, 8.11% of the group. According to the *P* values of 0.010 and 0.037, there is a significant difference in BMI between males and females from Han and minorities ($P < 0.05$).

Table 6. Four years changes in BMI of subtypes of Type 3 ($n = 341$).

Type of BMI	(5) unqualified: freshmen; sophomores, juniors, normal: seniors		(6) unqualified: freshmen, sophomores; normal: juniors, seniors		(7) unqualified: freshmen, juniors; normal: sophomores, seniors		(8) unqualified: freshmen, normal: sophomores, juniors, seniors		<i>P</i>
	Number/%	Number/%	Number/%	Number/%	Number/%	Number/%	Number/%		
1 Han boys (189)	72	38.09	49	25.93	19	10.05	49	25.93	0.017
2 Minority boys (38)	21	55.26	8	21.05	3	7.90	6	15.79	
3 Han girls (80)	23	28.75	25	31.25	9	11.25	23	28.75	0.037
4 Minority girls (34)	9	26.47	8	23.53	3	8.82	14	41.18	
Total (341)	125		90		34		92		

The highest number of normal minority boys was in subtype (5). Among them, the proportion of minority males was 55.26%. Subtype (8) had the highest number (41.18%) of normal minority girls; in contrast, Type (6) had the highest number (31.25%) of normal Han females (Figure 2).

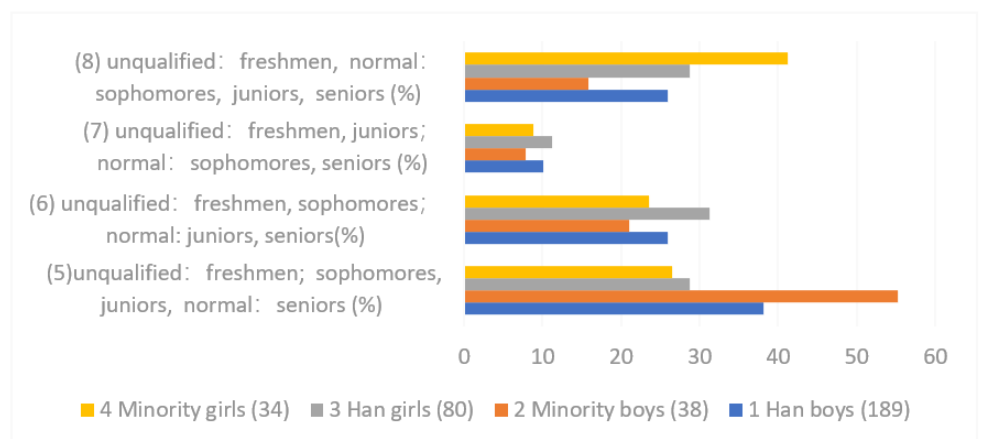


Figure 2. Intragroup proportion of normal BMI subtypes.

See Table 7, Type 3, for comparison of physical-fitness test scores between

minority freshmen and seniors. The boys in Sit and Reach and the girls in the SLJ and Sit and Reach showed statistically significant differences ($P < 0.05$).

Table 7. Comparison of physique test scores for minority students of Type 3.

Type/Number	COUNT	VC/mL	SLJ/m	Sit And Reach/cm	50 m/s
Male freshman/38		3585.74 ± 713.81	2.23 ± 0.24	13.62 ± 5.90	7.97 ± 0.72
Male senior/38		3867.92 ± 640.95	2.31 ± 0.26	21.87 ± 8.87	7.87 ± 1.12
	<i>F</i> value	0.929	0.394	5.204	6.306
	<i>P</i> value	0.074	0.153	0.000	0.636
Female freshman/34		2371.24 ± 388.43	1.59 ± 0.18	16.10 ± 4.84	9.39 ± 0.49
Female senior/34		2559.50 ± 412.82	1.80 ± 0.22	22.27 ± 9.38	9.49 ± 1.09
	<i>F</i> value	0.342	1.414	0.784	11.119
	<i>P</i> value	0.057	0.000	0.001	0.700

3.1.4. Type 4

Type 4 was normal in both freshmen and senior years: 434 minority students, 13.09% of the total and 56.22% of the group, higher than the 53.62% of Han students (Table 2). Table 8 compares physical-fitness tests for minority students of this type. For the minority boys, comparisons of the SLJ, Sit and Reach, and 50-m running showed significant differences ($P < 0.05$). For the female group, VC, the SLJ, and Sit and Reach showed a significant difference ($P < 0.05$).

Table 8. Comparison of physique test scores for minority students of Type 4.

Type/Number	COUNT	VC/mL	SLJ/m	Sit And Reach/cm	50 m/s
Male freshman/213		3667.90 ± 650.35	2.21 ± 0.17	15.43 ± 5.45	7.86 ± 0.60
Male senior/213		3619.03 ± 632.16	2.25 ± 0.22	21.35 ± 8.56	8.00 ± 0.91
	<i>F</i> value	0.001	6.009	28.95	55.184
	<i>P</i> value	0.404	0.023	0.000	0.044
Female freshman/221		2560.06 ± 520.85	1.64 ± 0.16	18.84 ± 5.01	9.29 ± 0.46
Female senior/221		2657.22 ± 554.26	1.83 ± 0.21	23.53 ± 6.17	9.16 ± 1.35
	<i>F</i> value	3.804	6.261	1.083	98.137
	<i>P</i> value	0.037	0.000	0.000	0.225

3.2. Analysis of BMI changes among minority students

As Figure 3 shows, from freshman to senior year, males' average height, weight, and BMI increased synchronously with age, and the average BMI index increased from 20.88 in freshman to 21.59 in senior year. However, females showed different development trends. As they age, average height and weight generally showed a growth trend, but the BMI average index gradually decreases from 21.59 in their freshman year to 19.52 in their senior year.

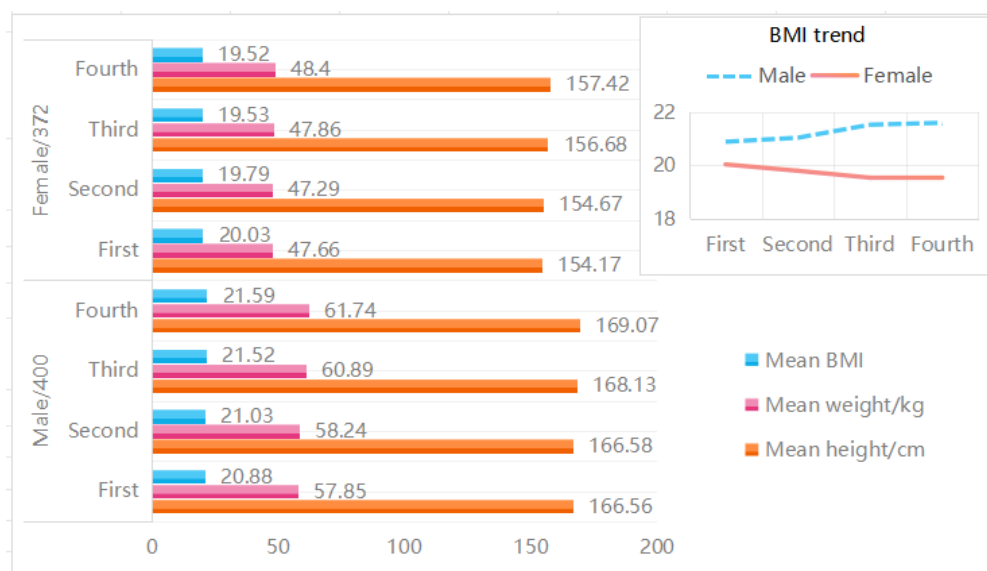


Figure 3. Changes in mean height, weight, and BMI among ethnic minority students.

3.3. Comparison of quality between the Han and minority groups

As Table 9 shows, in their freshman year, male Han students’ performance in the SLJ was not as good as that of male minorities, but their performances in other events

Table 9. Comparison of physique tests between Han and minority college students.

Type/Number	COUNT	VC/mL	SLJ/m	Sit And Reach/cm	50 m/s
Han male freshman/1542		3824.72 ± 793.05	2.15 ± 0.20	15.76 ± 5.69	7.96 ± 0.59
Minority male freshman/400		3677.08 ± 691.70	2.20 ± 0.18	15.16 ± 5.54	7.92 ± 0.61
	<i>F</i> value	7.999	3.698	0.684	0.115
	<i>P</i> value	0.001	0.000	0.057	0.227
Han male senior/1542		3804.03 ± 723.06	2.25 ± 0.23	21.18 ± 8.70	8.16 ± 1.04
Minority male senior/400		3642.44 ± 688.95	2.24 ± 0.22	21.48 ± 8.60	8.13 ± 1.03
	<i>F</i> value	3.556	1.451	0.013	0.062
	<i>P</i> value	0.000	0.157	0.535	0.622
Han female freshman/1000		2533.25 ± 522.44	1.61 ± 0.17	18.05 ± 5.39	9.36 ± 0.46
Minority female freshman/372		2474.94 ± 506.75	1.63 ± 0.16	17.74 ± 5.05	9.32 ± 0.47
	<i>F</i> value	1.327	0.473	2.300	2.902
	<i>P</i> value	0.065	0.044	0.359	0.205
Han female senior/1000		2686.26 ± 591.84	1.82 ± 0.23	24.43 ± 6.29	9.04 ± 1.30
Minority female senior/372		2653.65 ± 606.17	1.83 ± 0.22	23.41 ± 6.85	9.13 ± 1.26
	<i>F</i> value	0.174	0.307	1.139	0.064
	<i>P</i> value	0.368	0.437	0.010	0.242

were better. Differences in VC and SLJ performances were statistically significant ($P < 0.05$). Except for continued better VC levels, male Han seniors’ other performance scores were very similar to those of ethnic minorities; differences were not statistically significant ($P > 0.05$). Female Han freshmen performed better than ethnic minorities in all events except the SLJ, in which the difference was statistically significant ($P <$

0.05). As seniors, except for the difference between Sit and Reach, which was statistically significant ($P < 0.05$), the two female groups were very similar. Even so, the ethnic minorities surpassed the Han in the SLJ and 50-m run.

4. Discussion

From the analysis of the above test results, it can be concluded that a single BMI indicator cannot accurately reflect physical health status, combining BMI index with physique can more effectively evaluate physical health. Some ethnic minority college students' physical health is not ideal because during their high school years, they have had poor living conditions, limited educational resources, and a lack of physical exercise and health awareness [31]. Overall, however, minority freshmen have gradually adjusted to the university's multiethnic environment and culture, which has provided positive assistance for improving their physical health [32]. The BMI of minority college students in southwestern China is relatively low, with a thinner physique compared to Han students. The physical function level shows a slow development trend, but it is lower than the level of Han students, and the physique is also lower than the level of local Han students [33,34]. The physical health of students is an important indicator for the goal of common prosperity [35], which is related to the future development of the national rejuvenation strategy. Type 3 and Type 4 students, due to their normal BMI as seniors, have strong adaptability and self-control abilities, so there is no need for excessive physique monitoring. The focus of physique monitoring is on Type 1 and Type 2 students who fail the physique test.

Normal BMI analysis: As **Table 1** shows, 506 senior ethnic minority students had a normal BMI, that is, 65.54%, slightly higher than 64.20% for Han students. According to Types 1 and 4, normal minority freshmen numbered 551; overall, the number of normal seniors decreased by 45. In Type 1, 117 (15.16%) freshmen met normal standards but were substandard in their senior year. This number and proportion of participants were higher than that in Type 3 (unqualified as freshman and normal as seniors): 72 (9.33%). The difference between the two is also 45. During the 4-year dynamic development process of physique, 45 (5.83%) individuals, were normal in freshmen but unqualified as seniors due to negligence in BMI management, indicating that ethnic minority students' normal BMI scores are decreasing. In Type 3, students with normal BMI are concentrated in the following: Subtypes of boys (5): freshmen, sophomores, and juniors were unqualified, seniors were normal; and subtypes of girls (8): freshmen were unqualified, sophomores, juniors, and seniors were normal, indicating that girls have earlier awareness of weight management than boys.

Analysis of unqualified BMI: Type 1 had 117 individuals, 74 males and 43 females; Type 3 had 72 individuals, 38 males and 34 females. Obviously, the difference between Type 1 and Type 3 is 36 males, accounting for 9.00% of the 400 members in this group and 4.66% of the 772 members in the ethnic minority group. Nine female students accounted for 2.42% of the 372 students in this group and 1.16% of the minority group; thus, the 45 unqualified individuals were 36 males and 9 females. In Type 1, students with unqualified BMI were concentrated in the following: Subtypes of boys (1): freshmen were normal, sophomores, juniors, and seniors were

unqualified, and subtypes of girls (4): freshmen, sophomores, juniors were normal, and seniors was unqualified. This indicates that minority females pay more attention to health weight management than males, who, whether in the overall proportion of minority groups or in their own group, does not attach enough importance to weight management. Combined with the information in **Figure 3**, the different trend of BMI means that changes between males and females also illustrate this issue. The differences between ethnic groups and genders affects the changes and perspectives of minority college students on their physique and physique. The integration and identification of different ethnic cultures such as lifestyle habits, aesthetics, and exercise in university campuses affects their physical and healthy development. The same campus environment differently impacts male and female ethnic minority students. Campus culture influences students' physical health by improving their lifestyle and habits. For example, on the campus environment, the aesthetic preferences and diet of different ethnic groups can affect the BMI index. In the small dormitory environment where they spend time together day and night, there is a convergence in lifestyle habits such as sleep and physical exercise. Research has shown that high or low BMI can lead to low sleep quality levels, it is recommended improving sleep quality and regulate BMI through sports activities, diet control, and other means. Improving the frequency and duration of physical exercise for college students, promoting a healthy and nutritious diet, and controlling BMI are important ways to enhance physique and develop a healthy lifestyle [36]. It is evident that creating a healthy culture of campus physique is of great importance.

Physique analysis: Ethnic minority students had lower lung capacity, sitting forward bending, and 50-m running scores than Han students. However, their SLJ results were better than those of Han students. Comparison of 4-year physical-fitness test data reveals that ethnic minority students' performance in the standing long jump and sitting forward bending has improved year by year, whereas their improvement in lung capacity has not been significant. Furthermore, the performance in 50-m running shows a fluctuating downward trend. The short-term explosive power of the lower limbs and the flexibility of students' waists have improved during college, but developing scientific, uninterrupted fitness exercise habits is necessary to improve physical health. Maintaining a normal BMI level is the foundation for ensuring the physique of college students. Being underweight or overweight has a negative impact on health-related physique, with overweight and obesity having a more serious impact on reducing physique [37]. During university, minority students were able consciously to integrate into the campus cultural environment, actively improve their health levels through exercise, and adopt a healthy lifestyle [38].

5. Conclusions

A 4-year follow-up survey combining BMI with functional and physique can effectively monitor the physical health status and development trends of ethnic minority college students. Based on the physical development of students of different genders and ethnicities, actively explore scientific BMI management models [39], especially strengthen the weight management of ethnic minority boys. Establishing the concept of "health first" and lifelong sports, advocating universities in ethnic

regions to create a good physical and health environment [40]. Scientifically applying physique systems to improve physique monitoring systems, maintaining a normal BMI index to improve physical fitness, and providing a reference for the development of physical health among minority students.

Author contributions: Conceptualization, SX and YQ; methodology, SX and YQ; formal analysis, CG and LL; investigation, YQ and JK; resources, CG; data curation, LL and JK; writing—original draft preparation, SX; writing—review and editing, SX and LL; project administration, SX and YQ; funding acquisition, SX. All authors have read and agreed to the published version of the manuscript.

Funding: 2021 Guangxi Philosophy and Social Science Planning Research Project (21FTY011): Research on sports organizations and values in ethnic villages in Guangxi.

Availability of data and materials: The datasets generated by the survey research during and/or analyzed during the current study are available in the figshare repository. Copies of the data can be obtained free of charge via <https://figshare.com/account/items/25091789/edit>. The datasets used and/or analysed during the current study available from the corresponding author on reasonable request. All data generated or analysed during this study are included in this published article [and its supplementary information files].

Ethical approval: Not applicable.

Conflict of interest: The authors declare no conflict of interest.

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