



College Students' Knowledge, attitudes, and practices regarding body posture: A cross-sectional survey--Taking a university in Wuhu City as an example

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ABSTRACT

As body posture problems become more severe and tend to be younger, college students pay less attention to the effects of poor body posture. This study is an analysis of knowledge, attitudes, and behaviors related to body posture among college and university students. A random sample of 1012 college students aged 18–21 years old from Anhui Polytechnic University was randomly selected to distribute and collect the questionnaires by online questionnaire in April 2023. Descriptive statistics were also used to analyze the response rates of college students on the Knowledge, Attitude, and Practice (KAP) theory of body posture. The results of the study showed that the majority of subjects demonstrated good knowledge and attitudes towards healthy body posture; Most of the sample, 66.8% were clear about the definition of body posture, and 71.9% needed a body posture assessment to understand their body posture problems, but only 27% would develop an exercise program to improve poor body posture. Multiple linear regression analysis showed that Students with higher knowledge and attitudes have good motor behavior in correcting poor body posture. In addition, our study found that among college students in the age range of 18–21 years, the younger the age, the better their behavior in improving poor body posture through exercise. The results of this study demonstrate the importance of knowledge about healthy body posture and aim to promote knowledge education programs about healthy body posture among college students and to reduce the risks associated with poor body posture.

1. Introduction

When poor body posture becomes a growing problem and there is a trend toward younger age groups, exacerbates people's risk of developing musculoskeletal disorders. It has been shown that Low back pain (LBP) is one of the most common musculoskeletal disorders (Ghanei et al., 2013). Nowadays, non-ergonomic working conditions increase the amount of time people spend sedentary, incorrect Sedentary Posture May Exacerbate People's Low Back Pain (Butte et al., 2022). Young adult college students who spend too much time sitting in a slouched position while studying, using a computer, or during daily activities are more likely to have spinal disorders and pain (Toprak Çelenay and Özer Kaya, 2017). Excessive increase in screen use (e.g., computers, tablets, etc.) time, leading to their prolonged forward head tilt and neck flexion postures are known risk factors for neck pain, reproduced neck pain severity, and reduced balance control in subjects with mechanical neck pain (Lin et al., 2020). According to Joan Pagano, poor body posture also

has a bad effect on people psychologically, and improving body posture may be the key to better mood, improved memory, confidence, and stress resilience (Pagano, 2013). Riskind and Gotay (Riskind and Gotay, 1982), who first reported the effects of posture on psychological state, found that a seated upright posture increased persistence in problem-solving compared to a slumped posture, with no difference in mood or fatigue. The tilt of the head in the sitting position has also been examined and it has been shown that an upward head tilt is associated with a positive mood, whereas a downward one is associated with a negative mood (Suzuki and Haruki, 1992). Sekiya believes that changing posture is expected to improve a person's mood (Takayama and Sekiya, 2023). Body posture profoundly impacts how we feel and act and our health and well-being.

In China, the physical fitness test for college students in China includes body mass index (BMI), lung capacity, 50-meter run, seated forward bend, standing long jump, pull-ups (male)/sit-ups (female), 1000-meter run (male)/800-meter run (female), but the height, weight

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and BMI values in the test can only reflect the height, weight, physical development and malnutrition of students, and do not reflect the problems related to the physical fitness of college students (刘杰 et al., 2021). This suggests that in the college physical fitness test, there is no program to specifically assess body posture. Studies have been conducted, but most of them are only studying the factors influencing poor body posture, body posture assessment, and the effects of exercise interventions on body posture. For example, Rusek Rusek W, et al. used a spinal measurement analysis system to assess the posture of adolescents (Rusek et al., 2018); Exercises are effective and superior in improving thoracic and lumbar bending and mobility in college students (Çelenay et al., 2015), etc.

“The Knowledge, Attitude, and Practice (KAP) theory explains that any behavior is influenced by two constructs: attitude and knowledge (Paterson et al., 2023)”. There is a lot of research to analyze other aspects of behavior based on knowledge and attitudes, examples include a KAP cross-sectional survey of brucellosis among Tibetan cattle owners, and a KAP cross-sectional study of COVID-19 among university students in Vietnam (Doan et al., 2022; Zeng et al., 2018; Zhou et al., 2023). Therefore, the advantages of applying the KAP survey model to the work of body posture health education and body posture health promotion are more obvious. However, in the questionnaire on poor body posture, no one analyzed knowledge, attitudes, and behaviors at the same time. Although some studies have been conducted in other countries, for example, Salman et al. found through a systematic evaluation that the best results were found under a back care education program to improve college students’ knowledge of back health, ergonomics, and postural behavior (Salman et al., 2022). Epstein et al. analyzed the knowledge of 457 students aged 10–15 years about correct posture using questionnaires and objective tests. Even though students are taught the importance of correct posture and how to achieve it, only 21% have correct posture daily (Epstein et al., 2012). In addition, Tran et al. studied 537 Australian children aged 10–12 years old who received knowledge of computer ergonomics principles at school through questionnaires, but these children find it difficult to put this knowledge into practice for healthy computer use (Tran and Ciccirelli, 2012). In addition, Brink et al. analyzed the health problems of children and adolescents with musculoskeletal pain in the epigastrium brought about by persistent prolonged incorrect sitting (Brink and Louw, 2013). However in a large number of related articles, focusing on articles on the effects of exercise interventions on body posture, and assessment of body posture, no studies have been found on the simultaneous analysis of knowledge, attitudes, and behaviors regarding poor body posture among college students in Chinese universities. Therefore, this study analyzes body posture knowledge, attitude, and behavior simultaneously.

This study was conducted as a questionnaire survey, through which the collected data compiled and analyzed the current situation of college students’ knowledge, attitudes, and behaviors regarding healthy body posture. Researchers propose knowledge education programs to promote healthy posture so that college students can constantly self-supervise and improve themselves, making their behavior a conscious and purposeful action (张保华 et al., 2008). It is also hoped that the school will strengthen the educational work on body posture and health to provide a reference for the early prevention of poor body posture among college students.

2. Methods

2.1. Participants in the survey

This study was a cross-sectional non-experimental survey design. To improve the efficiency and accuracy of data collection, this study randomly selected college students of Anhui Polytechnic University in Wuhu City, Anhui Province, and distributed and recovered the questionnaires in April 2023 using the “Questionnaire Star” APP. In addition, to ensure the validity of the completed questionnaire, all subjects were

made fully aware of the content of the questionnaire through volunteer recruitment and were asked to fill it out carefully before the questionnaire was completed. According to the inclusion criteria, 1,100 university students completed the questionnaire, after screening and elimination, 1021 valid questionnaires were finally obtained. All participants understood the purpose of this questionnaire completion and agreed to its public release. The inclusion criteria for the participants in this study were being healthy college students in normal health between the ages of 18 and 21 years old, with no history of chronic diseases, from the same university. The Institutional Review Board of the Theoretical Committee of the Institute of Neuroscience and Cognitive Psychology, Anhui Polytechnic University, approved the study. All participants signed an informed consent form at the time of recruitment.

2.2. Measures

After an extensive review of the literature, the researcher developed a questionnaire to collect data on college students’ knowledge of poor body posture. The questionnaire contained 25 questions divided into two parts. The first part of the questionnaire collected demographic information about the participants, i.e., age, height, weight, gender, and grade level. The second part consists of 3 sets of questions on knowledge, attitudes, and behaviors related to healthy body posture. 9 surveys on knowledge of body posture (K1-K9), 4 surveys on correcting body posture attitudes (A1-A4), and 7 surveys on behavior (B1-B7). Knowledge and attitudes were measured using a three-point Likert scale with the choices “agree,” “unsure,” and “disagree,” and behavioral questions with three responses: “often,” “sometimes,” and “never. A correct answer was assigned 1 point and an incorrect/unknown answer was assigned 0 points. The total knowledge score ranged from 0 to 9, with a higher score denoting a better knowledge of body posture. The Cronbach’s alpha coefficient of the questionnaire we designed was 0.76 and the KMO value was 0.71, the questionnaire in this study showed acceptable reliability and validity.

2.3. Statistical analysis

Linear relationships between the independent and dependent variables were analyzed using multiple regression, the primary results took into account the statistical significance applied to the regression model (p -value < 0.05). The dependent variables included knowledge, attitude, and behavior (obtained by summing the scores from the corresponding questions). Independent variables included gender and age. In Model 1, we analyze the knowledge about the independent variables. In Model 2, we analyzed the attitudes toward the independent variables, including the knowledge among the independent variables. In Model 3, we analyzed the behaviors related to the independent variables and also included the knowledge and attitudes among the independent variables. Data analyses were conducted with SPSS version 27.0. Results were considered statistically significant if the p -value was ≤ 0.05 (bilateral).

3. Results

A total of 1100 questionnaires were distributed, and 1012 valid questionnaires were collected, with an efficiency rate of 92%. The frequency study of population characteristics showed that 59.3 % of the respondents were male and 40.6 % were female. In the final sample, the average age of the respondents was 18.71 years. ANOVA analysis showed that the significance value of the three stepwise regression models was 0.00, <0.05, and there was a significant correlation between the independent variable and the dependent variable. All three equations obtained from this stepwise regression analysis are significant, whereas, in terms of model goodness-of-fit, equation 3 is better fitted. Thus its stepwise regression equation can be written based on the B -values of the unstandardized coefficients as: $y = 7.300 + 0.248 \cdot x_1 - 1.588 \cdot x_2 + 0.289 \cdot x_3$ (y : Behavior, x_1 : Total knowledge, x_2 : Gender x_3 :

Total Attitude).

Table 1 shows the perceptions of college students about body posture. The results of the survey showed that 66.8% of the subjects were clear about the definition of body posture problems; 95.8% of subjects agreed that body posture was important; 46.2% of the subjects agreed that they thought their physique was good, with a very significant difference between male and female college students, and a significantly higher number of female than male college students thought their physique was not good enough. College students learning about proper body posture is necessary to reduce the risk of disease (Fonseca et al., 2015). The majority of subjects knew the causes of poor posture (59.8%), were aware that incorrect posture could cause physical pain (45.7%) and had also been emotionally affected by poor posture (82.4%), and that the postural awareness of college students was very important in promoting good posture; 90.3% of the subjects believed that body image can be improved and in this regard, a high percentage of respondents knew that exercise can improve poor body image (90.2%).

Table 2 shows college students' responses to the attitude questions related to body posture. 54.7% of the subjects were not surrounded by professional guidance for improving their body posture; Posture education is increasingly common in many parts of the world as a strategy to mitigate the risk of disease associated with poor posture (Noll et al., 2014), However, only 51.7% of the subjects in this study would have been educated about body posture health in their schools, which is not enough. In addition, 55.7% of the subjects had few physical assessment programs in their schools, but most of the subjects needed physical assessment to understand their physical problems (71.9%). The survey results show that the college population has a positive attitude toward poor body posture improvement.

Table 3 shows the response rates of college student's life and exercise behaviors. 74.1% of the subjects had frequent sedentary behavior; A high percentage of subjects used electronic screens for long periods each day (88.4%);75.2% of the subjects often had "bad habits such as crossing their legs, carrying a backpack on one shoulder and holding a cell phone on one side; 44.7% of the subjects had a long-term exercise habit; 59% of the subjects spent some time on exercise each week. Only 23% of the subjects actively tried to improve their body posture, while the rest only occasionally or rarely tried to improve their body posture.

There was no statistically significant correlation ($p > 0.05$) between knowledge and gender and age in the multiple linear regression (Model 1, Table 4); There was no statistically significant correlation between attitude and gender and age, but there was a statistically significant

Table 1
Cognitive levels on the knowledge related to poor body posture among college students in a university in Wuhu, China, April 2023.

N	Statements (variables)	Agree (%)	Uncertain (%)	Disagree (%)
K1	You know exactly what a body posture problem is.	66.8	22.6	10.6
K2	A person's body posture is important.	95.8	3.5	0.7
K3	You think you have a good physique.	46.2	29.7	24.1
K4	You know the causes of poor body image.	59.8	30.3	9.9
K5	The people around you also have body posture problems.	70.3	23.9	5.8
K6	Improper posture can cause your muscles or joints to feel pain regularly.	45.7	22.8	31.5
K7	Body image problems can be improved.	90.3	7.9	1.8
K8	Daily exercise can improve body image problems.	90.2	8.3	1.5
K9	Bad body posture can affect your mood.	82.4	5.3	12.3

Table 2
Attitudes of participants to poor posture improvement at a university in Wuhu, China, April 2023.

N	Statements (variables)	Agree (%)	Uncertain (%)	Disagree (%)
A1	You are surrounded by professional guidance for improving your body posture.	17.6	27.7	54.7
A2	Your school will have education on physical posture health.	51.7	35.4	12.9
A3	Your school will have a body posture assessment program.	40.1	4.2	55.7
A4	You need a body posture assessment to understand your body posture issues.	71.9	21.2	6.9

Table 3
Poor body posture associated with daily behavioral habits among college students in a university in Wuhu, China, April 2023.

N	Question	Often (%)	Sometimes (%)	Never (%)
B1	Do you sit for more than 4 h a day?	74.1	21.3	4.6
B2	Do you use electronic screens every day?	88.4	8.6	3
B3	Do you have bad habits such as "crossing your legs, carrying a backpack on one shoulder, and holding a cell phone on one side?"	75.2	10.5	14.3
B4	Have you ever tried to improve your body posture?	23	75.5	1.5
B5	Do you have the habit of exercising?	44.7	21.4	33.9
B6	Do you spend time on exercise every week?	16.9	42.1	41
B7	Are you on an exercise program to improve your shape?	27	51.2	21.8

correlation with knowledge ($p < 0.01$), and knowledge and attitude were positively correlated (Model 2, Table 4). In Table 4 of Model 3, statistically significant correlations were observed between behavior and age, knowledge, and attitudes, while no significant correlations were observed between behavior and gender.

4. Discussion

According to the results of our survey, college students have a good knowledge of body posture, which indicates that most subjects are aware of body posture. We found significant differences between male and female college students in their perceptions of their body posture. Women generally believe that their body posture is not very good or poor, while men generally believe that their body posture is very good or relatively good. One of the reasons for such a big difference between men's and women's perceptions may be due to the general lack of systematic body posture knowledge learning among college students. We also found that 54.3% of the sample was unsure or disagreed that poor posture caused body pain in response to question K6. This indicates that the importance of maintaining proper posture has not been sufficiently disseminated among the university student population, and therefore it is necessary to include posture education programs in schools to promote health and prevent the risk of related diseases (Rusek et al., 2018). According to our survey, we learned that most of the students have been affected emotionally by poor body posture at one time or another, resulting in psychological problems such as low self-esteem, anxiety, and depression. An interesting result of our survey is that poor body posture has an impact on college students' personality/physical and mental development, but it goes away after a while. According to Carney, Awad et al. the results of the study learned that particularly uncomfortable posture operation may lead to discomfort or cause people

Table 4

Multiple logistic regression analysis on factors associated with the cognitive levels of knowledge, behaviors, and attitudes related to poor body posture of 1012 college students at a university in Wuhu City, China, April 2023.

	Coefficients not Standardized		Coefficients Standardized Beta	t	p-Value
	B	Standard Error			
Model-Dependent variable: Knowledge					
Gender	0.090	0.103	0.028	0.876	0.381
Age	0.056	0.071	0.025	0.789	0.430
Mode2—Dependent variable: Attitudes					
Gender	-0.029	0.055	-0.016	-0.521	0.602
Age	-0.038	0.038	-0.030	-1.005	0.315
Total knowledge	0.189	0.017	0.331	11.142	0.000***
Mode3—Dependent variable: Behavior					
Gender	-0.150	0.183	-0.049	-0.821	0.412
Age	-0.296	0.121	-0.147	-2.448	0.015*
Total Attitude	0.117	0.015	0.244	7.983	0.001***
Total knowledge	0.136	0.059	0.150	2.325	0.021*

Notice: *** At the 0.001 level (two-tailed), the correlation is significant. ** At the 0.01 level (two-tailed), the correlation is significant. * At the 0.05 level (two-tailed), the correlation is significant.

to get used to the respective posture (Carney et al., 2015). And there is a correlation between emotion and posture (Awad et al., 2021). So subjects may have adapted to the psychological effects of poor body posture. However, they do not take into account that this behavior will remain with them for a long time (Huang et al., 2022). This adds to the psychological stress of students in the long run. In general, college students have developed an initial awareness of physical health and a better knowledge of body posture. However, we should later strengthen the education of knowledge related to body posture to help college students apply the knowledge related to body posture to their daily life habits.

Although college students have positive attitudes toward posture-related issues and understand the importance of attitudes in maintaining proper posture, in their daily lives most college students have bad habits, with sedentary behavior being particularly severe (Baradaran Mahdavi et al., 2021; Paterson et al., 2023), consistent with our findings. It has been shown that a sedentary lifestyle is a considerable risk factor for low back pain. Most students agree that body posture issues can be improved and also need a body posture assessment to understand their body posture issues. However, this attitude is not generally reflected in their practice. At the same time, we found, based on a literature survey, that in both China and other countries, the majority of subjects subjected to body posture assessment had poor body posture problems (Somhegyi, 2022; 赵修发 et al., 2022). There is a lack of professional methods of body posture education and teacher body posture correction on the school side. It is therefore important for the Government and schools to take relevant measures to translate this attitude of students into good practices.

In multiple linear regression, Knowledge was not statistically significantly correlated with gender and age. This indicates that young college students have a high level of understanding of knowledge related to body posture. For example, Paolo et al. showed that both young people and non-smokers had higher levels of posture-related knowledge and that they were more aware of postural problems (Montuori et al., 2023). In addition, Epstein inspired the importance of ergonomic knowledge, but only for adolescents (Epstein et al., 2012). In model 2 it can be concluded that attitude and knowledge are positively correlated (Table 4), proving that college students with higher knowledge have better attitudes in terms of correcting body posture. Our findings are consistent with the Montuori et al. study: people with higher knowledge and the best attitudes will therefore have good behavior in maintaining correct posture (Montuori et al., 2023). In Table 5 of Model 3, statistically significant correlations were observed between behavior and age, knowledge, and attitude, with younger students having better behavior in improving poor body posture through exercise. This may be because juniors and seniors have heavy academic pressures, which results in fewer students having time for consistent physical activity. In addition, according to the Alzghoul study, it is believed that in the KAP model,

people with high positive attitudes towards behavior and high knowledge will have a valid practice (Alzghoul and Abdullah, 2015). However, in this study, college students accounted for the majority of daily malpractice, correcting posture only sporadically, and they did not practice as an important part of their daily life. These results further suggest that we need to strengthen posture health education interventions and enrich knowledge education programs.

5. Limitations

Since the questionnaire is self-designed, the results may be inaccurate or subject to bias. The study population in this paper is from the same university, which is a limitation of this study. In addition, the questionnaire for this study was not collected with a limited sample size for college students nationwide. Future research directions could be related to different populations in different regions.

6. Conclusions

The results of this study indicate that among college students in the age range of 18–21 years old, the younger the student is than the older the student were knowledgeable about posture, had positive attitudes toward correcting poor posture, and had better behaviors in the practice of correcting poor posture. In addition, we found that college students have positive attitudes toward correcting poor posture, but further work is needed to translate positive attitudes into practice in correcting poor posture: For example, schools can conduct regular screenings for college students' physical fitness and then make targeted exercise recommendations, develop exercise prescriptions for physical fitness prevention, and design individualized physical education approaches to better promote the development of student physical fitness.

Another related result regarding the analysis of knowledge and attitudes on healthy body posture behavior demonstrates the importance of knowledge in healthy body posture. Schools should be encouraged to include education on body posture, add more educational programs on this knowledge, as well as training programs to correct poor body posture behaviors, incorporate body posture assessments into physical fitness tests, and strengthen KAP research on college student body posture.

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Conflicts of interest

The study was conducted in the absence of any business or financial relationships that could be considered potential conflicts of interest.

CRedit authorship contribution statement

Dan Feng: Conceptualization, Methodology, Validation, Investigation, Formal analysis, Writing – original draft, Writing – review & editing. **Yong Zhang:** Conceptualization, Methodology, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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