Physical Health Monitoring System Based on Artificial Intelligence

Li Qin and Kai Wang

Nanchang Institute of Science and Technology, Nanchang 330108, China

253419727@qq.com

Abstract: The benefits and risk perception of physical health knowledge can improve the health value expectation of individuals, and have a positive impact on their beliefs, motivations and attitudes, so as to promote their participation in physical activities. Based on the role and value of artificial intelligence monitoring model and physical health knowledge in the above theoretical model of physical activity promotion, this paper holds that among the antecedents of artificial intelligence monitoring model, knowledge is the basic condition for attitude and belief generation, because physical health knowledge education not only enables teenagers to understand the benefits of physical activity to health, but also helps them to improve their health, they will also be able to reasonably arrange physical activities according to their own situation, and how to adjust and modify the artificial intelligence physique monitoring combined with practice. Research shows that human behavior originates from the imperceptible cognitive process, which can deepen the learning and understanding of physical health through evaluation. Physical health can improve the ability to perform and expect behavior, and the results of artificial intelligence analysis expect that the correlation degree between personal belief and behavior can reach more than 86%. Adolescents learn the benefits and risk perception of physical activity through physical health education, and increase the intention of physical activity by increasing the expectation of results. The impact on individual behavior is 69% higher. When the profile of individual self-determination changes (or individual self motivation works), the change of behavior is an expected result.

1. Introduction

The makers of artificial intelligence monitoring for college students' physical health test are mainly related experts from government, sports and health departments. It is necessary to consider

the effectiveness of artificial intelligence monitoring. At the same time, we should balance the interests of all applicable subjects and the repercussions of all sectors of society. Artificial intelligence monitoring is difficult to achieve the desired results. The traditional ideas still restrict the effectiveness of the new system and hinder the implementation of the formal rules.

Sun h research found that physical health under artificial intelligence is positively related to students' exercise behavior, and with the increase of age, the understanding of the importance of physical health knowledge is more in-depth [1]. Kammer D C found that there was a low correlation between physical activity level and physical health knowledge of urban adolescents under artificial intelligence, and the level of physical activity increased slightly with the improvement of physical health knowledge [2]. Carne T g found in an artificial intelligence tracking study that there was a weak correlation between physical health knowledge and VO2max (r = 0.256, P = 0.001), and students with high scores of physical health knowledge had higher aerobic ability [3]. Shi ZY research shows that after receiving physical health knowledge education, it is suggested to strengthen physical health education by increasing physical health knowledge [4]. Zhang XH research confirmed that physical health knowledge is the ability foundation of artificial intelligence self-efficacy, behavior perception and value expectation, and is the necessary condition for the realization of physical activity promoting and strengthening factors of teenagers, which can directly or indirectly affect physical activity behavior [5].Tongpadungrod P proposed that physical health knowledge increases the perceived competence of teenagers to participate in physical activities, so that more students with self-determination motivation can maintain a positive life state. Therefore, when we expect changes in teenagers' health behavior, we should first increase students' physical health knowledge [6]. Rao ar m survey found that there was a moderate positive correlation between students' physical health knowledge and physical activity level. Artificial intelligence data analysis showed that the physical activity level of students in the low level group of physical health knowledge was significantly lower than that in the high level group [7]. Lin JF has an impact on College Students' social cognitive variables, such as exercise attitude, self-efficacy, exercise intention and exercise plan, thus promoting the development of exercise behavior [8]. Jiang X Y's empirical research found that artificial intelligence can increase the individual's expectation of physical health knowledge, and then affect physical activity behavior [9]. The above research from the perspective of physical health, combined with life to study the physical improvement, but not combined with artificial intelligence network mode.

Based on the role and value of artificial intelligence monitoring model and physical health knowledge in the above theoretical model of physical activity promotion, this paper holds that among the antecedents of artificial intelligence monitoring model, knowledge is the basic condition for attitude and belief generation, because physical health knowledge education not only enables teenagers to understand the benefits of physical activity to health, but also helps them to improve their health, they will also be able to reasonably arrange physical activities according to their own situation, and how to adjust and modify the artificial intelligence physique monitoring combined with practice.

2. Physical Health and the Formal Rules of Health Monitoring

2.1. Theory of Physical Health

To analyze human physical activity behavior, whether it is acquisition or persistence, its change is complex. According to the theory of knowledge belief behavior and health belief, knowledge is the premise and basis for establishing correct belief and changing behavior [10]. Social cognitive

theory emphasizes that the cognition of self-efficacy is the main factor affecting behavior, but the knowledge of physical health is the subject of exercise cognition, which can also be internalized into the cognition of behavior through educational means [11]. TPB theory emphasizes the importance of attitude and behavior perception control. Physical health knowledge itself is the precondition of attitude formation. It determines the strength of behavior perception control together with skills, thus affecting the change of behavior; The theory of self-determination and expected value attaches importance to individual perceived competence and expectation of cognition, which are significantly related to physical health knowledge; YPAP model takes physical health knowledge as the pre factor of physical activity behavior. Physical health knowledge includes not only what constitution and health are, but also how to apply them; It contains not only theoretical knowledge, but also skills and practical knowledge, which is the basis of establishing physical activity behavior [12]. In addition, the concepts, principles and norms of physique and health (physical activity) and their application in cognitive and physical fields can enable individuals to transfer their knowledge to a new environment, solve problems never encountered before, promote the growth of physique and health knowledge, and form a virtuous circle of mutual influence and promotion between physique and health knowledge and physical activity behavior. The combination of theory and practice makes teenagers know or try "I can do", which is also the source of attitude and belief. For example, when teenagers have a high level of physical health knowledge, they tend to control their sedentary lifestyle, feel that they are competent for physical activity and achieve better performance, so they or the people around them are encouraged to take active and healthy physical activity [13]. In addition, knowing how to design exercise plan according to fitt principle, teenagers will have enough knowledge and skills to adopt and maintain their behaviors, so as to increase physical activity. To sum up, physical health knowledge plays an important role in the promotion of physical activity. On the one hand, it combines with skills to become a pre factor of physical activity behavior, which can directly promote the participation of physical activity [14].

2.2. Formal Rules of Artificial Intelligence Physical Health Monitoring

It is determined in a certain form and has a certain force on human behavior. Informal rules refer to people's unwritten restrictions. Such as cultural tradition, values and ethics. It has the characteristics of spontaneity and non compulsion. Although advanced formal rules can change rapidly under the influence of politics or justice. But the backward informal rules embedded in tradition, custom and behavior are hard to change by deliberate formal rules. From the development of College Students' physical health test system. Through the promulgation of a number of rules and regulations, the state hopes to change the attitude of colleges and universities towards the work of physical fitness testing and the traditional concept that college students despise physical health. The so-called transaction cost is actually "system cost", including the cost of system formulation, operation, maintenance and supervision. If the innovation or change of the system itself is involved, the cost of the system change should also be considered, and the algorithm is input into the comprehensive ability evaluation matrix Q:

$$Q = \beta X + (In - \alpha W)^{-1} \varepsilon$$

(1)

Initial developer recommendation matrix T1; Task range vector L:

$$L(d_i, w_j) = P(d_i)P(w_j|d_i); P(w_j|d_i) = \sum_{k=1}^{K} P(w_j|z_k)P(z_k|d_i)$$

(2)

Conflict matrix C output maximum task completion quality ρ and developer recommendation matrix T:

$$T_{ssim} = 1 - \frac{(2\mu_x\mu_y + C_1)(2\sigma_{xy} + C_2)}{(\mu_x^2 + \mu_y^2 + C_1)(\sigma_x^2 + \sigma_y^2 + C_2)}$$

(3)

The matrix C, Q and T1 are transformed into one-dimensional array form

$$\frac{Q}{T_\kappa} = \frac{2k}{k+1} + [\frac{1}{2} + \frac{1}{2k}][\frac{c_2 - c_1}{3}]^2 + \frac{2(c_2 - c_1)}{3}$$

(4)

Add formula and call the solve method of Q to get ρ T is different from the traditional recommendation method, the focus of developer recommendation based on e-cargo model is to consider the cooperation between developers after the recommendation, that is, developers cooperate to complete a specific project with high quality. Therefore, in order to solve this problem, this paper considers the collaboration between developers, and uses e-cargo modeling, in order to optimize the overall task completion quality as the guidance, and makes a developer recommendation.

3. Experiment

3.1. Research Methods

Based on the role and value of artificial intelligence monitoring model and physical health knowledge in the above theoretical model of physical activity promotion, this paper holds that among the antecedents of artificial intelligence monitoring model, knowledge is the basic condition for attitude and belief generation, because physical health knowledge education not only enables teenagers to understand the benefits of physical activity to health, but also helps them to improve their health, they will also be able to reasonably arrange physical activities according to their own situation, and how to adjust and modify the artificial intelligence physique monitoring combined with practice.

3.2. Experimental Design

This paper points out that in modern society, there are three kinds of interest adjustment mechanisms: economic, legal and ethical, the most important of which is the legal mechanism. Aiming at the low legal status of artificial intelligence monitoring in college students' physical health test and the contradiction between lower law and upper law. The less authoritative text of AI monitoring should be included in the legislative process. Through the legal form to protect the physical health of college students, promote the authority of artificial intelligence monitoring, give play to the rigid binding force and practical gravity of the law to urge college students to actively participate in physical exercise, clarify the responsibility of the implementation subject of artificial intelligence monitoring at all levels, ensure that the incentive and punishment measures are seriously implemented, so that there is a law to follow and the school is governed by law. Instead of the continuous decline of physical health level for several years, the implementation of "one vote

veto", for example, the excellent rate can be evaluated only when it reaches a certain level, which makes the school development more closely linked with the students' physical health level, and fully mobilize the enthusiasm of the school to implement artificial intelligence monitoring.

4. Results and Analysis

It is their responsibility to support and promote the implementation of AI monitoring. Under the action of artificial intelligence monitoring, school and other external forces. Although the physical health test is in full swing on the surface, but once the PE teacher is absent. Due to the large number of students, heavy tasks, sports injury risk occurs from time to time, teachers are prone to be disgusted. But these negative emotions will not show up as overt resistance. It's modification and limited deviation from AI monitoring.
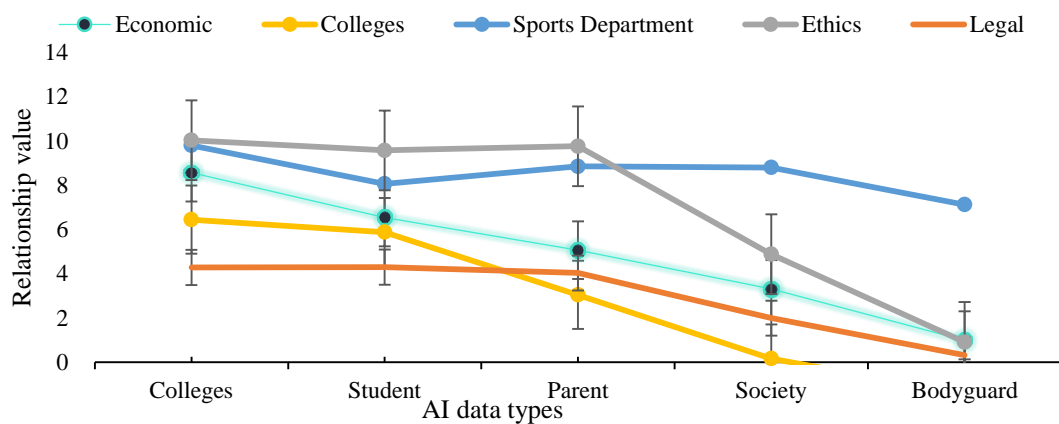

Figure 1. The supervisory role of the artificial intelligence monitoring system

As shown in Figure 1, the defects of the third party monitoring system make it unable to play its due supervisory role. It is difficult to "escort" the implementation of artificial intelligence physical health monitoring. But we can't be in a hurry. We should find a balance point in the participation of government departments, social organizations and market institutions. From the top-level design and institutional arrangements, we should make clear the principal-agent relationship between the provincial sports, health and art department and the third party organization, regulate the rights and obligations between the two. Secondly, the current third-party monitoring mechanism should be reformed, accelerate the cultivation of third-party market institutions. Provide artificial intelligence monitoring and financial support to enhance the independence, professionalism and authority of third-party market institutions. Finally, build an artificial intelligence physique monitoring system with multiple subjects including provincial department of sports, health and arts, universities, students, parents, social organizations and market institutions.

Table 1. AI path dependence

Item	Colleges	Student	Parent	Society	Bodyguard
Economic	8.63	6.97	7.1	6.52	6.8
Legal	3.86	1.95	1.81	1.7	0.36
Ethics	8.27	8.59	7.18	7.6	6.88
Colleges	6.57	6.07	5.94	4.37	4.95
Sports Department	8.98	8.73	7.58	6.09	4.57

As shown in Table 1, path dependence of artificial intelligence is the main reason for college students' physical health test to get into trouble. What really disintegrates the driving force of reform and passively resists AI monitoring is the internal resistance caused by the "increasing returns" effect in path dependence. College physical education is a part of higher education. College Students' physical health test system must be embedded in the higher education system. China's higher education has moved from elite education to mass education, which has trained many excellent talents for the country. It has created a large number of achievements in basic research and scientific and technological innovation in many fields. The higher education system is constantly strengthened and consolidated through the positive feedback mechanism. As a result, the college students' physical health test system makes concessions for the development of colleges and universities everywhere. Moreover, artificial intelligence monitoring related to college students' physical health test is mainly released in the form of administrative regulations.
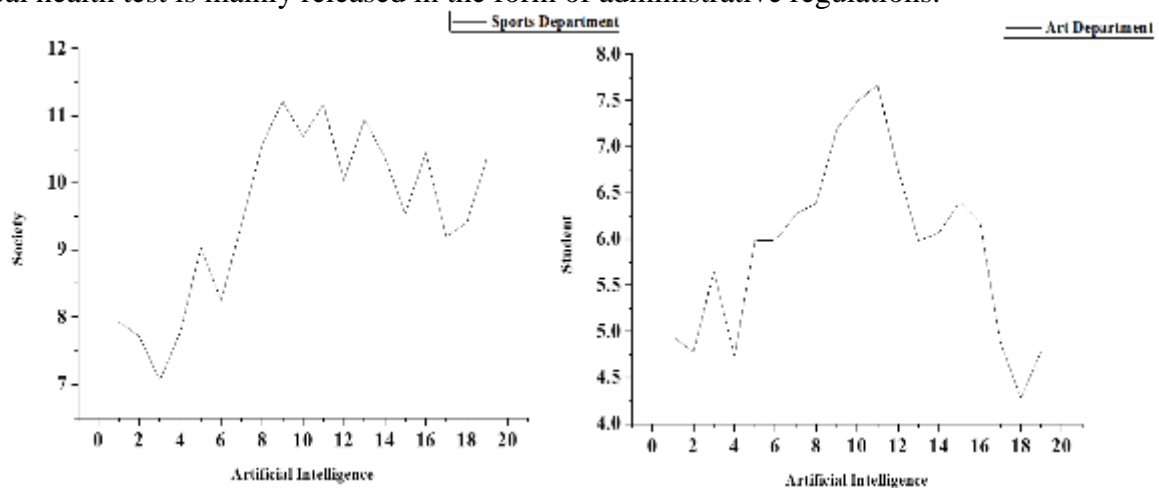

Figure 2. Cognitive level and attitude of physical fitness test

As shown in Figure 2, from the perspective of students and society, the cognitive level and attitude of artificial intelligence to physical health test will inevitably affect the accuracy of test results. Some college students hold indifferent attitude to the results of physical health test. Physical health has not been truly reflected. Some college students think that physical health test is not important relative to professional study. So try every means to open the proof to avoid testing. Some college students even violate the test rules in order to pass the physical test. Including finding someone to take the test. That is, the makers or executors of the system are aware of the adverse consequences of path dependence. But it's hard to change because of various factors.

Table 2. Physical health knowledge and motivation to choose

Item	Economic	Legal	Ethics	Colleges	Sports Department
Colleges	8.57	4.28	5.75	6.44	9.8
Student	6.54	4.3	5.27	5.88	8.06
Parent	5.06	4.03	5.73	3.04	8.85
Society	3.31	1.99	2.89	0.16	8.8
Bodyguard	0.99	0.32	0.59	-1.41	7.12

As shown in Table 2, if an individual does not have enough physical health knowledge (goal setting, plan implementation, physical health assessment, etc.) in his daily life, it is bound to affect his motivation to participate in physical activity selection. In essence, physique intervened lifestyle

group (learning of physique health knowledge and behavior strategy, 0.5 h physical activity every day is close to daily life) and routine training students for 6 months. After the intervention, the physical activity level and cardiopulmonary fitness of the two groups were significantly improved, and the cardiopulmonary endurance level of the routine training group was significantly higher than that of the lifestyle group; after 18 months of independent physical activity planning, it was found that the two groups had higher levels of physical activity and cardiopulmonary fitness, but the level of physical activity and cardiopulmonary fitness in the lifestyle intervention group was significantly higher than that in the traditional training group, indicating that the physical health knowledge teaching in the physical activity intervention has long-term advantages.

5. Conclusion

Whether artificial intelligence monitoring can achieve the expected results depends on the attitude of the application subject of artificial intelligence monitoring to a certain extent. If AI monitoring is not approved by the applicable subject, it will lead to the invalidity or failure of the implementation of AI monitoring. In the system of College Students' physical health test, the applicable subjects are not only college students, but also PE teachers and colleges and universities. For colleges and universities, the key work is to improve the status, strive for high-quality resources and improve the employment rate. For physical education teachers, the test work increases the additional burden, and the salary performance and professional title evaluation are not affected by the physical health test work. Papers, projects and other scientific research achievements are the important weights on the road of promotion. For students, it is difficult to change the inherent idea that physical education is a "side course". Employment is the most concerned topic. Therefore, both colleges and universities, physical education teachers and college students are the beneficiaries of the inherent system. There is a conflict of interest with the implementation of College Students' physical health test system, which leads to conflict or even antagonism. Individual rational behavior leads to collective irrational consequences, forming the external thrust of path dependence.

Funding

Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

References

[1] Sun H, Büyük Ztürk O. Optimal Sensor Placement Instructural Health Monitoring Using Discrete Optimization. Smart Materials & Structures, 2020, 24(12):125-134. https://doi.org/10.1088/ 0964-1726/24/12/125034

[2] Kammer D C. Estimation of Structural Response Usingremote Sensor Locations. Journal of

Guidance, Con-trol and Dynamics, 2020, 20(4):501-508. https://doi.org/10.2514/2.4069

[3] Carne T G, Dohrmann C R. A Modal Test Design Strate-Gy for Model Correlation. Proceedings of Spie−The International Society for Optical Engineering,2020,24(4):927-929.

[4] Shi Z Y, Law S S, Zhang L M. Optimum Sensor Place-Ment for Structure Damage Detection. Journal of Engi-neering Mechanics, 2020, 126(11):1173-1179. https://doi.org/10.1061/ (ASCE) 0733-9399(2000)126:11(1173)

[5] Zhang X H, Zhu S,Xu Y L,et al. Integrated Optimalplacement of Displacement Transducers and Strain Gaugesfor Better Estimation Of Structural Response. Interna-tional Journal of Structural Stability and Dynamics, 2021, 11(3):581-602. https://doi.org/10.1142/S0219455411004221

[6] Tongpadungrod P, Rhys T D L,Brett P N. An ap-proach to Optimise the Critical Sensor Locations in one-Di-Mensional Novel Distributive Tactile Surface to Maximizeperformance. Sensors & Actuators A:Physical,2020,105(1):47-54. https://doi.org/10.1016/S0924-4247(03)00059-1

[7] Rao A R M,Anandakumar G. Optimal Placement of Sensors For Structural System Identification and Healthmonitoring Using a Hybrid Swarm Intelligence Technique. Smart Materials and Structures,2017,16(6):2658-2672. https://doi.org/10.1088/0964-1726/16/6/071

[8] Lin J F, Xu Y L, Law S S. Structural Damage Detec-Tion-Oriented Multi-Type Sensor Placement with Multi-ob-jective Optimization. Journal of Sound Vibration, 2018, 422(4):568-589. https://doi.org/10.1016/j.jsv.2018.01.047

[9] Jiang X Y, Li S. BAS: Beetle Antennae Search Algo-Rithm for Optimization Problems. International Jour-nal of Robotics and Control, 2018, 6(1):1-6. https://doi.org/10.5430/ijrc.v1n1p1

[10] Deb K, Pratap A, Agarwal S, et al. A Fast and Elitistmulti-Objective Genetic Algorithm: NSGA-II. IEEET Ransactions on Evolutionary Computation, 2020, 6(2):182-197. https://doi.org/10.1109/ 4235.996017

[11] Owen N, Bauman A, Brown W Too much Sitting: A Noveland Important Predictor of Chronic Disease Risk?. British Journal of Sports Medicine, 2019, 43(2):85-89. https://doi.org/10.1136/ bjsm.2008.055269

[12] Clemes S A, Patel R, Mahon C, et al Sitting Time Andstep Counts in Office Workers. Narnia, 2019, 64(3):188-189. https://doi.org/10.1093/occmed/kqt164

[13] Hilde K Brekke, Ragnhild A Lenner, Marja-Riitta Taskin-en, et al Lifestyle modification improves risk factors in type 2diabetes relatives. Diabetes Research and Clinical Prac-tice, 2020,68(1):18-28. https://doi.org/10.1016/j.diabres.2004.07.023

[14] Gow Megan L, van Doorn Nancy, Broderick Carolyn R, etal Sustained Improvements in Fitness and Exercise Tolerancein Obese Adolescents after a 12 Week Exercise Intervention. Obesity Research & Clinical Practice, 2019, 10(2):178-188. https://doi.org/10.1016/j.orcp. 2015.04.001