ORIGINAL RESEARCH

Analysis of Current Situation Regarding Scientific Fitness Literacy of Nurses in Sports Medicine Integration

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Objective: The present study aims to analyze the current situation of scientific fitness literacy in nurses and provide a basis for all-round strategies for its improvement.

Methods: Nurses in tertiary hospitals were conveniently selected as subjects in order to investigate the current situation regarding the scientific fitness literacy of nurses. The selection process was completed via the demographics questionnaire and the adult scale of scientific fitness literacy in sports medicine integration. As the minimum sample size was 5–10 times the number of variables in the study of exploring influencing factors of related variables and using the equation N =[numberofvariables×(5 − 10)]×`1 + 10%], given 20% of invalid questionnaires, the sample size should be >600 persons. The methods used for statistical analysis were descriptive statistical analysis and the *t*-test.

Results: The scientific fitness literacy score in nurses was 110.81 ± 25.04 (relative value: 69.7%); this consisted of 50.85 ± 11.19 (73.7%) for scientific fitness knowledge dimension, 25.99 ± 5.35 (78.8%) for scientific fitness attitude dimension, and 33.97 ± 13.59 (59.6%) for scientific fitness behavior and skill dimension. The results of the independent sample *t*-test and analysis of variance showed that the differences in gender, education level, position, exercise habits, and balanced diet in daily life among nurses (regarding scientific fitness literacy) were statistically significant ($P < 0.05$).

Conclusion: Nurses generally have an above-average level of scientific fitness literacy; this is mainly due to their good cognition and attitude regarding scientific fitness. However, their scientific fitness behaviors and skills are greatly inadequate. They are especially weak in completing WHO's recommended amount of exercise, mastering the cores of sports skills, undergoing a professional assessment before exercise, and developing exercise plans.

Keywords: sports medicine, nurses, scientific fitness, literacy, situation

Introduction

With the rapid development of the social and economic level, continuous improvement of material conditions, and constant acceleration of population aging, chronic diseases act as diseases of long duration and high mortality and have an increasing yearly incidence.[1] Chronic diseases have become the top killer threatening human health; they are responsible for 86.6% of total deaths and cause 70% of the total economic burden of disease.[2] Furthermore, chronic diseases gradually tend to occur in younger people,[3] with an incidence reaching 30.78% among adults aged 20–35 years.[4] Hence, chronic diseases are a major public health problem affecting social and economic development, for example, they cause high medical burden, and affect many people's health. CPC (Communist Party of China) Central Committee and the State Council issued an Outline of the "Healthy China 2030" plan in 2016.[5] The plan sets forth the goal of greatly improving the national health literacy and popularizing healthy lifestyles across the board.

Sports medicine integration emphasizes the promotion and maintenance of health through scientific fitness. Scientific fitness literacy represents a person's comprehensive ability of scientific fitness. The adult scale of scientific fitness literacy in sports medicine integration, which was developed by the research group in the preliminary stage, was used in the present study. The scale

included 53 items in 3 dimensions: scientific fitness knowledge, scientific fitness attitude, and scientific fitness behaviors and skills. The score of each item ranged from 0 to 3 using the 4-point Likert scale, and the overall scale score ranged from 0 to 159; the higher the score, the higher the individual scientific fitness literacy. Experts in the frontier field of sports medicine integration in China were consulted during the compilation of the scale. The scale covered all aspects of scientific fitness literacy in adults in the current context of sports medicine integration. The S-CVI/Ave of the scale was 0.981 and the I-CVI was 0.833–1.000. The Cronbach's α coefficient of the whole scale was 0.964, and the Cronbach's α coefficient of each dimension was between 0.911 and 0.956, suggesting that the scale had a good validity. The test-retest reliability of the whole scale was 0.871, and the test-retest reliability of each dimension was 0.740–0.815, suggesting that the scale had a good reliability.[6] High scientific fitness literacy helps individuals complete safe, effective, and sustainable exercise and eventually achieve the goal of maintaining and promoting health.[6] Hence, the scientific fitness literacy level in nurses is vital for the promotion of health through exercise, and research on the scientific fitness literacy of nurses is of great significance.

On the one hand, it is helpful to maintain and promote the health of nurses. Nursing work is characterized by a high intensity, work overload, and strong pressure. Professional activities lead to frequent occurrence of chronic diseases in nurses, and the fight against the COVID-19 epidemic has further increased nurses' workload. In short, continuous, high-intensity, and high-risk nursing causes nurses to suffer from great physical and mental pressure, leading to a worsening in their health condition. Many studies have also indicated that (1) pain in the neck, shoulders, low back, and back and (2) osteoporosis, hyperlipidemia, and other conditions frequently occur in nurses.[7–9] Studies have shown that scientific exercise can be a therapy and a supportive therapy for 26 chronic diseases as well as a means of primary prevention for 35 diseases.[9] Therefore, improving nurses' scientific fitness literacy is beneficial to maintaining and promoting their health.

On the other hand, the relevant research provides scientific fitness guidance for patients to promote their health. The work output of nurses directly associated with the level of clinical nursing services and safety of patients, along with the level of scientific fitness literacy of nurses, influences the nursing effect of the scientific fitness guidance for patients.[10] The Chinese Academy of Engineering carried out a national survey of nurses in the consulting project of medicine sports integration (2018–2020). The survey shows that nurses generally believe exercise rehabilitation is important for patients' prognosis, and they are unable to provide more scientific and normative exercise guidance for patients due to lack of knowledge and skills regarding scientific exercise; hence, patients do not benefit from exercise. China has entered an aging society, and chronic diseases have become an important public health issue among Chinese residents. Thus, nurse-led exercise rehabilitation guidance is required socially. This creates a need for nurses to have a certain level of scientific fitness literacy and thus provide scientific exercise rehabilitation guidance for different service objects.

In the preliminary stage, using an expert interview and using the Delphi method, the present research group constructed an "evaluation index system of scientific fitness literacy of adults in sports medicine integration".[11] An "adult evaluation scale of scientific fitness literacy in sports medicine integration" was compiled based on the system and books on scientific fitness, including *ACSM's Guidelines for Exercise Testing and Prescription* and *Scientific Guide to National Fitness*. The scale followed the scale compilation principles.[11]

The scale was tested for reliability and validity. It reflects the consensus of experts in the frontier field of sports medicine integration in China; its contents cover (1) all aspects of adult scientific fitness literacy in the current context of sports medicine integration and (2) scientific fitness knowledge, attitude, behavior, and skills that ensure exercise is safe, effective, and sustainable for health purposes. As there's not so much research of scientific fitness literacy in nurses, this study will investigate the scientific fitness literacy of nurses using the evaluation tool developed by the research group in the preliminary stage. The present study aims to (1) investigate the current situation regarding the scientific fitness literacy of nurses in tertiary hospitals and (2) explore the influencing factors.

Subjects and Methods
Subjects

Nurses in tertiary hospitals were conveniently selected as respondents. This study was conducted in accordance with the declaration of Helsinki and approved by the Ethics Committee of Hebei University. Written informed consent was obtained from all participants.

Inclusion and Exclusion Criteria

Inclusion criteria: (1) practicing nurses with a qualification certificate; (2) nurses working in the clinical front line; and (3) nurses who voluntarily participated in the survey.

Exclusion criteria: (1) subjects in an internship and with further study; and (2) subjects absent in hospitals due to maternity leave or departure during the survey.

Sampling Method and Estimation of Sample Size

Papers have shown that the required average sample size of a regional study is ≥500 persons.[12,13] In addition, the minimum sample size is 5–10 times the number of variables in the study of exploring influencing factors of related variables.[14]

$$N = [\text{number of variables} \times (5 - 10)] \times [1 + 10\%]$$

Given 20% of invalid questionnaires, the sample size should be >600 persons.

Research Tools
Demographics Questionnaire

The demographics questionnaire included the subject age, gender, education level, place of residence, marital status, BMI (kg/m^2), length of service, position, total monthly household income, smoking and drinking habits in daily life, exercise habits in daily life, balanced diet in daily life, and used modes of transportation.

Data Collection

Convenience sampling was used to select the subjects. The specific steps were performed as follows: contacting the relevant responsible persons in tertiary hospitals in Baoding by convenient means; forwarding the link with the electronic questionnaire to nurses in these hospitals via WeChat after obtaining the consent of the responsible persons; and distributing and collecting the electronic questionnaires.

Quality control: (1) In the preliminary stage of the study, the authors read an extensive number of papers, repeatedly consulted with the supervisor and members of the research group to determine the study tools and inclusion/exclusion criteria, and carried out a pre-experiment to ensure the quality of the formal study. Before forwarding the link with the formal electronic questionnaires, the authors communicated on details with the head of the nursing department of each hospital. The head was required to forward the link to the head nurse, who forwarded it to eligible nurses in the department to ensure that investigation samples met the inclusion/exclusion criteria of the study. (2) The electronic questionnaire designed by the Wenjuanxing platform was used and distributed via WeChat. The questionnaire could be completed once from each IP address in order to ensure the sample representativeness and authenticity. Each question was set to be required to ensure that respondents would not miss any question and the questionnaire was completed soundly. Anonymous form was used. After the head nurse sent the link, each nurse was required to complete the questionnaire within 20 minutes after opening the link.[15] (3) After data collection, the questionnaires were checked twice to remove disqualified questionnaires, such as those completed in <3 minutes or those with regular answers, in order to ensure the validity of questionnaires. Data were directly input after the removal of invalid questionnaires.

Statistical Analysis

(1) Statistical description and statistical inference were performed using the SPSS 22.0 software. The level of the two-sided test was used, and a P value of <0.05 was considered statistically significant.

(2) Descriptive statistics were carried out. The scores of scientific fitness literacy of the subjects were expressed with mean ± standard deviation and relative value (actual score/maximum). Demographics were expressed with frequency and percentage.

Results
Demographics of Nurses

A total of 2566 questionnaires were collected for the present study. Via checking by Juan Liu, Yan Wang and Xin-Yu Liu, 166 questionnaires were removed, including those completed in <180 seconds and those with obviously regular answer

options (eg, continuous answers of 1, 1 and 1; and 0, 0 and 0). As a result, 2400 valid questionnaires were collected. The average age of nurses in this study was 32.98 ± 7.03 years, and the average length of service was 11.42 ± 7.86 years. Other data and characteristics are detailed in Table 1.

Current Situation of Scientific Fitness Literacy of Nurses

The average score of scientific fitness literacy among nurses in this survey was 110.81 ± 25.04, with a relative value of 69.7%. The scores of scientific fitness knowledge, attitude, and behaviors and skills, and the scores of the top 10 and bottom 10 items are shown in Tables 2 and 3, respectively. The top 5 and bottom 5 items in the dimensions of scientific fitness knowledge, attitude, and behaviors and skills are presented in Tables 4–6, respectively.

Table 1 Demographics (n=2400)

Item		n	Percentage (%)
Age (year)	≤35	1589	66.2
	>35	811	33.8
Gender	Male	178	7.4
	Female	2222	92.6
Education level	Technical secondary school	15	0.6
	Junior college	272	11.3
	Bachelor's degree	2086	86.9
	Master's and higher degree	27	1.1
Marital status	Unmarried	612	25.5
	Married	1774	73.9
	Others	14	0.6
BMI (kg/m²)	<18.5	157	6.5
	18.5–23.9	1422	59.3
	24–27.9	611	25.5
	≥28	210	8.8
Length of service (year)	<10	157	6.5
	(10~20)	1422	59.3
	(20~30)	611	25.5
	>30	210	8.8
Position	Nurse	1457	60.7
	Primary nurse	538	22.4
	Backbone nurse	203	8.5
	Head nurse	175	7.3
	Head nurse of department	22	0.9
	Director of nursing department (including deputy director)	5	0.2
Total monthly household income (Yuan)	<5000	438	18.2
	(5000~10,000)	1495	62.3
	>10,000	467	19.5
Do you smoke in daily life	Yes	41	1.7
	No	2359	98.3
Do you drink in daily life	Yes	145	6.0
	No	2255	94.0
Do you have a balanced diet in daily life	Yes	1251	52.1
	No	1149	47.9
Do you keep exercise in daily life	Yes	717	29.9
	No	1683	70.1

(Continued)

Table 1 (Continued).

Item		n	Percentage (%)
Mode of transportation	Walking	330	13.8
	Cycling	893	37.2
	Taking public transport	267	11.1
	Driving private car	560	23.3
	Others	350	14.6

Table 2 Current Situation of Scientific Fitness Literacy of Nurses

	Minimun-Maximum Score (Mean±SD)	Average Score	Relative Value
Scientific fitness knowledge dimension	0–69 (50.85±11.19)	2.21±0.49	73.7%
Scientific fitness attitude dimension	0–33 (25.99±5.35)	2.36±0.49	78.8%
Scientific fitness behavior and skill dimension	0–57 (33.97±13.59)	1.79±0.71	59.6%
Total score of scientific fitness literacy	22–159 (110.81±25.04)	2.10±0.47	69.7%

Table 3 Top 10 and Bottom 10 Items in Scientific Fitness Literacy Scores of Nurses

	Item Ranking	Average Score	Relative Value
Top 10 items			
I think that health includes physical, mental and moral health, and good social adaptation, not only absence of diseases.	1	2.52±0.55	84.0%
Exercise is necessary for health maintenance and promotion	2	2.50±0.57	83.3%
I hope to overcome my inertia and keep exercise	3	2.46±0.55	82.0%
I should stop exercising immediately when precardiac discomfort, dizziness, shortness of breath and other discomfort occur during exercising	4	2.46±0.57	82.0%
I should wear comfortable shoes and clothes when exercising	5	2.45±0.58	81.7%
I should suspend the original exercise plan when discomfort occurs	6	2.43±0.59	81.0%
I should not take high-intensity exercise on an empty or full stomach	7	2.43±0.58	81.0%
I should not take strenuous exercise before sleeping	8	2.42±0.59	80.7%
I hope to exercise under the guidance of professionals	9	2.41±0.56	80.3%
Inadequate exercise will increase the risk of heart disease, stroke, diabetes, tumor, osteoporosis, anxiety, depression and other diseases	10	2.41±0.59	80.3%
Bottom 10 items			
I do resistance exercise at least 2–3 days a week	1	1.53±0.91	51.0%
I do aerobic exercise at least 3–5 days a week	2	1.61±0.91	53.7%
I do 30–60 minutes of moderate-intensity aerobic exercise or 20–60 minutes of high-intensity aerobic exercise, or an equivalent amount of moderate- and high-intensity aerobic exercise on a cumulative basis every day	3	1.62±0.91	54.0%
I master the essentials of main resistance exercise of upper limbs, lower limbs and core muscles	4	1.70±0.85	56.7%
I ask a professional to make an exercise plan according to my conditions before exercise	5	1.70±0.89	56.7%
I ask professionals to carry out medical evaluation and physical fitness evaluation before exercise	6	1.71±0.89	57.0%
I master the essentials of at least two balance exercises	7	1.71±0.85	57.0%
I master the essentials of flexibility exercise (namely stretching) of neck, shoulder, trunk, limbs and other parts	8	1.73±0.84	57.7%
I do aerobic, resistance, flexibility (stretching) and balance exercises weekly	9	1.76±0.87	58.7%
I master the technical essentials of at least two aerobic exercises	10	1.78±0.83	59.3%

Table 4 Top 5 and Bottom 5 Items in Scientific Fitness Knowledge Dimension Scores of Nurses

	Item Ranking	Average Score	Relative Value
Top 5 items			
I should stop exercising immediately when precardiac discomfort, dizziness, shortness of breath and other discomfort occur during exercising	1	2.46±0.57	82.0%
I should wear comfortable shoes and clothes when exercising	2	2.45±0.58	81.7%
I should not take high-intensity exercise on an empty or full stomach	3	2.43±0.58	81.0%
I should suspend the original exercise plan when discomfort occurs	4	2.43±0.59	81.0%
I should not take strenuous exercise before sleeping	5	2.42±0.59	80.7%
Bottom 5 items			
Comprehensive medical evaluation and physical fitness evaluation are required before exercise	1	1.91±0.73	63.7%
I can identify common basic exercise types, such as aerobic, resistance, flexibility (stretching) and balance exercises	2	1.92±0.71	64.0%
Various types of exercises, such as aerobic, resistance, flexibility (stretching) and balance exercises, should be properly arranged in the exercise plan	3	2±0.66	66.7%
The type of exercise should be chosen based on the purpose	4	2.04±0.66	68.0%
Proper exercise intensity, time and frequency should be ensured to maintain or promote health	5	2.09±0.64	69.7%

Table 5 Top 5 and Bottom 5 Items in Scientific Fitness Attitude Dimension Scores of Nurses

	Item Ranking	Average Score	Relative Value
Top 5 items			
I think that health includes physical, mental and moral health, and good social adaptation, not only absence of diseases.	1	2.52±0.55	84.0%
Exercise is necessary for health maintenance and promotion	2	2.5±0.56	83.3%
I hope to overcome my inertia and keep exercise	3	2.46±0.55	80.0%
Inadequate exercise will increase the risk of heart disease, stroke, diabetes, tumor, osteoporosis, anxiety, depression and other diseases	4	2.41±0.59	80.3%
I hope to exercise under the guidance of professionals	5	2.41±0.56	80.3%
Bottom 5 items			
I like exercising	1	2.18±0.66	72.7%
I meet many friends during exercise, making me happy	2	2.21±0.65	73.7%
I actively do exercise	3	2.23±0.61	74.3%
I feel good after exercise	4	2.31±0.61	77.0%
I hope to learn some knowledge and skills of scientific exercise	5	2.37±0.57	79%

Univariate Analysis of General Data on Scientific Fitness Literacy in Nurses

The results of the independent sample *t*-test and analysis of variance showed that there were differences in gender, education level, position, exercise habits, and balanced diet in daily life among the nurses ($P < 0.05$). Male nurses had higher scores of scientific fitness literacy than female nurses (116.79±26.28 vs 110.33±24.88, P=0.001), and nurses with exercise habits (106.82±24.77 vs 120.19±23.09, P<0.001), and a balanced diet in daily life (104.42±25.05 vs 116.69±23.55, P<0.001), had a higher score than others. Regarding the education level, differences were seen between specialized nurses and undergraduate nurses as well as between specialized nurses and nurses with a master's degree and above (P<0.001). The scores of the scientific fitness literacy were higher in specialized nurses than in undergraduate nurses and nurses with master's degree and above (P<0.001). Regarding the work position, differences were seen between nurses and primary nurses as well as between nurses and head nurses (P<0.001). The scores of the scientific fitness literacy of nurses were higher than those of primary nurses and head nurses (P<0.001). The details are shown in Table 7.

Table 6 Top 5 and Bottom 5 Items in Scientific Fitness Behavior and Skill Dimension Scores of Nurses

	Item Ranking	Average Score	Relative Value
Top 5 items			
I always warm up before each exercise	1	1.98±0.75	66.0%
I judge the intensity through heart rate, breathing and exertion during exercise	2	1.95±0.74	65.0%
I do cooling-down and relaxation exercises after exercise	3	1.94±0.77	64.7%
I generally achieve moderate or higher relative exercise intensity during each aerobic exercise (I have sweating and increased heart rate and breathing, and am not out of breath)	4	1.91±0.78	63.7%
I adjust my exercise plan properly according to the feeling after exercise	5	1.9±0.77	63.3%
Bottom 5 items			
I do resistance exercise at least 2–3 days a week	1	1.53±0.91	50.0%
I do aerobic exercise at least 3–5 days a week	2	1.61±0.91	53.7%
I do 30–60 minutes of moderate-intensity aerobic exercise or 20–60 minutes of high-intensity aerobic exercise, or an equivalent amount of moderate- and high-intensity aerobic exercise on a cumulative basis every day	3	1.62±0.91	54.0%
I master the essentials of main resistance exercise of upper limbs, lower limbs and core muscles	4	1.7±0.85	56.7%
I ask a professional to make an exercise plan according to my conditions before exercise	5	1.7±0.90	56.7%

Table 7 Univariate Analysis of Scientific Fitness Literacy of Nurses

Item	Category	Score of Scientific Fitness Literacy	t/F	P
Age (year)	≤35	111.36±25.44	1.522[a]	0.134
	>35	109.74±24.21		
Gender	Male	116.79±26.28	3.315[a]	0.001
	Female	110.33±24.88		
Length of service (year)	<10	111.62±25.47	2.463[b]	0.086
	(10~20)	109.21±25.25		
	(20~30)	111.63±21.57		
Marital status	Unmarried	112.53±24.63	1.999[b]	0.136
	Married	110.25±25.09		
	Others	107.64±33.47		
Education level	Technical secondary school	113±27.05	12.498[b]	0.000
	Junior college	119.14±24.81		
	Bachelor's degree	109.83±24.87		
	Master's and higher degree	101.78±23.42		
Position	Nurse	112.79±25.82	5.581[b]	0.001
	Primary nurse	107.71±24.77		
	Backbone nurse	108.87±24.14		
	Head nurse	106.26±18.70		
	Head nurse of department	111.41±21.38		
	Director of nursing department (including deputy director)	106±7.84		
BMI	<18.5	113.57±25.61	0.926[b]	0.427
	18.5–23.9	110.88±25.04		
	24–27.9	110.45±25.06		
	≥28	109.33±24.56		
Total monthly household income	<5000	112.10±25.97	2.200[b]	0.111
	(5000~10,000)	109.98±24.63		
	>10,000	112.27±25.37		

(Continued)

Table 7 (Continued).

Item	Category	Score of Scientific Fitness Literacy	t/F	P
Mode of transportation	Walking	109.98±24.23	2.224[b]	0.064
	Cycling	111.19±25.23		
	Taking public transport	110.41±24.37		
	Driving private car	112.75±25.83		
	Others	107.85±24.35		
Do you drink in daily life	Yes	110.57±24.51	0.120[a]	0.905
	No	110.83±25.08		
Do you keep exercise in daily life	Yes	106.82±24.77	12.352[a]	0.000
	No	120.19±23.09		
Do you have a balanced diet in daily life	Yes	104.42±25.05	12.362[a]	0.000
	No	116.69±23.55		

Notes: [a]*t*-test; [b]*F* test.

Discussion

In this study, we found that the differences in gender, education level, position, exercise habits, and balanced diet in daily life among nurses (regarding scientific fitness literacy) could cause significant differences in scientific fitness literacy score ($P < 0.05$).

The survey results suggested that the scientific fitness literacy of nurses is generally above-average, which is mainly ascribed to good scientific fitness knowledge (relative value: 73.7%) and positive scientific fitness attitude (78.8%). However, scientific fitness behaviors and skills (59.6%) were inadequate, and the bottom 10 items fell into the behavior and skill dimension. It was found by analysis of reasons that in some cases, scientific fitness knowledge and positive scientific fitness attitude in nurses were associated with health-related professional education.

During medical student training, nurse students have specialized advantages in addition to physical education courses and can gain knowledge on exercise rehabilitation from specialized courses, such as Medical Nursing and Surgical Nursing.[16] The role of the exercise and the relevant requirements are emphasized in the prevention, treatment, and rehabilitation of many diseases;[17–19] this is helpful for nurses to increase their cognition and attitude regarding scientific fitness during professional training. Calonge-Pascual et al[20] found that it was very different among universities that acquired knowledge could be scarce for physical activity improvement in primary healthcare staff. Nurses need more physical activity on prescription training to improve physical activity and exercise prescription knowledge.

As health professionals, nurses believe that the concept of "Exercise is Doctor/Medicine" is highly accepted in their hospitals (80.8% of respondents answered "Yes"). Their hospitals not only encourage medical workers to provide exercise rehabilitation guidance or exercise prescription for patients (83.3%/74.8%), but train medical workers in scientific fitness knowledge (71.7%) and carry out a scientific fitness campaign (78.5%). Up to 67.3% of respondents state that their hospitals invite professional scientific fitness instructors to guide them. These organizational environmental factors are helpful for nurses to improve scientific fitness knowledge, establish the concept and attitude that scientific fitness is beneficial to health promotion, disease treatment, and rehabilitation, and have high awareness of the need for attention in exercise to ensure safety.

However, the survey shows that there is still great inadequacy in scientific fitness behaviors and the skills of nurses and the relative value of the dimension is 59.6%. The bottom 10 items fall into the behavior and skill dimension. The type, time, and frequency and intensity standard of weekly exercise have the lowest scores (relative value: 51.0–54.0%), suggesting that nurses mostly fail to complete WHO's recommended amount of exercise. The mastery of essentials of several types of exercise also had a lower score (56.7–59.3%). Most nurses did not have a professional assessment or make an exercise plan before exercise (56.7% and 57.0%). This reveals that as nurses generally know and recognize the role and requirements of exercise; however, they fail to put them into action due to various reasons.

This survey indicates that although nurses have knowledge of scientific fitness and a correct attitude toward scientific fitness, there are certain deficiencies present. Scientific fitness behaviors and skills are developed by repeated practicing with a positive fitness attitude and related knowledge.

On the one hand, there is a lack of guidance from professional fitness instructors and relevant scientific fitness culture and promotion. On the other hand, due to limited human resources of nurses and the busy and intense clinical nursing work in China, most nurses do not have enough energy to learn exercise skills and do not develop the habit of scientific fitness,[21–26] resulting in a failure to achieve the recommended state of exercise. This is detrimental to nurses when trying to achieve health through scientific fitness and causes an inability to give exercise guidance to service objects in a sufficiently scientific and effective manner due to a lack of scientific fitness skills.

The results of this study show that male nurses have a higher level of scientific fitness literacy than female nurses; this is consistent with the results described in the study.[27] Generally, men have a higher capacity and enthusiasm for exercise than women, including exercise frequency, time, and intensity.[28] In addition, studies have demonstrated that men have a better attitude toward exercise and fitness than women,[29] helping them master knowledge and skills of scientific fitness and carry out fitness behaviors.

Daily lifestyle also influences the level of scientific fitness literacy. A high health literacy and scientific fitness are important to a healthy lifestyle, suggesting that a healthy lifestyle is related to scientific fitness literacy. The scores of scientific fitness literacy of specialized nurses were higher than those of undergraduate nurses and nurses with a master's degree and above, indicating that the education level is negatively correlated with scientific fitness literacy to a certain extent. This is in contrast with the results specified in the study.[30] In general, the higher the education level, the wider the channels of access to scientific fitness and other health-related knowledge are, and the better the attitude is. Thus, a higher level of scientific fitness literacy may be presented. This is in contrast with the results of the present study, and consistent with the results of the studies on physical activities of different populations conducted by Su et al,[31] Luo et al,[32] and Liu Min et al,[33] which may be related to the nurse occupation through analysis. Undergraduate and graduate nurses need to invest energy in scientific research and teaching in addition to clinical tasks in order to spend less time on exercise. According to the analysis of items of influencing factors, "lack of time" is an important factor influencing the implementation of scientific fitness behavior. It was also found that the scores of scientific fitness literacy of nurses were higher than those of primary nurses and head nurses. This suggests that the work position is negatively correlated with scientific fitness literacy to a certain extent; this is similar to the influence of the education level. Due to having a higher position than other nurses, primary nurses and head nurses undertake more clinical responsibilities and management tasks and bear greater pressure, making it difficult to ensure enough fitness time. Hence, nurses at high positions have a low level of scientific fitness literacy.

Conclusion

Nurses generally have an above-average level of scientific fitness literacy; this is mainly due to their good cognition of and attitude toward scientific fitness. However, their scientific fitness behaviors and skills are greatly inadequate. They are especially weak in completing the amount of exercise recommended by WHO, mastering the cores of sports skills, conducting a professional assessment before exercise, and developing exercise plans.

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Disclosure

The authors declare there is no conflict of interest in this work.

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