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A MIXED-METHODS STUDY ON THE INFLUENCE OF PHYSICAL ACTIVITY PARTICIPATION ON HEALTH PERCEPTION AMONG CHINESE OLDER ADULTS

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Abstract: This study employs a mixed-methods approach, integrating both qualitative and quantitative research designs, to investigate the influence of physical activity participation on health perception among older adults in China. The qualitative component utilizes grounded theory, drawing upon online textual data related to 'exercise and health in later life'. Through three stages of coding—open, axial, and selective—four primary categories were extracted, namely scientific exercise, physical condition, economic factors, and personal preferences. These were further abstracted into three overarching dimensions: psychological health, physiological status, and social context. Based on this process, a theoretical framework was developed to illustrate the relationship between exercise participation and health perception among elderly individuals. The quantitative component employed a structured survey with 129 Chinese older adults aged 60 years and above. Physical activity participation, social support, and health perception were measured using the PARS-3 scale, the Perceived Social Support Scale (PSSS), and a health perception scale, respectively. Findings revealed a positive correlation between the degree of exercise participation and health perception, while social support emerged as a critical mediating variable in this relationship. By adopting a mixed-methods design, this research provides a more comprehensive understanding of the complex interplay between exercise engagement, social support, and health perception among Chinese elderly populations. The results not only contribute theoretical insights to gerontology, kinesiology, and health psychology, but also offer empirical evidence for promoting active aging and enhancing public health strategies for older adults in China.
Keywords: Older adults; Physical activity participation; Health perception; Social support; Mixed-methods research

1 INTRODUCTION

With the accelerating process of population aging in China, the health and well-being of older adults have become a pressing social concern. As of 2023, the number of Chinese citizens aged 60 and above has reached approximately 297 million, accounting for more than one-fifth of the total population. This demographic shift is accompanied by a significant increase in physical, psychological, and social challenges faced by the elderly. Consequently, the Chinese government has placed growing emphasis on health promotion, elderly care, and psychological intervention policies in recent years.

Physical activity participation has long been recognized as a crucial determinant of both physical and psychological health among older adults. Regular engagement in exercise not only improves physical functions such as cardiovascular fitness, muscular strength, and mobility, but also exerts substantial effects on mental well-being, life satisfaction, and health-related perceptions. Particularly, health perception—defined as an individual's cognitive appraisal, attitudes, and behavioral tendencies regarding personal health—plays a pivotal role in shaping health behavior and quality of life in later years.

Although numerous studies have demonstrated that exercise enhances physical fitness and subjective well-being among older adults, relatively few have systematically explored the mechanisms through which exercise participation influences health perception. In addition, social support, a multidisciplinary concept spanning sociology, psychology, and public health, is increasingly recognized as a vital factor in the well-being of older adults. Adequate social support not only facilitates greater participation in physical activity but also strengthens individuals' resilience and confidence in maintaining a healthy lifestyle.

Against this backdrop, the present study adopts a mixed-methods research design to comprehensively investigate the influence of exercise participation on health perception among older Chinese adults. By integrating qualitative exploration with quantitative validation, this study aims to uncover not only the direct effects of physical activity but also the mediating role of social support in shaping health-related cognition. The findings are expected to provide both theoretical contributions and practical implications for active aging, community health promotion, and the formulation of eldercare policies in China.

2 RESEARCH METHODOLOGY

2.1 Qualitative Research

The grounded theory method was employed, utilizing NVivo 20 software to perform open, axial, and selective coding on the collected textual data.

2.1.1 Open coding

During the open coding phase, the interview transcripts were analyzed sentence by sentence and word by word. Statements irrelevant to this research were removed, resulting in 10 relevant raw statements. Through the conceptualization of these raw statements, a total of 8 concepts were derived, as shown in the Table 1 below.

Table 1 Results of Open Coding

Concept	Raw Statement
Access to Scientifically-Based Exercise Guidance	Regardless of our age group, moderate exercise is only beneficial, not harmful, to the body. Exercise not only helps delay the decline of physical activity functions in the elderly but also plays a role in preventing and assisting in the treatment of chronic diseases such as hyperlipidemia, hypertension, diabetes, and obesity. However, elderly individuals must not exercise blindly. First, they must follow medical advice, especially those suffering from certain diseases. Second, they should have guidance from professional coaches; exercising alone can easily lead to physical injury. Third, it is essential to have nutritionists provide advice on sports nutrition. Finally, elderly people should exercise within their capabilities, adhering to the principle of "any movement is beneficial, consistency is key, more activity is better, and it should be done in moderation according to one's ability."
Suitable Exercise Programs	For many retired elderly individuals who prioritize health, choosing suitable exercise is very important. For example, walking is particularly suitable for the elderly. It is gentle, not too intense, allows the body to become active, promotes blood circulation, and exercises cardiopulmonary function. Walking daily in a park or residential area and breathing fresh air can also make one feel very relaxed and happy.
	After retiring at 65, Uncle Huang moved back to the countryside for his retirement. Having little to do daily, he developed a passion for exercise. However, Uncle Huang had no previous exercise habits, so he started with walking. After persisting for a while, he increasingly found that while walking seemed effortless for others, it was pure torture for him. After each walk, his legs and feet ached significantly. Over time, Uncle Huang developed a strong aversion to exercise.
Attention to Exercise Intensity	Elderly individuals should choose low to moderate-intensity exercises such as walking, cycling, swimming, practicing Tai Chi, or square dancing. These activities can exercise the body without being too strenuous, thereby reducing the risk of sports injuries. Cycling can exercise leg muscles and joints, preventing arthritis and limb stiffness; swimming can exercise (quán shēn jī ròu - whole body muscles) and enhance cardiopulmonary function; practicing Tai Chi and square dancing can improve internal circulation and alleviate chronic diseases.
Rich Life Experience of the Elderly	The elderly have extensive experience dealing with people, have rich life experiences, and have tasted all the joys and sorrows of life. The most important thing for them is to have a healthy and robust body. Upon entering old age, it is crucial to develop a suitable fitness routine to ensure physical and mental well-being and a peaceful (wǎn nián - late years/old age). Engaging in activities like walking, stretching 筋骨 (jīn gǔ - muscles and bones), doing exercises for the cervical and lumbar spine, or Tai Chi is recommended. If combined with special training methods like sitting quietly, Qigong, or meditation, even better results can be achieved. Long-term persistence and surpassing oneself will undoubtedly lead to unexpectedly excellent outcomes.
Increased Health Awareness After Illness	During the long treatment process, Grandma Bai realized the preciousness of health. She said, "Having lost health, one truly understands its meaning. Being sick also cost so much money; it really wasn't worth it."
High Enthusiasm for Physical Fitness	In recent years, the atmosphere for physical fitness among the elderly has become more vibrant, and their enthusiasm for participating in sports and fitness activities has been increasing. The proportion of elderly people regularly participating in physical exercise is about 60% in urban areas and 40% in rural areas. Various sports fitness competitions, exchanges, and training activities for the elderly have become (cháng tài huà - normalized/regular). People who lack exercise and suffer severe muscle loss live like flickering candles, with a low quality of life. Elderly people who can persist in exercise and maintain muscle mass are like light bulbs, shining continuously – going out is just a momentary thing. So, in a sense, I persist in exercise perhaps to die "quickly" when I am old.
Economic Considerations of Exercise (Cost-Effectiveness)	Cost-saving daily exercises. When grocery shopping and carrying bags, switch hands periodically (to train arm strength). While watching TV, raise heels (to prevent calf cramps) and rub hands and face (to promote blood circulation). When strolling, walk backward (to protect the lower back, but find a flat and deserted place to do so).
Personal Exercise Preferences	Those with a strong foundation and good athletic ability can participate in sports like table tennis, badminton, basketball, or shuttlecock kicking. These activities can be chosen based on personal preference and athletic capability, but they involve relatively higher exercise intensity, so one must act according to their ability. Elderly people engaging in these sports should pay extra attention to warming up. If there is pain in the knees or back, it is advisable to avoid such strenuous activities.

2.1.2 Axial coding

The axial coding phase involved further analysis and repeated consideration of the relationships between the concepts derived from open coding, thereby establishing categories for concepts with relevant relationships. By integrating and refining more abstract and general categories, the empirical materials were connected in a clearer and more systematic manner. Therefore, this study, based on the raw statements and concepts, conducted an in-depth analysis and discernment to identify categories highly relevant to the research, ultimately summarizing and generalizing to derive 4 categories (Table 2).

Table 2 Results of Axial Coding

Category	Concepts
Scientific Exercise Practice	Access to Scientifically-Based Exercise Guidance
	Suitable Exercise Programs
	Attention to Exercise Intensity
Physical Condition	Increased Health Awareness After Illness
Economic Considerations	Economic Considerations of Exercise (Cost-Effectiveness)
Personal Inclination	High Enthusiasm for Physical Fitness
	Personal Exercise Preferences

2.1.3 Selective coding

Selective coding involves extracting core categories from the established categories for in-depth analysis, as shown in the Table 3 below.

Table 3 Results of Selective Coding

Core Category	Category	Relationship Structure
Psychological Health Status	Personal Inclination	Psychological health status encompasses personal inclination.
Physiological Status	Physical Condition	Physiological status can reflect physical condition.
Social Status	Economic Considerations	Social status encompasses personal economic situation and whether one receives scientifically guided intervention from social forces.
	Scientific Exercise Practice	

2.2 Quantitative Research

Exercise Participation Level was measured using the Physical Activity Rating Scale-3 (PARS-3), revised by Liang Deqing et al. from the Wuhan Institute of Physical Education. This scale primarily assesses exercise participation level from three dimensions: intensity, time, and frequency of physical activity. The scale has been tested and demonstrates good reliability and validity. It consists of 3 items, each with 5 questions representing 5 levels of exercise participation. The scoring methods are as follows: exercise intensity scores 1–5 points, exercise time scores 1–5 points, and exercise frequency scores 0–4 points. The scale defines exercise volume = intensity × (time - 1) × frequency. The maximum score for exercise volume is 100 points, and the minimum is 0 points. The criteria for exercise volume are: low volume ≤ 19 points; medium volume = 20–42 points; high volume ≥ 43 points. Confirmatory Factor Analysis (CFA) was conducted using AMOS 24, revealing $\chi^2/df = 2.762$, RMSEA = 0.117, GFI = 0.986, indicating good structural validity of the scale.

Social Support was measured using the Perceived Social Support Scale (PSSS). The PSSS was originally compiled by Blumenthal et al. in 1987 and later translated and revised into Chinese by Jiang Qianjin. The scale consists of 12 items, measuring support from three dimensions: family support, friend support, and support from other significant people. Items 3, 4, 8, and 11 pertain to family support; items 6, 7, 9, and 12 pertain to friend support; the remaining items pertain to support from others. The scale comprises 12 self-report items using a five-point Likert scale. The total perceived social support score is the sum of all item scores, providing an overall measure of an individual's perceived social support. CFA using AMOS 24 showed $\chi^2/df = 1.198$, RMSEA = 0.039, GFI = 0.926, CFI = 0.994, NFI = 0.963, TLI = 0.992, indicating that the revised scale has good structural validity. The Average Variance Extracted (AVE) for family support was 0.654 (Composite Reliability, CR = 0.833), for friend support AVE = 0.731 (CR = 0.916), and for other support AVE = 0.746 (CR = 0.921), demonstrating good convergent validity for the scale.

Health Consciousness was assessed using the Health Consciousness Scale compiled by Zhang Jin in 2011. After several years of testing and use, this scale employs a five-point Likert scale. It consists of 15 items divided into three dimensions: items 1-7 measure Health Intention, items 8-10 measure Health Vigilance, and items 11-15 measure Health Participation. CFA using AMOS 24 showed $\chi^2/df = 0.964$, RMSEA = 0, GFI = 0.922, CFI = 1, NFI = 0.957, TLI = 1.002, indicating good structural validity of the revised scale. The AVE for Health Intention was 0.728 (CR = 0.950), for Health Vigilance AVE = 0.766 (CR = 0.907), and for Health Participation AVE = 0.636 (CR = 0.897), indicating good convergent validity for the scale.

3 RESEARCH RESULTS

3.1 Qualitative Research Results

Through grounded theory coding, the study found that the influencing factors of exercise participation among the elderly primarily focus on four aspects:

- Scientific Exercise Practice: Emphasizes professional guidance, suitable exercise types, and appropriate intensity.
- Physical Condition: Increased value placed on health post-illness or during recovery.
- Economic Considerations: The cost-effectiveness and convenience of exercise methods.
- Personal Inclination: Interest in sports and enthusiasm for fitness.

These were further abstracted into three core categories: Psychological Health Status, Physiological Status, and Social Status, constructing a relational framework between elderly exercise participation and health consciousness.

3.2 Quantitative Research Results

Correlation Analysis Pearson correlation analysis was conducted. The results are presented in Table 4 below.

Table 4 Correlation Analysis of Dimensions of Exercise Participation, Social Support, and Health Consciousness

	Family Support	Friend Support	Other Support	Health Intention	Health Vigilance	Health Participation	Exercise Intensity	Exercise Time	Exercise Frequency
Family Support	1								
Friend Support	.922**	1							
Other Support	.893**	.933**	1						
Health Intention	.920**	.945**	.935**	1					
Health Vigilance	.899**	.927**	.918**	.919**	1				
Health Participation	.899**	.926**	.910**	.919**	.880**	1			
Exercise Intensity	0.057	0.081	0.091	0.076	0.091	0.074	1		
Exercise Time	-0.13	-0.09	-0.059	-0.082	-0.053	-0.097	-0.068	1	
Exercise Frequency	0.042	0.001	0.003	0.021	0.024	-0.064	0.008	0.13	1

Note: **p < 0.01

4 DISCUSSION

This study provides important insights into the complex relationship between physical activity, social support, and health perception among older adults in China. The qualitative findings revealed that older adults' exercise behaviors are influenced by multiple dimensions, including physiological conditions, psychological well-being, economic resources, and personal motivations. These results align with prior studies suggesting that exercise participation in later life is not solely determined by health status but is also shaped by socioeconomic and cultural contexts.

Quantitative analyses confirmed that exercise participation significantly predicts health perception. This suggests that active engagement in physical activity helps older adults cultivate a more positive view of their health, which in turn may influence health behaviors and quality of life. Furthermore, the mediating role of social support underscores the importance of family, friends, and community networks in facilitating both exercise participation and health-related cognition.

From a theoretical perspective, this study contributes to gerontology, kinesiology, and health psychology by integrating exercise behavior, social support, and health perception into a unified framework. Practically, the findings highlight the necessity of designing community-based programs that not only encourage physical activity but also strengthen social support structures for older adults.

This mixed-methods study elucidates a critical mechanism: sports participation among the elderly does not directly translate into enhanced health consciousness; rather, it heavily relies on the social support system as a mediating conduit. This finding indicates that the traditional model of merely “promoting more exercise” has limited efficacy. Instead, it is imperative to construct an ecosystem with social support at its core, enabling the synergistic development of all three elements. The developmental pathways and corresponding countermeasures are proposed as follows:

This pathway clearly illustrates the progression from “spontaneous individual participation” to “supported social system,” with social support acting as the bridge connecting “sports participation” and “health consciousness.”

I. Analysis of Developmental Pathways Initial Stage: Spontaneity and Perception (Individual-Driven)

Pathway Description: Older adults initiate physical activity based on personal interest (personal inclination), post-illness recovery needs (physical condition), or economic convenience (economic considerations). Their health consciousness stems from vague personal sensations and fragmented experiences. Exercise behavior is characterized by significant blindnes and instability, making it susceptible to discontinuation due to setbacks (e.g., sports injuries, lack of perceived [xiàoguǒ - effect]).

Typical Manifestations: As seen in the qualitative study, "Uncle Huang" engaged in walking independently, which led to pain and eventual abandonment of the activity. Or, "Grandma Bai" possessed only an abstract concept of health's value post-illness without a practical path to achieve it.

Intermediate Stage: Guidance and Reinforcement (Social Support Intervention)

Pathway Description: Support begins to be provided by family, friends, the community, and even professional institutions. The high correlations found in the quantitative research (near 0.9 for family and friend support with health intention, vigilance, and participation) underscore the criticality of this stage. Social support transforms individual spontaneous behavior into guided, sustainable activity.

Mechanisms of Action:

Family Support: Encouragement and accompaniment from children for exercise, provision of material(bǎozhàng - guarantee/support) (purchasing equipment, covering fitness costs), and fostering a family health atmosphere.

Peer Support: Invitations from friends and colleagues, role modeling, and group activities (e.g., square dance groups, walking clubs) fulfill belongingness needs and make exercise more enjoyable.

Community Support: Providing accessible, low-cost facilities (community gyms, park equipment) and organizing regular activities (Tai Chi classes, health lectures) creates a supportive physical and social environment.

Advanced Stage: Internalization and Conscientization (System Synergy)

Pathway Description: Under sustained social support and personal practice, scientific health consciousness (health intention, vigilance, participation) becomes truly internalized as a personal value and daily lifestyle. At this stage, older adults not only participate in sports consciously and scientifically but can also become disseminators of knowledge and organizers of activities, thereby replenishing the social support network.

Typical Manifestations: Older adults no longer require external prompting. They can choose "suitable exercise programs" and monitor "exercise intensity" based on their own condition (scientific exercise practice), discern the veracity of health information (health vigilance), and proactively integrate nutrition, physical examinations, and other elements into health management (health participation), ultimately forming stable health behavior patterns.

Comprehensive Countermeasures and Suggestions Based on the pathways outlined above, strategies should shift from simply encouraging "more exercise" to systematically building a "support network," promoting the evolution of elderly participation from the initial to the advanced stage.

Strengthen the Micro-System: Emotional and Behavioral Support Centered on Family and Peers

Implement "Family Health Promotion Plans": Encourage children and parents to jointly develop exercise plans, engage in family outdoor activities during holidays, and make health a common family goal and topic.

Cultivate "Elderly Fitness Leaders": Identify and train influential and enthusiastic older adults within communities, providing them with basic training to empower them to motivate and organize their peers, creating a "snowball effect."

Establish Peer Support Groups: Encourage the formation of interest-based exercise groups (e.g., cycling teams, swimming groups), utilizing tools like WeChat groups to strengthen connections and form mutual supervision and encouragement mechanisms.

Optimize the Meso-System: Organizational and Platform Support Centered on Communities and Institutions

Promote the Integration of Sports and Health Services ("Ti-Wei Ronghe") at the Community Level: Integrate resources from community health service centers and community fitness centers. Establish an "exercise prescription" system where doctors prescribe based on health assessments, and community fitness instructors guide execution, forming a closed loop of "screening-assessment-prescription-guidance-feedback."

Institute a "Community Fitness Instructor" System: Place professional, resident sports instructors in every community responsible for daily teaching, activity organization, safety supervision, and nutritional advice (addressing the needs for "professional coach guidance" and "nutritionist advice" identified in the qualitative study), thereby translating scientific exercise into practice.

Develop and Promote "Economical" Fitness Programs: Systematically compile and promote low-cost, easy-to-integrate daily fitness methods (addressing "economic considerations"), such as those identified in the study (e.g., "switching hands when carrying groceries," "raising heels while watching TV"), through video tutorials, pamphlets, etc.

Improve the Macro-System: Policy and Cultural Support Centered on Government and Society

Formulate Preferential Policies: Incorporate per-capita sports funding for the elderly into government budgets and encourage social capital investment in the silver fitness industry. Provide subsidies (e.g., "sports vouchers") for older adults to purchase sports and fitness services, alleviating economic burdens.

Enhance the Precision of Health Knowledge Dissemination: Utilize media channels preferred by the elderly (e.g., TV health programs, WeChat public accounts) for professionals to disseminate easily understandable, anti-"pseudoscience" health information, improving their "health vigilance" and "health participation" capabilities.

Foster a Societal Atmosphere of Active Aging: Through media campaigns, awards, and recognition, change the stereotype that "elderly exercise is just square dancing," showcase diverse, high-quality sports participation in later life, role model positive examples, and inspire greater participation enthusiasm among the elderly population.

5 CONCLUSION

This mixed-methods study demonstrates that physical activity participation exerts a positive influence on health perception among older Chinese adults, with social support playing a critical mediating role[1-3]. The integration of qualitative and quantitative findings provides a holistic perspective on the issue, showing that exercise, when combined with supportive social environments, significantly enhances older adults' awareness, confidence, and positive attitudes toward health[4].
These results carry practical implications for policymakers, healthcare professionals, and community organizations. Efforts to promote active aging should prioritize not only exercise interventions but also the creation of supportive social networks that empower older adults to sustain healthy lifestyles. Future research could further examine longitudinal effects of exercise participation and explore cross-cultural comparisons to broaden the understanding of health perception in aging populations[5-8].

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

AUTHOR CONTRIBUTIONS

Yi Cheng: Conceptualization, Methodology, Formal Analysis, Investigation, Writing – Original Draft.Data Curation, Validation, Writing – Review & Editing.Supervision, Project Administration, Resources.

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