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The Development of Adult Piano Teaching from the Perspective of Health Promotion

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Abstract

With the advancement of lifelong learning and national health promotion concepts, demand for adult piano learning continues to grow. However, most existing adult piano instruction emphasizes skill training and inadequately integrates health-promotion goals. Relevant studies tend to focus merely on single health dimensions, lacking systematic teaching plans that integrate the three-dimensional health of physical, psychological, and social adaptation, as well as corresponding empirical examinations. This study aims to investigate adult piano learners' health-related needs, develop a three-dimensional health-oriented teaching plan, and empirically examine its intervention effectiveness. Stratified sampling recruited 220 adults for needs assessment. A standardized teaching plan was formulated following content validity testing by three experts via the Index of Item-Objective Congruence (IOC). Thirty adults then completed a 5-week single-group pretest-posttest intervention; paired-samples t-tests were used for quantitative analysis. The results showed that participants' overall piano skills increased by an average of 11.30 points ($t=29.20$, $df=29$, $p<0.001$, Cohen's $d=5.330$, 95% CI=[10.51,12.09]), and their overall health improved by an average of 6.29 points ($t=21.81$, $df=29$, $p<0.001$, Cohen's $d=3.981$, 95% CI=[5.18,7.40]), indicating significant intervention effects. The teaching plan simultaneously enhances adults' piano skills and three-dimensional health. This research constructs a practical paradigm for health-integrated adult piano teaching to fill the literature gap of integrated health-oriented teaching models. It provides implementable practical solutions and empirical references for community-based adult music education and national health promotion initiatives, and carries important practical implications for improving the adult health-oriented aesthetic education system.

Keywords: health promotion, adult piano teaching, constructivism, andragogy, music pedagogy, teaching plan design, mixed methods research, teaching intervention, one-group pretest-posttest quasi-experiment

1. Introduction

1.1 Background and Objectives

Global music education is undergoing a multi-dimensional transformation characterized by technological empowerment, health orientation, and lifelong learning as well as cultural diversity. The disciplinary boundaries of traditional music education have been continuously broken down, and music education is gradually shifting from a single model of skill instruction to a paradigm centered on holistic human development (Marín-Suelves et al., 2022; Crawford, 2013; Zhang, 2025). As an essential branch of music education, adult piano education carries dual values of artistic inheritance and health promotion (Song, 2026). Adult learners generally possess self-directed learning awareness and clear learning demands. Their learning motivations are no longer limited to technical improvement, but extend to diverse goals such as aesthetic pleasure, physical and mental relaxation, and stress relief (Fan, 2005). Accordingly, adult piano teaching must move beyond the traditional skill-centric model, prioritize practical teaching content and immersive experiential learning, and organically integrate technical training with physical and mental health improvement. As defined in the World Health Organization's Constitution of 1948, health encompasses three interrelated dimensions: physical well-being, psychological well-being, and social adaptation (Li, 2008). Essentially, health refers to an individual's

capacity for self-adaptation and self-management in physical functioning, mental status, social interaction, and public participation when confronted with environmental challenges, enabling a harmonious state between individuals and their surroundings (Li, 2008). Drawing on this framework, the present study subdivides health into three domains: physical health (physical functioning, daily mobility, and fine motor capacity), mental health (emotional regulation and cognitive performance), and social adaptive health (social role functioning, interpersonal communication, and access to social support) (Xia et al., 2017).

A wealth of domestic and international research has verified the health-promoting effects of adult piano learning. Physiologically, consistent piano practice remodels neural pathways (Zhang & Li, 2019; Gaser & Schlaug, 2003), enhances auditory discrimination, and improves executive function and working memory among older adults (Bugos et al., 2007). It also optimizes blood circulation and muscular coordination while lowering the risk of musculoskeletal disorders (Li et al., 2024). Psychologically, piano training regulates emotional states (Blood & Zatorre, 2001), boosts cognitive flexibility and self-efficacy (Jiang, 2012; Chen et al., 2021; Jiang, 2018), and effectively alleviates negative affective states (Seinfeld et al., 2013; Wattanasoei et al., 2017; Zhai, 2022; Zhang, 2016; Zhao, 2021). In terms of social adaptation, group piano performances and community recitals facilitate interpersonal communication and strengthen individuals' social identity and sense of belonging (Coffman & Adamek, 2001; Dabback, 2008; Tu et al., 2021). Existing studies have verified that piano learning exerts positive effects on adults' health. Nevertheless, multiple deficiencies remain. Traditional piano teaching centers on technical training while neglecting the integration of health promotion concepts. To date, academia has not established an integrated adult piano teaching model that incorporates three-dimensional health objectives, complete teaching procedures, and multi-dimensional comprehensive evaluation systems. Mature, implementable practical teaching plans and corresponding empirical evidence are also lacking. Against this backdrop, the present study takes this research gap as its core entry point to develop a dedicated teaching plan and verify its intervention effects through empirical trials.

Against the above research background and practical demands, this study develops and empirically tests a health-oriented adult piano teaching plan. The research objectives are as follows: (a) To investigate the current situation of adult piano teaching and learners' health demands in community schools of Shizhong District, Leshan City; (b) To develop a teaching plan that improves learners' piano skills and promotes their health; (c) To verify the practical effects of the proposed teaching plan. This study realizes the in-depth integration of piano skill cultivation and health promotion, fills the research gaps regarding the three-dimensional health-promoting effects in adult piano teaching, provides a practical paradigm for the transformation of adult piano education from skill-oriented to health-oriented, and also offers empirical evidence for the development of adult music education.

1.2 Concept Definition

Global music education: In this study, global music education refers to the general transformation trends of music education in terms of objectives, contents, methods, and evaluation from a global comparative perspective, including technology empowerment, health orientation, lifelong learning, and cultural diversity. It does not represent a unified curriculum system implemented by a specific country or international organization. This concept provides the study's macro background and problem context, explaining the international development trend of adult piano education shifting from skill-oriented to health-integrated education.

Aesthetic education: Based on contemporary research, aesthetic education is defined as an educational practice centered on aesthetic experience, artistic perception, emotional expression, and personality development, enhancing individuals' sensitivity, expressiveness, creativity, and sense of life meaning through artistic activities (Du, 2023). In this study, aesthetic education is not limited to the narrow teaching of aesthetic knowledge or instrumental performance skills. Instead, it is defined as health-integrated aesthetic education, which promotes learners' aesthetic pleasure as well as their physical, psychological, and social adaptive health through adult piano learning. This definition is inherently consistent with the teaching goal of integrating piano skill training with health promotion adopted in this study.

Community-based adult music education: It refers to non-degree, non-vocational, and lifelong music education activities for adults carried out in grassroots public venues such as community schools and community cultural centers, with music learning, practical performance, and social interaction as core carriers (Song & Ma, 2008). In this study, this concept is specifically operationalized as the adult piano courses offered by community schools in Shizhong District, Leshan City. It serves as the practical site for the needs assessment and teaching intervention of this study, as well as a practical carrier connecting piano skill learning, health promotion, and community participation.

2. Method

2.1 Research Design

This study constructs its overall framework based on the research and development (R&D) approach (Kusumarasdyati, 2019) and adopts a mixed methods research that combines quantitative and qualitative research. It consists of two implementation phases to achieve three research objectives.

The first phase focuses on needs analysis and teaching-plan development. The core task of this phase is to conduct preliminary needs analysis and systematically construct the intervention teaching plan. Through semi-structured in-depth expert interviews and structured questionnaires, this study investigates the current status and learning needs of piano-learning adults as well as relevant experts in piano education. Drawing on quantitative questionnaire data and qualitative interview findings, a health-promotion-oriented teaching plan for adult piano learning is developed.

The second phase covers teaching-intervention implementation and comprehensive effect evaluation. A one-group pretest-posttest quasi-experimental design is employed for the empirical teaching examination. Quantitative measurements of participants' piano skills and health status are administered before and after the teaching intervention. Meanwhile, supplementary qualitative data are collected through whole-process classroom observation records and post-intervention semi-structured student interviews to triangulate quantitative results. The practical intervention effects of the proposed teaching plan are evaluated from multiple perspectives. The research framework is shown in Figure 1.

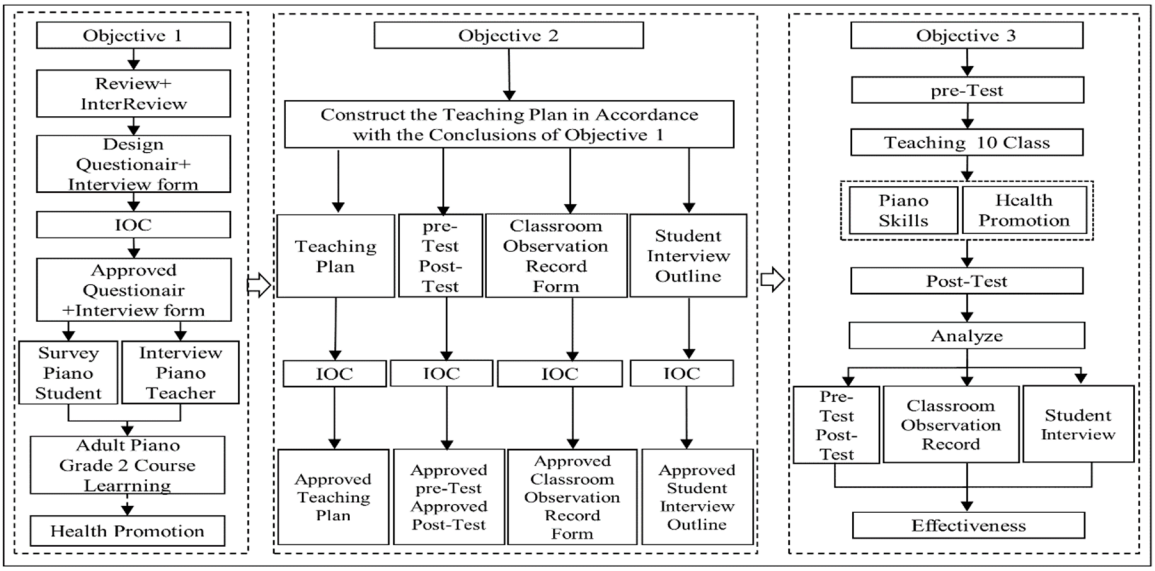


Figure 1. Research Framework

2.2 Research Setting

The research survey and intervention site of this study is Shizhong District Community School of Leshan. As a government-sponsored inclusive public-welfare educational institution, it undertakes non-formal education, community services, and cultural development for residents and forms an important part of the regional lifelong-learning system. The school offers training programs in sports, painting, music, dance, and other fields, with well-developed resources and professional faculty for its piano courses. Three rationales support the selection of this site: participants show great variations in age, occupation, prior piano proficiency, learning interest, and physical condition, which facilitates sample diversity; experienced teachers and a reasonable student-teacher ratio enable classroom observation, data collection, and teaching intervention, and instruction covering multiple proficiency levels yields abundant practical cases; stable venues and supporting resources support the implementation and effectiveness evaluation of the health-promotion-oriented adult piano teaching plan. The target population consists of all registered adult piano learners at the school, with a total population size of $N = 510$.

2.3 Research Participants

Four groups of participants were included in this study: 220 participants for needs-assessment questionnaires, 5

piano-education experts, 30 participants for teaching-intervention experiments, and 6 participants for student semi-structured interviews. The first stage focused on the development of the teaching plan. Questionnaires were distributed to 220 adult piano learners, and 5 piano-education experts were invited for consultation and evaluation. Information obtained from questionnaires and expert consultation laid an empirical foundation for developing the teaching plan. The demographic characteristics of the 220 questionnaire sample were as follows: 168 female participants (76.36 %) and 52 male participants (23.64 %). In terms of age distribution, 79 respondents (35.90 %) were aged 55-59 years, 116 respondents (52.73 %) were aged 60-65 years, and 25 respondents (11.36 %) were aged 66 years and above. The overall sample was predominantly aged between 55 and 65 years. The second stage was the teaching-intervention experimental phase. Thirty adult piano learners were recruited as the experimental group to test the effectiveness of the health-promotion-oriented adult piano teaching plan. Demographic profiles of the 30 experimental participants were: 27 females (90%) and 3 males (10%); all participants were aged 60-65 years; 28 participants held a bachelor's degree (93.33%), and 2 had a high-school education (6.67%). Upon completion of the 5-week teaching intervention, six participants were randomly selected from the 30 experimental subjects for semi-structured interviews to collect qualitative data for cross-validating quantitative results. The interview participants followed the same inclusion and exclusion criteria as questionnaire respondents, and verbal informed consent was obtained prior to each interview.

Unified inclusion criteria: Participants shall be registered adult piano learners at Shizhong District Community School of Leshan; participants shall reach Level 1 piano proficiency assessed by course instructors, and possess basic knowledge and playing skills required for Level 2 coursework. Exclusion criteria: Participants with severe hearing or visual impairments that prevent normal piano learning; participants with severe cognitive impairment who cannot comprehend or follow teaching instructions; participants suffering from diseases severely affecting upper-limb and finger mobility, such as acute rheumatoid arthritis and advanced Parkinson's disease.

2.4 Sample-size Determination and Sampling Procedures

a) Needs-assessment questionnaire sample ($n = 220$): Given a 95% confidence level ($Z = 1.96$), an expected proportion ($p = 0.5$), and a margin of error ($E = 0.05$), the uncorrected minimum sample size calculated by the simple random-sampling formula was 385. Given the finite population ($N = 510$) and a sampling fraction exceeding 5%, the finite-population correction formula was applied. The corrected value was 219.37, rounded upward to set the minimum questionnaire sample size at 220. A mixed-sampling strategy combining purposive sampling and stratified proportional random sampling was adopted. First, all 510 learners were preliminarily screened based on admission records and instructor evaluations to identify eligible participants via purposive sampling. Stratified proportional random sampling was then conducted among qualified subjects. Primary stratification variable: piano proficiency level (just reaching Level 1, consolidated Level 1, slightly above Level 1). Secondary stratification variables: gender and age group. A total of 220 participants were finally recruited. Research purposes were fully explained, and written informed consent was acquired before questionnaire administration.

b) Expert sample ($n = 5$): Purposive sampling was adopted for expert recruitment. Experts and senior practitioners with solid theoretical knowledge in piano education and rich practical experience in health promotion were selected to guarantee the professional quality of expert consultation.

c) Teaching-intervention experimental sample ($n = 30$): Thirty participants were recruited from the 220 questionnaire respondents through stratified convenience sampling. Eligible participants were required to complete the full 5-week intervention and guarantee daily minimum piano-practice time. Participants were stratified by piano proficiency: Level A (well-established proficiency) and Level B (satisfactory baseline proficiency). Priority was given to Level-B participants, and 30 experimental-group participants were finally determined. Research purposes were fully explained and informed consent was obtained prior to intervention implementation.

d) Student semi-structured interview sample ($n = 6$): Following completion of the teaching intervention, six participants were randomly selected from the 30 experimental subjects for semi-structured interviews. These interviews served as supplementary qualitative verification to interpret quantitative outcomes rather than independent theory-building research. Qualitative research suggests that 5-8 interviewees for intervention-focused interviews can achieve preliminary information saturation. Considering the total size of the experimental group and research workload, six interviewees were selected to capture learners' subjective learning experiences, enable cross-validation with quantitative data, and satisfy the qualitative-analysis requirements of this study.

2.5 Research Instruments

Seven types of research instruments were adopted in this study:

a) Expert interview outline: Used to collect piano-education experts' viewpoints, practical experience, and optimization suggestions regarding adult piano teaching.

b) Questionnaire: A 4-point Likert-scale questionnaire was employed to investigate learners' current piano proficiency, as well as the effects and existing problems of current piano teaching in promoting three-dimensional health covering physical health, mental health, and social adaptation.

c) Teaching plan: Developed based on status quo and needs-analysis findings. Its theoretical framework was constructed drawing on constructivism (Fan, 2022), multiple-intelligence theory (Gardner & Moran, 2006), adult-education theory (Knowles, 1978), along with the pedagogies of Jaques-Dalcroze (1967), Kodály (Kissné Mogyorósi, 2023), and Orff-Schulwerk (Chen, 2025). The plan sets objectives for piano-skill development and three-dimensional health cultivation, and is divided into 10 teaching themes. Each theme lasts 90 minutes, yielding a total instructional duration of 15 hours.

d) Piano-skill rating scale: Composed of five evaluation dimensions, each scored out of 20 points. This scale quantifies the magnitude of improvement in learners' piano-skill performance.

e) Self-Rated Health Measurement Scale: Adapted from the Self-Rated Health Measurement Scale Version 1.0 (SRHMS V1.0) developed by Xu et al. (2000, 2002). Items closely relevant to the present study's objectives and the health-promoting effects of piano teaching were retained. The modified scale contains 21 items grouped into three subscales: physical health (7 items), mental health (6 items), and social adaptive health (8 items). The physical subscale assesses somatic symptoms, organ function, and activity capacity; the mental subscale measures positive affect, negative affect, and cognitive function; the social subscale evaluates role adaptation, social connection, and social support.

f) Classroom-observation record form: Designed to document students' in-class skill performance, playing states, health awareness, emotions, and social-adaptation conditions throughout teaching sessions.

g) Student interview outline: Used to gather learners' real-world course experiences, feedback on skill-related and health-related improvements, and suggestions for course revision.

Three experts in the field of music education were invited to conduct an IOC assessment for the above-mentioned research instruments to guarantee their validity. IOC scoring rules: Each item of every research instrument was rated on a 3-point scale, where 1 = fully consistent, 0 = questionable, and −1 = inconsistent. The item-level IOC score was calculated as the total score given by experts divided by the number of participating experts. The overall IOC score was obtained by dividing the sum of all item-level IOC scores by the total number of items. The research instruments yielded favorable overall IOC scores. The expert interview outline reached 0.866, the questionnaire reached 0.929, the teaching plan reached 0.967, the piano-skill rating scale reached 1.000, the classroom-observation record form reached 0.900, and the student interview outline reached 0.933. All research instruments exhibited satisfactory content validity and were suitable for the requirements of this study. For the Self-Rated Health Measurement Scale, the overall Cronbach's α coefficient was 0.946. Subscale Cronbach's α values were 0.901 for physical health, 0.889 for mental health, and 0.899 for social adaptive health. The scale demonstrated acceptable stability and internal consistency and was appropriate for the measurement objectives of the present study.

2.6 Development of the Teaching Plan

Researchers developed an adult piano teaching plan oriented toward physiological-psychological-social three-dimensional health promotion based on findings from status-quo investigations and needs analyses. The plan includes ten teaching themes that cover fundamental performance skills (e.g., scales, chords, and arpeggios), alongside core content such as polyphonic works and complete Chinese and foreign musical pieces. Each theme's lesson plan is structured around five key components: teaching objectives, prior knowledge, teaching procedures, class summary, and teaching reflection. Teaching objectives are further divided into piano-skill objectives and three-dimensional health-promotion objectives (physical health, mental health, and social-adaptive health). A standard 90-minute session for each theme follows a standardized five-segment procedure: course introduction, theoretical instruction, analysis of health-adapted score design, in-class practical activities, and teacher evaluation and feedback.

During the course-introduction segment, rather than focusing solely on transmitting musical knowledge, instructors establish connections between music and health in light of learners' physical and psychological characteristics. Real-world cases, short-video clips, and life-relevant metaphors are used to illustrate how piano practice facilitates physical activity, cognitive activation, emotion regulation, and social participation, thereby introducing core health-related concepts. The theoretical-instruction segment integrates both music-theoretical knowledge and

health-promotion principles. As musical concepts including rhythm, scales, chords, modes, and polyphony are explained, their corresponding physiological, psychological, and social health mechanisms are elaborated concurrently. Illustrative associations include chord colour and emotional release, scale practice and fine-motor conditioning of hand musculature, and ensemble participation and the development of collaborative competence.

Analysis of health-adapted score design represents the core innovation of this programme. Age-friendly, health-centered modifications are applied to original musical scores: physical movements such as hand-raising, head-nodding, body swaying, and deep-breathing are embedded within musical phrasing to engage the cervical, shoulder, and lumbar spine. For chord transitions and scale passages, explicit performance guidelines for relaxed wrists and shoulders are provided to mitigate risks of tenosynovitis and joint stiffness. Grounded in multi-sensory design principles, visual colour-coded cards, vocal singing, and rhythmic bodily movement are integrated with musical notation to reduce cognitive load among older-adult learners.

In-class practical activities adopt a stratified multi-sensory training model with three practice modalities: keyboard-free tactile training, instrumental practice, and collaborative group work. Practice tasks are designed at two difficulty tiers: basic and advanced. A wide array of group-based activities — including role-rotating ensemble performance, percussion accompaniment, and collective singing — are incorporated to integrate individual skill acquisition with group-level social interaction.

Teacher-led evaluation and feedback move beyond a binary correct-incorrect performance standard and implement a dual-dimensional assessment framework encompassing both skill-related and health-related outcomes. Within the skill dimension, evaluators focus on performance fluency. For the health dimension, observers assess learners' physical relaxation (hand posture, shoulder and neck tension), affective expressions, and degree of engagement in group-based activities, followed by tailored health guidance. Positive reinforcement strategies, such as ensemble showcases, group applause, and recognition via creative cards, are implemented. Each session concludes with a summary that recaps key musical takeaways and associated health benefits. Homework assignments combine piano performance practice with physical exercise, extending the piano-health intervention from classroom settings to home-based out-of-class contexts.

The overall average IOC value of the teaching plan was 0.967. This value indicates that the plan is methodologically rigorous, demonstrates strong alignment between instructional content and research objectives, and is appropriate for use in teaching experiments.

Table 1. Teaching Topics and Health Connotations

Num	Teaching themes	Health connotations
1	Body Movement and Multisensory Integration	Integrate rhythmic perception and physical movement to strengthen multisensory coordination and response
2	Finger Activation and Basic Scale Training	Take scale practice as a carrier to improve finger dexterity and joint control
3	Études and Chord Construction Cognition	Combine chord learning and rhythm training to consolidate music theory foundation and performing techniques
4	Traditional Songs Melody and Emotional Expression	Adopt pentatonic folk music materials to cultivate emotional expression competence
5	Polyphonic Co-operation and Social Connection	Conduct two-part duet training to boost active listening and collaborative awareness
6	World Masterpieces and Life Narrative Therapy	Appreciate and perform classic musical pieces to relieve negative emotions and evoke positive memories
7	Improvisational Accompaniment and Self-Efficacy	Develop the ability of simple accompaniment arrangement to enhance independent expression and sense of achievement
8	Self-Accompanied Singing and Stress Management	Integrate singing-playing skills and breathing exercises to build pathways for stress relief
9	Collaborative Piano and Social Collaboration	Adopt piano four-hands performance to deepen teamwork and interpersonal trust
10	Practical Training of Stage Performance and Internalization of Health Outcomes	Deliver stage performances to consolidate learning outcomes and strengthen health literacy and sense of social belonging

This teaching plan served as the intervention protocol for the experimental group in the present study. Detailed intervention implementation protocols and participant compliance-monitoring procedures are described in Section 2.7, Experimental Intervention. Table 1 presents each teaching theme together with its corresponding health-cultivation connotations.

2.7 Experimental Intervention

The experimental group of this study consisted of 30 adult piano learners. The teaching plan developed in Section 2.6 was adopted for the teaching intervention implemented at Shizhong District Community School of Leshan. The intervention lasted for five weeks, with two offline sessions per week. Each session lasted 90 minutes and covered one teaching theme. Throughout the intervention, full-process management was implemented, covering pre-class, in-class, and post-class stages. Before each session, physical condition was confirmed for all participants. Teaching aids including pianos, color charts, rhythm percussion instruments, and tactile massage balls were available in class. Classroom observation and video recording were adopted to document participants' emotional states and group interactions during sessions. After class, participants were required to complete 60 minutes of independent piano practice every day, either in the free piano classrooms of Shizhong District Community School of Leshan or at home. To ensure participants' practice compliance and preserve research validity, a dual-monitoring mechanism was established. First, participants completed paper-based practice logs daily to truthfully record their practice duration, practice content, and physical and mental experiences. These logs were collected and reviewed by the instructor at weekly offline classes. Second, participants' actual playing proficiency was randomly spot-checked in class and cross-checked against entries in the practice logs. One-on-one reminders were provided to participants who failed to satisfy practice requirements for three consecutive days. All practice logs were fully archived as supporting evidence of participants' intervention compliance. The entire intervention was delivered by a single instructor in strict accordance with the developed teaching plan. Only one experimental group was designed in this study, with no control group set up for comparison.

2.8 Data Analysis

Mixed qualitative and quantitative analytical approaches were adopted to process all collected research data. Qualitative data derived from semi-structured interviews and classroom observation records were coded and interpreted through qualitative content analysis and thematic analysis. Descriptive statistics were applied to quantitative questionnaire data to clarify the current status and demand of adult piano teaching. Paired-samples t-tests were performed on pretest and posttest data using SPSS (Version 29.0.2.0) to compare the total scores and dimensional subscores of participants' piano skills and health status, thereby examining the intervention effectiveness of the teaching plan. The statistical significance level was set at $p < 0.05$.

3. Results

3.1 Results of Current Status Investigation and Learning Needs Analysis

A total of 220 online questionnaires were distributed in this study, with 220 questionnaires returned and 220 valid responses included in the final analysis, yielding an effective response rate of 100%.

3.1.1 Current Status of Respondents' Piano Skills

The questionnaire assessed participants' piano skills across six dimensions. Table 2 displays the survey results of respondents' current piano skills.

Table 2. Current Status of Respondents' Piano Skills

Item	Mean	SD
Completeness of the piano piece performance?	2.06	0.77
How accurate are the notes when performing a piano piece?	1.97	0.79
How is the accuracy of rhythm when performing a piano piece?	2.01	0.83
How is the fluency of the execution speed of the piece when performing a piano piece?	1.95	0.84
How is the ability to grasp the performance style of the piece when performing a piano piece?	2.04	0.79
How is the musical expressiveness of the piece when performing a piano piece?	2.02	0.79
Overall average	2.01	0.80

As shown in Table 2, respondents' overall piano proficiency was at a moderate level (M = 2.01, SD = 0.80). Their self-evaluation scores were tightly distributed without obvious polarization. Among all dimensions, "completeness of musical performance" obtained the highest score (M = 2.06, SD = 0.77), while "fluency of playing tempo" had the lowest score (M = 1.95, SD = 0.84), representing the most prominent weakness of the group. This indicated that most participants suffered from incoherent rhythm and insufficient fluency during performance. All six skill dimensions were rated moderately, revealing weak overall playing foundations with balanced development and no dominant strength. Note reading accuracy and tempo fluency stood out as the two greatest difficulties for adult learners. Therefore, the proposed teaching plan highlights targeted training on note recognition and smooth performance to address these two core deficiencies, while maintaining balanced improvement of other piano skills.

3.1.2 Respondents' Evaluation of the Health Promotion Effects of Current Adult Piano Teaching

Questionnaires were adopted to explore participants' subjective perceptions of the health benefits brought by existing piano courses. The actual health effects and learning demands in physical, mental, and social adaptive dimensions were analyzed, and the relevant evaluation results are presented in Table 3.

Table 3. Respondents' Evaluation of the Health Promotion Effects of Piano Teaching

Health dimension	Mean	SD
Physical Health	3.16	0.530
Mental health	3.14	0.459
Social Adaptation Health	3.16	0.412
Overall average	3.15	0.467

As shown in Table 3, the overall mean score was 3.15 (SD=0.467), with the mean value of each dimension ranging from 3.14 to 3.16, all rated as "Good". It can be concluded that the existing adult piano teaching delivers steady health-promoting effects. Participants generally recognized the positive value of piano courses in physical, mental, and social adaptive health, which verifies the overall effectiveness of the current teaching model in health improvement. Specific dimensional findings are as follows: Physically, regular practice significantly improves limb flexibility, yet exerts limited effects on boosting stamina and physical endurance for moderate-intensity activities. Mentally, piano learning effectively relieves negative emotions and provides emotional comfort, whereas practicing complex musical scores generates weak improvements in learners' problem-solving abilities. Socially, piano study facilitates interpersonal communication, but learners lack a strong sense of belonging when participating in group activities.

3.1.3 Results of Expert Interviews

In-depth interviews were conducted with five piano education specialists to provide professional support for the design and implementation of the health-oriented adult piano teaching plan. All interviewed experts reached a consensus: adult piano courses serve as an excellent carrier for health intervention. Instead of merely focusing on technical drills, curriculum reform should take health promotion as a core educational objective, integrate physical, mental, and social health cultivation into the whole teaching design, and naturally embed physical relaxation training, emotion regulation, and social interaction into skill practice sessions. Diversified classroom forms, including warm-up relaxation, musical improvisation, group ensemble, and thematic salons, can make health guidance a core classroom module rather than an extra supplementary task. Meanwhile, supporting mechanisms such as teaching material renewal, teachers' competency upgrading, multi-dimensional assessment, learning community construction, and digital teaching tool application can simultaneously improve adult learners' piano performance proficiency and physical and mental well-being. The qualitative interview results are consistent with the foregoing quantitative survey data, further proving the practical necessity of developing an integrated piano teaching plan that combines skill training with health promotion.

3.2 Results of the Teaching Experiment

Participants' piano skills and health status were measured before and upon the completion of the teaching intervention. Paired-samples t-tests were conducted to compare pretest and posttest scores, and the statistical results are presented in Table 4 and Table 5.

Table 4. Results of Paired-sample T-tests on Participants' Pre-test and Post-test Scores of Piano Skills

Evaluation content	Pre-test Mean	Post-test Mean	Mean Difference	*SD*	*t*	*p*	*Cohen's d (ES)*	95% CI
Completeness of Piano Piece Performance	13.13	15.67	2.53	1.14	12.21	<.001	2.219	[2.10, 2.96]
Accuracy of Sheet Music Reading	14.00	16.07	2.07	0.69	16.37	<.001	3.000	[1.81, 2.33]
Fluency of Piano Piece Performance	13.33	15.73	2.40	1.13	11.61	<.001	2.124	[1.98, 2.82]
Mastery of Piano Piece Performance Style	13.53	15.60	2.07	0.91	12.48	<.001	2.275	[1.73, 2.41]
Musical Expressiveness of Piano Piece	13.40	15.63	2.23	0.90	13.63	<.001	2.478	[1.89, 2.57]
Total score	67.40	78.70	11.30	2.12	29.20	<.001	5.330	[10.51, 12.09]

Results of paired-samples t-tests in Table 4 revealed that following the health-promotion-oriented adult piano teaching intervention, participants achieved significantly higher scores in the completeness of piano performance, sight-reading accuracy, performance fluency, mastery of performance style, musical expressiveness, and overall piano skills than before the intervention ($p < 0.001$). The lower bounds of the 95% confidence intervals for the mean differences of all indicators exceeded zero, and *Cohen's d* values for all dimensions were greater than 0.8. These findings verified that the teaching plan comprehensively improves adults' piano performance ability with a large intervention effect, and the most prominent improvement was observed in sight-reading accuracy.

Table 5. Results of Paired-sample T-tests on Participants' Pre-test and Post-test Scores of Health Status

Evaluation Content	Pre-test Mean	Post-test Mean	Mean Difference	*SD*	*t*	*p*	*Cohen's d* (ES)	95% CI
Physical Health	75.05	77.67	2.62	1.80	7.96	<.001	1.456	[1.95, 3.29]
Mental Health	61.21	70.71	9.50	3.37	15.43	<.001	2.819	[8.24, 10.76]
Social Adaptive Health	55.11	61.39	6.28	2.50	13.74	<.001	2.512	[5.35, 7.21]
General Health	64.08	70.37	6.29	1.58	21.81	<.001	2.981	[5.18, 7.40]

Table 5 displays the results of paired-samples t-tests. Following the health-promotion-oriented adult piano teaching intervention, participants' overall average health score increased by 6.29. Scores in physical health, mental health, and social adaptive health were all significantly higher than the pre-intervention baseline, with the improvements reaching an extremely high level of statistical significance ($p < 0.001$). The lower limits of the 95% confidence intervals for the mean differences in all three dimensions were greater than zero, and all *Cohen's d* values exceeded 0.8. These results verified that the teaching intervention significantly improved adults' three-dimensional health status covering physical, mental, and social adaptive well-being, with a large overall intervention effect size. Specifically, the intervention produced the most pronounced improvement effect on the mental health dimension.

One expert in piano education was invited to attend all lessons and observe students' classroom performance alongside the course instructor. Both observers reached identical conclusions: health-oriented adult piano teaching delivers comprehensive and significant improvements in students' playing proficiency and overall health. This integrated plan fosters simultaneous progress in learners' piano skills, physical fitness, mental wellness, and social adaptation, precisely aligning with adults' demands for health promotion. Upon completion of the teaching experiment, semi-structured interviews were carried out with six participants. All interviewees endorsed the curriculum that integrates technical training with health cultivation. They stated that this model consolidates playing foundations, optimises physical conditions, relieves emotional stress, and expands social interactions. It breaks the rigid stereotype of conventional piano tuition and greatly stimulates learning motivation. The qualitative findings derived from classroom observations and learner interviews are highly consistent with the quantitative analytical results, mutually validating the research outcomes.

4. Discussion

This study was designed based on constructivism (Fan, 2022) and andragogy (Knowles, 1978). Classic music pedagogies were systematically integrated into teaching sessions in line with adults' self-directed and problem-centered learning characteristics (Knowles, 1978). The organic integration of music teaching approaches and adult education theories helps simultaneously achieve dual goals: improving piano proficiency and fostering physical and mental well-being.

The study verifies that experiential, interactive, and diversified teaching activities adopted in health-oriented adult piano classes can significantly enhance learners' piano skills and overall health status. This finding supports the core viewpoints of constructivism, andragogy, multiple intelligences theory (Gardner & Moran, 2006), as well as the three renowned music pedagogies proposed by Jaques-Dalcroze (Chen, 2022), Kodály (Kissné Mogyorósi, 2023), and Orff (Chen, 2025).

The conclusion of this study that piano learning promotes multi-dimensional health among adults is generally consistent with existing domestic and international findings, yet it offers supplements and extensions from an intervention perspective. At the physical level, prior studies have mostly focused on neurological and physical functional changes induced by instrumental practice itself (Seither-Preisler, 2023; Zhang, 2016; Seither-Preisler et al., 2023; Worschech et al., 2025). By contrast, this study integrates health-oriented designs such as posture adjustment and physical relaxation into teaching procedures. While delivering skill training, it avoids musculoskeletal risks caused by improper playing and provides practical evidence for physical health promotion within instructional contexts. At the psychological level, existing research has confirmed the emotion-regulating and stress-reducing values of musical activities (Du, 2021; Hays & Minichiello, 2005a; Seinfeld et al., 2013; Song, 2026; Wattanasoei et al., 2017). Nevertheless, most of these studies adopt cross-sectional designs. This quasi-experimental intervention further verifies the psychological benefits of piano classes and adds empirical evidence from intervention research. At the social-adaptation level, previous works largely validate the positive effects of extracurricular orchestras and community performances on social bonding (Chen et al., 2021; Coffman & Adamek, 2001; Dabback, 2008; Hays & Minichiello, 2005a; Hays & Minichiello, 2005b). This study demonstrates that ensemble playing, improvisation, and group collaboration within regular piano classes can also improve adults' social-adaptation competence, which broadens the pathways for achieving social-adaptation health via classroom-based instruction. In summary, this research supports established scholarly consensus and expands the pathways toward three-dimensional health from a teaching-intervention dimension.

There exists a bidirectional facilitative relationship between the advancement of piano skills and the improvement of health. Diversified and experiential classroom formats and activities motivate adult learners and deliver multi-dimensional health interventions with stable and remarkable effects, which align with multiple intelligences theory (Gardner & Moran, 2006).

Obvious individual differences are observed in participants' progress in piano skills and health status, which conform to the theory of individual differences (Ji & Zhang, 2011). Differences in learners' prior piano proficiency, baseline physical and mental health status, and degree of classroom engagement may all constitute potential sources of individual variation in intervention outcomes.

This study adopted a short-term intensive intervention model lasting five weeks with two sessions per week. It fits adults' features of fragmented learning, clear learning objectives, yet fluctuating motivation, enabling learners to rapidly consolidate playing foundations and form healthy practice habits with concentrated intervention effects. Lessons combine skill training with physical and mental relaxation to mitigate learning burnout. Nevertheless, the intensive schedule carries a potential risk of increasing participants' learning burden.

Existing research on health intervention in adult music mostly focuses on verifying partial health benefits of piano performance, lacking a three-dimensional teaching framework covering physical, psychological, and social adaptation (Bugos et al., 2007; Seinfeld et al., 2013). Traditional adult piano teaching prioritizes skill training while ignoring the core goal of health promotion. It lacks systematic curriculum development and empirical verification (Song, 2026), resulting in fragmented curricula and poor operability. Compared with similar studies, this research presents three innovations. First, it constructs an integrated three-dimensional health teaching model incorporating physical, psychological, and social adaptation, advancing research on the mechanism in this field. Second, grounded in constructivism and andragogy, this study integrates three-dimensional health goals with skill training and establishes a practicable standardized teaching and evaluation system to fill the gap of practical models in existing literature. Third, it adopts mixed qualitative and quantitative methods with cross-verification of multi-dimensional data to strengthen the reliability of research conclusions. The health-integrated teaching paradigm established in this

study improves the adult piano aesthetic education system and provides references for health-oriented aesthetic intervention of instrumental music for adults.

5. Conclusion

This study developed an integrated health-promoting piano teaching plan tailored to adults' three-dimensional health needs. Quantitative empirical results verified that this plan could simultaneously and substantially improve adult learners' piano skills as well as their physical, mental, and social adaptive health. The study has two core contributions. First, it produces a fully implementable teaching plan integrated with three-dimensional health promotion, consisting of 10 standardized teaching themes, in-class implementation procedures, and supporting evaluation tools. This teaching plan can be directly applied to community-based adult piano classes, public welfare art programs for national health promotion, and other relevant scenarios. Second, it provides comprehensive quantitative empirical evidence for health-oriented adult piano education and fills the research gap regarding the intervention effects on three-dimensional health outcomes.

Several limitations of the present study should be noted. To begin with, a one-group pretest-posttest quasi-experimental design without a control group was adopted, which failed to rule out confounding variables such as maturation effect, pretest practice effect, and daily health behaviors. Accordingly, the causal inference power was compromised. Secondly, the intervention only lasted for 5 weeks. Such a short-term intervention could only capture immediate improvements, rather than the sustained long-term impacts of the teaching plan on adults' health status and piano performance proficiency. Thirdly, core health indicators were solely collected via self-report scales from participants, which may lead to subjective response bias. No objective physiological indicators (e.g., heart rate and physical function tests) were included for triangulation. In addition, the sample only recruited middle-aged and older adults from Shizhong District, Leshan City, resulting in limited geographic and age coverage and restricting the generalizability of the findings.

Corresponding future research directions are proposed based on the aforementioned limitations: 1)Extend the intervention period and conduct longitudinal follow-up studies to examine the long-term effectiveness of the teaching plan; 2) Add a conventional piano teaching control group and a blank control group, and adopt a randomized controlled trial design to strengthen causal evidence; 3) Expand the sampling scope to recruit adults from diverse cities and age groups for cross-regional and cross-demographic comparative research; 4) Translate the three-dimensional health teaching model to other instrumental courses such as guzheng, vocal music, and guitar, and compare the health-promoting effects across different art forms; 5) Incorporate objective physiological testing equipment to reduce subjective bias derived from self-reported questionnaires.

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Appendix A

Adult Student Questionnaire

Profiles of Adult Respondents

Student ID: _____ Gender: _____Male _____Female Age: _____years old

Table A1. The Current Status of Adult Students' Piano Skills

Dimensions	Item	4	3	2	1
Piano	1. Completeness of the piano piece performance?				
Skills	2. How accurate are the notes when performing a piano piece?				
	3. How is the accuracy of rhythm when performing a piano piece?				
	4. How is the fluency of the execution speed of the piece when performing a piano piece?				
	5. How is the ability to grasp the performance style of the piece when performing a piano piece?				
	6. How is the musical expressiveness of the piece when performing a piano piece?				

Table A2. The Effect of Adult Piano Teaching on Health Promotion

Health dimensions	Item	4	3	2	1
Physical Health	1. Regular piano practice or performance helps me improve my sleep quality (e.g., falling asleep more easily, sleeping more soundly).				
	2. Immersing myself in piano music (practicing or listening to performances) effectively helps me reduce physical fatigue or alleviate mild pain/discomfort in different parts of my body (such as the shoulders, neck, and wrists).				
	3. Piano practice requires control of fine motor skills (such as finger dexterity and hand-eye coordination), which has improved my ability to perform dexterous tasks in daily life (such as writing, using tools, and buttoning buttons).				
	4. After participating in piano activities (practice, lessons, performances), I feel more energetic and less easily fatigued in my daily life (e.g., work, housework).				
	5. Engaging in prolonged piano practice or performance requires and develops the endurance needed to maintain good posture and body stability, which benefits me in other daily activities that require stable sitting or standing postures (e.g., reading, working, queuing).				
	6. Piano activities (especially performances that require expressiveness and physical strength) have enhanced my overall endurance and physical strength during moderate-intensity physical activities (such as walking long distances, doing housework, and light exercise).				
	7. The benefits of learning and playing the piano for my physical health.				
Mental Health	8. Learning new pieces or successfully completing a performance gives me a sense of accomplishment and confidence, making me feel more optimistic about the future.				
	9. Immersing myself in piano music (practicing or playing) brings me joy, peace, or happiness, and increases my satisfaction with my current life experience.				
	10. When I feel tense, anxious, or restless, focusing on playing the piano effectively helps me relax and relieve these negative emotions.				
	11. Piano music (especially playing or listening to favorite pieces) helps me ease my low mood and reduce feelings of loneliness or unexplained fear.				
	12. Practicing or playing the piano requires a high level of concentration (such as reading sheet music, coordinating both hands, and controlling the rhythm), which has trained and improved my ability to focus on tasks in my daily work.				
	13. Learning to understand complex sheet music, solve technical challenges in playing, or express music has enhanced my ability to think critically, analyze problems, and creatively solve issues in my daily life.				
	14. The positive impact of learning and playing the piano on my mental health.				
Social Adaptation Health	15. My experience of learning/practicing/playing the piano has helped me better cope with stress and unpleasant events encountered in life, study, or work.				
	16. Through participating in piano activities (such as practicing, taking lessons, and performing), I have developed a more positive evaluation of my performance and value in related roles (such as learner and performer).				
	17. Learning or playing the piano (e.g., participating in an orchestra, ensemble, concert, or piano community) has provided me with opportunities to meet new friends and form meaningful connections.				
	18. Piano-related peers (e.g., classmates, teachers, orchestra members, audience members) are important people with whom I can share the joy of music or discuss related issues.				
	19. When I encounter difficulties in learning or playing the piano, I feel supported by my piano teacher, classmates, or other members of the piano community, and I can seek help from them.				
	20. Participating in piano-related group activities (such as rehearsals, performances, music salons, and online exchanges) gives me a sense of belonging and strengthens my confidence in seeking and obtaining social support.				
	21. Learning and playing the piano has promoted my social adaptation and well-being.				
	The general health benefits of learning and playing the piano.				

Appendix B

Pre-test & Post-test Piano Skills Test Score Sheet

Student ID	Name	Gender	Age	Completeness of Piano Piece Performance (0-20 points)	Accuracy of Sheet Music Reading (0-20 points)	Fluency of Piano Piece Performance (0-20 points)	Mastery of Piano Piece Performance Style (0-20 points)	Musical Expressiveness of Piano Piece (0-20 points)	Score
1									
2									
3									
4									
5									
6									
7									
8									
9									
…									

Appendix C

Pre-test & Post-test Self - Rated Health Measurement Scale

Item No.	Subscale	Dimension	Item Content	Status Data (0-10)	Score	Description
1	Self-reported Physical Health Subscale	Physical Symptoms and Organ Function	How is your hearing?			0: Hearing is very poor. 10: Hearing is normal and very good.
2		Daily Living Activities	How is your sleep?			
3			Do you have difficulty combing your hair?			
4			Do you have difficulty performing daily household chores?			
5			Do you have difficulty bending over or bending your knees?			
6		Physical Activity	Do you have difficulty going up or down stairs (at least one flight of stairs)?			
7			Do you have difficulty participating in activities that require significant energy expenditure (such as strenuous physical exercise, or moving heavy objects)?			
8	Self-assessment Mental Health Subscale	Positive Emotions	Are you satisfied with your current living conditions?			
9			Are you confident in yourself?			
10			Do you feel happy?			
11		Psychological Symptoms and Negative Emotions	Do you feel mentally tense?			0: Mentally very relaxed, not tense at all. 10: Mentally highly tense. (Reverse scoring)

Pre-test & Post-test Self - Rated Health Measurement Scale (continued)

Item No.	Subscale	Dimension	Item Content	Status Data (0-10)	Score	Description
12			Do you feel unhappy or depressed?			0: Excellent mood. 10: Very poor mood. (Reverse scoring)
13			Do you feel lonely even when you are with others?			Reverse scoring
14		Cognitive Function	How is your memory?			
15			Do you find it easy to concentrate on one thing?			

Appendix C

Pre-test & Post-test Self - Rated Health Measurement Scale (continued)

Item No.	Subscale	Dimension	Item Content	Status Data (0-10)	Score	Description
16	Self-assessment of Social Health Subscale	Role Activities and Social Adaptation	Are you able to handle unpleasant things that happen to you in your daily life, studies, and work in a proper manner?			
17			Can you adapt quickly to new living, learning, and working environments?			
18		Social Resources and Social Contacts	Do you have many classmates, neighbors, relatives, or friends who are close to you?			
19			Do you have friends with whom you can share your joys and sorrows?			
20		Social Support	Do you frequently participate in social or group activities (such as social gatherings with friends, cultural activities, etc.)?			
21			When you encounter difficulties, do you actively seek help from others?			

Author Statements

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Author contributions follow the CRediT (Contributor Roles Taxonomy). Use only the contributor roles applicable to this manuscript.

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Consent for Publication

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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.

Informed Consent

Informed consent was obtained from all participants.

Ethics Approval

The Publication Ethics Committee of the Sciedu Press.

All intervention procedures, participant recruitment, and data collection in the present study referenced the ethical principles for human-subjects research outlined in the *Declaration of Helsinki*. All participants were fully informed of the research objectives, intervention procedures, potential risks, and anticipated benefits, and provided written informed consent on a purely voluntary basis. Participants retained the right to withdraw from the study at any time without penalty. All individual questionnaire and test data were anonymized to protect participants' privacy strictly.

Data Availability Statement

Restricted: The datasets generated and analyzed during the current study are not publicly available due to ethical and privacy restrictions, but are available from the corresponding author upon reasonable request and with permission from the data owner, where applicable.

Use of Artificial Intelligence

The authors used Doubao and DeepSeek to assist with English-language editing and stylistic refinement. The tool was not used to generate or analyze the study's original empirical data. All suggested language revisions were critically reviewed and approved by the authors, who assume full responsibility for the final content.

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