



Developing a Home Exercise Program for Children with Down Syndrome

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Abstract

Background and Aim: Children with Down Syndrome are a group that needs special care and support. By gaining a deeper understanding of their characteristics and needs, we can create a more welcoming and inclusive environment for them. Therefore, this research aims to develop a home exercise program for children with Down Syndrome. Home exercise programs can promote the parent-child relationship of children with Down Syndrome by improving physical fitness, promoting intellectual development, enhancing social skills, enhancing self-confidence, and providing opportunities for children with Down Syndrome to interact with other families to help them better integrate into the family environment.

Materials and Methods: The research participation was divided into four groups as follows: (1) five experts were invited to evaluate the expert interview form and Delphi questionnaires using the Index of Item-Objective Congruence (IOC); (2) nine experts were invited to participate in expert's interview; (3) 19 experts were invited to participate in Delphi consensus to develop a home exercise program for children with Down Syndrome; (4) 7 experts were invited to participate in connoisseurship discussion, to confirm the developed home exercise program. This consensus data was evaluated through the median and interquartile range. The criteria for consensus required a median of ≥ 3.50 and an interquartile range of ≤ 1.50 .

Results: Home exercise program for children with Down Syndrome includes three aspects: 1. warm-up, including 3 first-level indicators as follows: (1) aerobic fitness; (2) dynamic stretching; (3) core activation, and 24 second-level indicators. 2. Physical exercise, including 5 first-level indicators as follows: (1) improves strength and functional structure; (2) sports interests; (3) psychological needs; (4) excitation and inhibition balance; (5) self-control, and 17 second-level indicators and 146 third-level indicators. 3. relaxation extension including 3 first-level indicators as follows: (1) static diagram; (2) dynamic plotting; (3) mental and breathing relaxation, and 21 second-level indicators.

Conclusion: The home exercise program developed in this research offers a comprehensive solution that meets the diverse needs of children with Down Syndrome, contributing positively to their physical, emotional, and social development.

Keywords: Home Exercise Program; Children; Down Syndrome

Introduction

Down Syndrome, also known as trisomy 21, is a genetic disorder caused by an extra copy of chromosome 21. It is usually caused by an error in the germ cells during meiosis, resulting in a fertilized egg with three chromosomes 21 instead of the normal two (Wang, Y.X., 2007). This chromosomal abnormality results in several physical and intellectual characteristics. The physical characteristic is delayed growth, and children with Down Syndrome are usually short, have a smaller head circumference, and have slower bone development. Distinctive facial features, wide eye distance, low nose bridge, and small ears. Abnormal organ function may be accompanied by congenital heart disease, digestive tract abnormalities, and other health problems. Intelligence is characterized by low intelligence, which is present in most children with Down Syndrome, but the degree varies from person to person. Learning difficulties: Because of Down Syndrome, they may have difficulty learning new knowledge and skills. Psychological characteristics such as emotional instability: Children with Down Syndrome may be more prone to mood swings and anxiety. Social difficulties and may have trouble understanding and expressing social norms (Lee et al, 2015).

Children with Down Syndrome are a group that needs special care and support. By gaining a deeper understanding of their characteristics and needs, we can create a more welcoming and inclusive environment for them. At the same time, all sectors of society should work together to promote research progress and social attitudes to bring more hope and opportunities to this special group. Let us join hands to love and support children with Down Syndrome, so that they can grow up happily in love and care. These





characteristics may have some impact on children's quality of life and health. Therefore, it is important to develop a family exercise program for children with Down Syndrome. First, family exercise programs help improve the physical fitness of children with Down Syndrome. Through regular, moderate exercise, children can improve their motor skills by increasing their muscle strength, flexibility, and coordination. This not only helps them take better care of themselves in their daily lives but also improves their quality of life. Secondly, family exercise programs can promote the intellectual development of children with Down Syndrome. Exercise not only contributes to physical health but also stimulates brain development (Wang, H. Y. et al, 2012). Multiple studies have shown that moderate physical activity can promote the connection and communication of neurons, thereby improving children's cognitive ability and intelligence. For children with Down Syndrome, regular exercise can provide more stimulation to their brains and help their intellectual development. (Logan, 2012). In addition, home exercise programs can enhance the social skills of children with Down Syndrome. Exercising in a home environment can provide children with more social opportunities (Wick, K.,2017). Parents can exercise with their children and encourage them to interact with other family members or friends. Such an environment can help children better learn social skills and improve social competence. Finally, a family exercise program can help boost confidence in children with Down Syndrome. Through regular exercise, children can see their progress and achievements, which not only boosts their self-confidence but also makes them more active in their daily lives (Perich et al, 2022).

Children with Down Syndrome face significant physical, intellectual, and social challenges due to their genetic condition. Despite advancements in medical care and special education, there remains a gap in research regarding effective interventions that holistically enhance their physical, cognitive, and social well-being. The primary reason for presenting this paper is to address the identified research problems by highlighting the importance of home exercise programs as an effective intervention for children with Down Syndrome. Family-based exercise programs offer a structured and supportive environment where children can develop motor skills, enhance cognitive function, and improve social abilities. Through this research, the researcher aims to provide valuable insights into how structured home exercise programs can significantly enhance the quality of life for children with Down Syndrome. By promoting a comprehensive and inclusive approach, this study seeks to contribute to the ongoing efforts to create a more supportive and understanding society for individuals with special needs.

Objectives

To develop a home exercise program for children with Down Syndrome.

Literature Review

1. Down Syndrome

Down Syndrome is a genetic disorder caused by the presence of an extra copy of chromosome 21 (trisomy 21). This additional genetic material affects development, leading to characteristic features and cognitive delays. It is one of the most common chromosomal disorders, with an estimated prevalence of 1 in 700 live births worldwide (Centers for Disease Control and Prevention, 2022).

For physical characteristics, individuals with Down Syndrome often exhibit distinct physical traits, including: (1) a flattened facial profile; (2) Almond-shaped eyes with an upward slant; (3) A single deep crease across the palm (simian crease); (4) Short stature and increased susceptibility to obesity; (5) Low muscle tone (hypotonia) and hypermobility in joints.

For cognitive and developmental features, cognitive development is typically delayed, with intellectual disabilities ranging from mild to moderate. Common developmental challenges include: (1) delayed speech and language acquisition; (2) difficulties with fine and gross motor skills; (3) challenges in abstract thinking and problem-solving. Despite these challenges, individuals with Down Syndrome often excel in social interactions and emotional intelligence. With proper support, they can acquire new skills and adapt effectively (Bull, 2020).





For health considerations, individuals with Down Syndrome are at an increased risk for various health conditions, including: (1) congenital heart defects (affecting nearly 50% of cases); (2) hearing and vision impairments; (3) thyroid dysfunctions; (4) respiratory and immune system issues; (5) sleep apnea. Early diagnosis and regular medical care are crucial for managing these conditions and promoting overall well-being (National Down Syndrome Society, 2021).

For education and development, early intervention programs that include physical, occupational, and speech therapy are essential for optimizing development. Tailored educational plans in inclusive or specialized settings enable children with Down Syndrome to reach their potential (Roizen & Patterson, 2018).

For the importance of physical activity, physical activity is vital for improving muscle strength, coordination, and cardiovascular health. Customized exercise programs, such as home-based activities, enhance motor skills and self-esteem while reducing health risks (Foley et al., 2018).

For social integration and support, with appropriate resources, individuals with Down Syndrome can lead fulfilling lives, contributing to their families and communities. Support networks, advocacy organizations, and public awareness play key roles in fostering inclusion and independence (World Health Organization, 2021).

2. Basic motor skills of Down Syndrome children

Motor skills are critical for a child's overall development, encompassing their ability to perform physical movements and interact with their environment. Children with Down Syndrome often experience delays in developing motor skills due to factors such as low muscle tone (hypotonia), joint hypermobility, and delayed neural development. Despite these challenges, early intervention and targeted training can significantly enhance their motor abilities (Bull, 2020).

Gross motor skills involve large muscle groups and are essential for activities like walking, running, jumping, and balancing. Children with Down Syndrome typically take longer to achieve milestones like crawling, standing, and walking. Physical therapy and exercises focusing on strength, balance, and coordination can help accelerate their gross motor skill development (Foley et al., 2018B). Fine motor skills involve small muscle movements, such as grasping, writing, and manipulating objects. These skills are often underdeveloped in children with Down Syndrome due to challenges like reduced grip strength and difficulty with coordination. Occupational therapy, focusing on hand-eye coordination and finger dexterity, can help improve their fine motor skills (Roizen & Patterson, 2018). Postural control refers to the ability to maintain balance and stability during movement or while stationary. Children with Down Syndrome often struggle with postural control due to hypotonia and joint instability. Activities like yoga, balancing exercises, and core-strengthening workouts are effective in improving their posture and overall stability (Shields et al., 2018).

Motor coordination and timing are areas where children with Down Syndrome often face difficulties. These skills are essential for performing complex movements, such as throwing and catching a ball or riding a bicycle. Structured games and activities that involve repetition and gradual progression can help improve coordination and reaction time. Developmental milestones such as sitting, crawling, and walking are typically delayed in children with Down Syndrome. For instance, while most children learn to walk by 12–15 months, those with Down Syndrome may achieve this milestone closer to 2–3 years. Early intervention programs that include physical and occupational therapy can help mitigate these delays. Children with Down Syndrome may require additional time and repetition to learn new motor skills. They benefit from structured environments, visual aids, and consistent routines that break tasks into manageable steps. Positive reinforcement and encouragement are essential in building their confidence and motivation (Foley et al., 2018).

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and occupational therapy can help mitigate these delays. Children with Down Syndrome may require additional time and repetition to learn new motor skills. They benefit from structured environments, visual aids, and consistent routines that break tasks into manageable steps. Positive reinforcement and encouragement are essential in building their confidence and motivation. Physical activity plays a vital role in developing motor skills in children with Down Syndrome. Activities such as swimming, dancing, and adaptive sports help improve muscle strength, coordination, and endurance. These exercises also promote social interaction and emotional well-being, contributing to their overall development. Early intervention is critical for addressing motor skill delays in children with Down Syndrome. Programs that integrate physical, occupational, and speech therapies provide comprehensive support to enhance their physical and cognitive development. These interventions are most effective when initiated during infancy or early childhood (Roizen & Patterson, 2018). Therefore, developing basic motor skills lays the foundation for independence and improved quality of life in children with Down Syndrome. Enhanced motor abilities allow them to participate in daily activities, engage in social interactions, and explore their environment more effectively. With the right support, they can achieve significant progress and lead active, fulfilling lives.

3. Home exercise program

A home exercise program (HEP) is a structured set of physical activities designed to enhance physical and cognitive development in a familiar environment. For children with Down Syndrome, a home exercise program focuses on addressing specific developmental delays such as low muscle tone, joint instability, and motor coordination challenges. These programs also complement therapy sessions by providing consistent practice opportunities at home (Bull, 2020; Ulrich et al., 2008). Home exercise programs are valuable because they provide an opportunity for children with Down Syndrome to practice physical activities regularly and in a setting that promotes comfort and consistency. By focusing on individualized goals such as improving balance, strength, coordination, and motor planning, HEPs aim to build foundational skills that support functional independence and overall health (Carmeli et al., 2014).

One of the key advantages of a home-based approach is the involvement of family members or caregivers, who play a crucial role in motivating and guiding the child. Caregiver participation not only ensures the exercises are performed correctly but also fosters a supportive environment that encourages the child's progress. Additionally, this setting allows the incorporation of familiar and enjoyable elements, such as toys or music, into the program, increasing engagement and adherence (Kumin, 2012). The implementation of a home exercise program for children with Down Syndrome also aligns with therapeutic goals established by professionals, including physical and occupational therapists. These programs are designed in collaboration with experts to ensure exercises are safe, effective, and appropriately challenging. Regular evaluations and adjustments to the program help address the evolving needs of the child as they develop (Roizen & Patterson, 2018).

Physical activity is a critical component in the management of Down Syndrome, as it contributes to improvements in strength, cardiovascular health, and overall quality of life. Children with Down Syndrome often have a higher risk of obesity and associated health conditions, making regular exercise essential for maintaining physical well-being (Foley et al., 2018). Furthermore, a home exercise program promotes the development of gross motor skills, such as walking, jumping, and climbing, which are essential for participating in play and social activities. They also help refine fine motor skills, enabling children to perform tasks like drawing or picking up objects more efficiently. These improvements not only enhance physical abilities but also boost confidence and self-esteem (Shields et al., 2018).

4. Related research

Rimmer and Rowland (2008) highlight the necessity of customizing physical activity programs to accommodate the unique needs of children with disabilities. By incorporating a diverse range of exercises





and progressive adaptations, the home exercise program fosters inclusivity and long-term participation, supporting both physical and psychological growth.

Mahyuddin et al. (2020) highlight that home-based interventions significantly enhance participation rates among children with disabilities by offering a familiar and supportive environment. The program's flexibility and simplicity allow for seamless integration into daily routines, making it more accessible to a wider range of families. By providing clear instructions, visual aids, and adaptable exercise options, parents are empowered to play an active role in their child's fitness development.

Smith et al. (2015) highlight the crucial role of parental involvement in maintaining physical activity among children with disabilities. The program is designed to accommodate the diverse abilities and interests of children with Down Syndrome by allowing exercises to be tailored to individual needs. By providing a variety of activities, the program encourages engagement, enabling children to select exercises that align with their preferences, which enhances both motivation and long-term adherence.

Summary

The existing research literature on the development of family exercise programs for children with Down Syndrome provides valuable references and insights. However, after in-depth analysis and comprehensive evaluation, it is not difficult for us to find out the shortcomings.

First, from the perspective of research content, the existing research covers the design and implementation of family exercise programs and their impact on children's physical and mental health. Most of these studies are based on a combination of theory and practice, providing a wealth of material for our understanding of the special needs of children with Down Syndrome and the benefits of exercise. However, despite these findings, there is still room for further exploration of how to personalize home exercise regimens based on individual differences in children with Down Syndrome. Secondly, in terms of research methods, most of the existing research adopts traditional methods such as questionnaire surveys, observation, and experiment. These methods can reflect the effect of family exercise programs to a certain extent, but the objectivity and accuracy of their results are still limited. For example, a questionnaire survey may be affected by subjective factors of respondents, while observation and experimental methods may be restricted by multiple factors such as sample size and experimental conditions. Therefore, future research can try to introduce more diversified and advanced research methods, such as big data-based analysis and machine learning, to improve the scientific reliability of research. Thirdly, in terms of the application value of the research, the existing research has guided practice to a certain extent, but there is still a disconnect between theory and practice. Although many studies have proposed the theoretical framework and implementation strategies of family exercise programs, the lack of specific operational guidelines and implementation plans makes it difficult to effectively promote these research results in practical applications. Therefore, future research needs to pay more attention to the combination of theory and practice to provide parents and professionals with more operational guidance and advice. Finally, in terms of research perspective, most of the existing studies start from a single discipline, such as medicine and kinematics, and lack the integration of interdisciplinary perspectives. Family exercise programs for children with Down Syndrome involve not only physical health but also mental health, social adaptation, and many other aspects. Therefore, future research needs to focus more on interdisciplinary cooperation and exchange to examine and explore the impact of family exercise programs on children with Down Syndrome from a broader perspective.

Conceptual Framework

In this research, the independent variable was Down Syndrome children and the basic motor skills of Down Syndrome children. The dependent variable was a home exercise program for children with Down Syndrome. The conceptual framework was as follows:



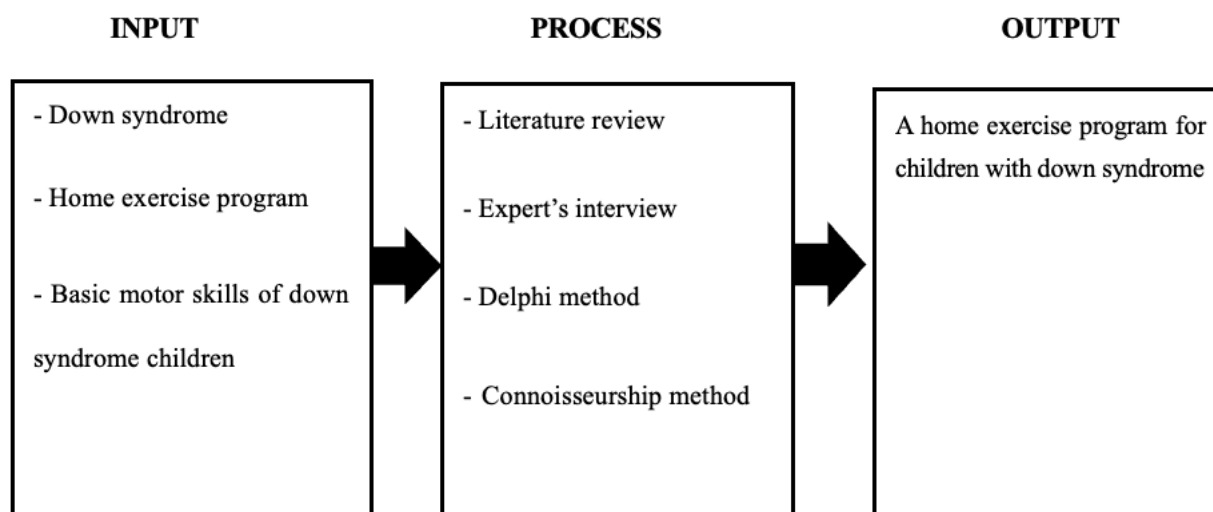


Figure 1 Conceptual framework

Methodology

1. Research Tools

The research tools used in this research are as follows: (1) an interview form for the expert; (2) a Questionnaire for Delphi; (3) an Evaluation form for Connoisseurship.

2. Research Participation

In this research, the purposive sampling method was used to select the experts. The details for experts are as follows:

Expert for IOC: Five experts were selected through a purposive sampling method, consisting of experts from special education schools who held associate senior titles or had more than five years of work experience. These experts were invited to evaluate the expert interview form and Delphi questionnaires using the Index of Item-Objective Congruence (IOC) method.

Experts' interview: 9 experts were selected through a purposive sampling method, consisting of 5 physical education teachers, and 4 experts from special education schools who held associate senior titles or had more than five years of work experience

Expert for Delphi method: 19 experts were selected through the snowball sampling method, consisting of 7 physical education teachers, 6 experts from special education schools, and 6 with Down Syndrome. All experts have more than 5 years of work experience. These experts were invited to participate in a Delphi consensus to develop a home exercise program for children with Down Syndrome.

Expert for Connoisseurship method: 7 experts were selected through a purposive sampling method, consisting of 4 physical education teachers and 3 experts from special education schools with associate senior titles or more than 5 years of work experience.

3. Data Collection

1. Summarizing related research related to home exercise programs and children with Down Syndrome through a literature review.

2. Draft the interview form for the expert and have it evaluated by 5 experts to evaluate their alignment with the objectives using the Item-Objective Congruence (IOC) method.

3. 9 experts, including 5 physical education teachers, and 4 experts from special education schools, were invited to conduct face-to-face expert interviews to gather information about the current situation and challenges faced by children with Down Syndrome, and the key elements to develop a home exercise program for children with Down Syndrome.

4. Draft a questionnaire for Delphi and have it evaluated by 5 experts to evaluate their alignment with the objectives using the Item-Objective Congruence (IOC) method.

5. 19 experts, including 7 physical education teachers, 6 experts from special education schools, and 6 Down Syndrome experts, were invited to conduct a Delphi consensus, aiming to develop a home exercise program for children with Down Syndrome. Questionnaires for Delphi were distributed to 19 experts in the form of on-site and online distribution.

6. Draft evaluation form for connoisseurship to confirm the suitability and effectiveness of implementing the home exercise program designed for children with Down Syndrome.

7. 7 experts, including 4 physical education teachers and 3 experts from special education schools, were invited to conduct a connoisseurship discussion to confirm the developed home exercise program designed for children with Down Syndrome.

4. Data Analysis

This research primarily employed a software package to analyze the data.

1. Evaluate the content validity of the interview form for the expert and questionnaire for Delphi, using the Index of Item-Objective Congruence (IOC) (Rovinelli & Hambleton, 1977). The IOC value for the interview form for the expert was 0.86, and the IOC value for the questionnaire for Delphi was 0.89.

2. The expert's interview and connoisseurship discussion were analyzed using content analysis.

3. Descriptive statistics, including the median and interquartile range, were used to analyze Delphi consensus data. The analysis criteria were a median of ≥ 3.50 and an interquartile range of ≤ 1.50 .

Results

In this research, the data analysis was divided into 3 parts as follows:

Part 1: Investigate the current situation and challenges faced by children with Down Syndrome using experts' interviews.

Part 2: Delphi consensus results for developing a home exercise program for children with Down Syndrome.

Part 3: Confirmation of the developed home exercise program for children with Down Syndrome using the connoisseurship method.

Part 1: Investigate the current situation and challenges faced by children with Down Syndrome using experts' interviews.

Based on the literature and the core content of the related research, the interview form for the expert was developed. The purpose was to gather insights into the current situation and challenges faced by children with Down Syndrome, as well as to identify key elements for developing a home exercise program tailored to their needs. 9 experts agreed that a comprehensive home exercise program for children with Down Syndrome should include warm-up, main exercise, and post-exercise relaxation and stretching. Exercise methods should be diversified and adjusted according to the characteristics of children of different ages. In the selection of family sports activities, it is necessary to tailor the activities according to their specific needs, interests, and preferences, and physical conditions. The first principle is to ensure the safety of the activity content and avoid complex or potentially risky actions; Secondly, the activities need to be attractive and can stimulate and maintain children's interest in participation; Moreover, the activity design should be simple and clear, easy for children to understand and practice, while maintaining a certain structure and repeatability, to promote the establishment of routine and improve learning efficiency. In addition, all activities need to be supervised by an adult, and the difficulty and complexity of the activities need to be flexibly adjusted according to the feedback of the children, aiming to create a safe and enjoyable family physical exercise atmosphere to help them develop exercise habits.

After finishing the experts' interview with 9 experts, to achieve these goals, the researchers constructed a scientific and practical home exercise program model for children with Down Syndrome based on the recommendations of 9 experts, which related to the key elements to develop a home exercise program for children with Down Syndrome. The home exercise program model for children with Down Syndrome was drafted as follows:

Table 1 The framework of the home exercise program for children with Down Syndrome

| Movement type | Take exercise intensity | Frequency of exercise | Period | Sports intervention mechanism |
|---|---|---------------------------|------------------|--|
| Fun sport It mainly plays ball games and sports | Moderate strength | 3 times a week (16 weeks) | 30 to 40 minutes | Sports interest: stimulate the main body's sports interest and fun, cultivate sports skills, and form sports habits through fun sports. |
| High intensity intermittent exercise High leg lift, squat jump, Quick ladder | Medium to high strength exercise practice | 3 times a week (16 weeks) | 30 to 40 minutes | The balance of excitation and inhibition enhances the brain's ability to regulate excitation and inhibition |
| Strength and body training Dumbbell bend, plank, sit-up, kneeling position press | Moderate to high intensity exercise | 3 times a week (16 weeks) | 30 to 40 minutes | Structural function improvement Changes in body shape and cognitive function through strength training or aerobic exercise, thereby improving the emotional and physical self Respect and self-concept. |
| Moderate cardio Cooper exercises, upper body power meter, calisthenics, yoga. | Moderate strength | 3 times a week (16 weeks) | 30 to 40 minutes | Improvement of self-control: To improve self Controlled by moderately intense robot motion. |
| Optional item To provide independent support environment, design challenging activities, integrate activities, and establish a good atmosphere for activities. | Moderate dietary intensity | 3 times a week (16 weeks) | 50 to 60 minutes | Satisfaction of psychological needs: The exercise intervention process satisfies the three basic psychological needs of individual autonomy, ability and relationship. |

Part 2: Delphi consensus results for developing a home exercise program for children with Down Syndrome

Based on the literature review and experts' interviews with 9 experts, questionnaires for Delphi to develop a home exercise program for children with Down Syndrome were developed. It can be divided into three modules as follows: (1) Warm-up module, including 3 first-level indicators and 24 second-level indicators. (2) The physical exercise module, including 5 first-level indicators, 17 second-level indicators, and 146 third-level indicators. (3) The relaxation extension module, including 3 first-level indicators and 21 second-level indicators.

Results of the third round of the Delphi consensus

Table 2 Third round of Delphi results on the three modules of the home exercise program

| Item | Response level N=19 | | | | | Mdn. | IQR | Result |
|----------------------|---------------------|---|---|---|----|------|------|----------|
| | 1 | 2 | 3 | 4 | 5 | | | |
| Warm-up | | | | | 19 | 5.00 | 0.00 | Retained |
| Physical exercise | | | | | 19 | 5.00 | 0.00 | Retained |
| Relaxation extension | | | | | 19 | 5.00 | 0.00 | Retained |

Expert opinions on the three modules of the home exercise program are acceptable.



Table 3 Third round of Delphi results on first-level indicators

| Item | Response level N=19 | | | | | Mdn. | IQR | Result |
|---|---------------------|---|---|---|----|------|------|----------|
| | 1 | 2 | 3 | 4 | 5 | | | |
| A1 Aerobic Fitness | | | | | 19 | 5.00 | 0.00 | Retained |
| A2 Dynamic stretching | | | | | 19 | 5.00 | 0.00 | Retained |
| A3 core activation | | | | | 19 | 5.00 | 0.00 | Retained |
| B1 improves strength and functional structure | | | | | 19 | 5.00 | 0.00 | Retained |
| B2 Sports Interests | | | | 1 | 18 | 4.94 | 0.00 | Retained |
| B3 Psychological needs | | | 2 | 1 | 16 | 4.73 | 0.00 | Retained |
| B4 excitation and inhibition balance | | | | | 19 | 5.00 | 0.00 | Retained |
| B5 Self-control | | | | | 19 | 5.00 | 0.00 | Retained |
| C1 Static diagram | | | | | 19 | 5.00 | 0.00 | Retained |
| C2 Dynamic plotting | | | 3 | 6 | 10 | 4.36 | 1.00 | Retained |
| C3 mental and breathing relaxation | | | 2 | 1 | 16 | 4.73 | 0.00 | Retained |

The Delphi consensus of experts on the first-level indicators is all acceptable.

According to the above third round of Delphi results on first-level indicators, 1 indicator, C3 mental and respiratory relaxation indicators which did not reach the second round of Delphi consensus. In the third round of the Delphi consensus, it already reached Delphi expert consensus.

Table 4 Third round of Delphi results on second-level indicators

| | | | | First-level indicators | | Second-level indicators | | Response level N=19 | | | | | Mdn. | | IQR | | Result | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------|---------------------------------|-----------------------------|-------------------------|------------------------|---|-------------------------|----|---------------------|------|----------|--------------------------------|---------------------|------|---|-----|---|--------|------|--------|----------|------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| First-level indicators | Second-level indicators | First-level indicators | Second-level indicators | Response level N=19 | | | | | Mdn. | IQR | Result | Response level N=19 | | | | | Mdn. | IQR | Result | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | | | | 1 | 2 | 3 | 4 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A1 Aerobic Fitness | A1.1 Jump will your feet in pla | C1.3 Pull the chest muscles | | | | | 19 | 5.00 | 0.00 | Retained | C2.7 Spinal horizontal torsion | | | | 2 | 9 | 8 | 4.21 | 1.00 | Retained | C3 mental and breathing relaxation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

The Delphi consensus of experts on the second-level indicators is all acceptable.

According to the above third round of Delphi results on second-level indicators, 5 indicators, including A1.5 sprint, A2.5 single straight leg, A2.7 horizontal lunge, C1.1 side neck curvature, C1.2 two fists, chin, and head which did not reach the second round of Delphi consensus. In the third round of the Delphi consensus, it had already reached a Delphi experts.



Table 5 Third round of Delphi results on third-level indicators

| Second-level indicators | Third-level indicators | Response level N=19 | | | | | Mdn | IQR | Result | |
|--|---|-----------------------------------|---|----|------|------|------|----------|----------|----------|
| | | 1 | 2 | 3 | 4 | 5 | | | | |
| B.1.4 Development of coordination capacity | B1.4.1Fast two-handed strike | | 2 | 1 | 16 | 4.73 | 0.00 | | Retained | |
| | B1.4.2Double Arm rotation | | 2 | 1 | 16 | 4.73 | 0.00 | | Retained | |
| | B1.4.3Prone to avoid obstacles | | 1 | 8 | 10 | 4.47 | 1.00 | | Retained | |
| | B1.4.4Jump from side to side with feet | | 3 | 6 | 10 | 4.36 | 1.00 | | Retained | |
| | B1.4.5TAB | | 2 | 9 | 8 | 4.21 | 1.00 | | Retained | |
| | B1.4.6Alternate jump | | 1 | 8 | 10 | 4.47 | 1.00 | | Retained | |
| | B1.4.7Double Cross jump | | 1 | 8 | 10 | 4.47 | 1.00 | | Retained | |
| | B1.4.8 Cross your hands and feet | | 2 | 17 | | 4.89 | 0.00 | | Retained | |
| | B1.4.9Log rolling | | 1 | 18 | | 4.94 | 0.00 | | Retained | |
| | B1.4.10High leg lateral motion | | 3 | 16 | | 4.84 | 0.00 | | Retained | |
| | B1.4.11Clown Jump | | 5 | 14 | | 4.73 | 0.00 | | Retained | |
| B.1.5 Development of balance | B1.5.1Standing on one foot | | 5 | 14 | | 4.73 | 0.00 | | Retained | |
| | B1.5.2Holding the ball while standing on one foot | | 1 | 18 | | 4.94 | 0.00 | | Retained | |
| | B1.5.3Holding with one foot | | 1 | 18 | | 4.94 | 0.00 | | Retained | |
| | B1.5.4Straight line | | | | 19 | 5.00 | 0.00 | | Retained | |
| | B1.5.5Skiating jump (single leg side jump) | | | | 19 | 5.00 | 0.00 | | Retained | |
| | | | | | | | | | | |
| Second-level indicators | Third-level indicators | Response level N=19 | | | | | Mdn | IQR | Result | |
| B.2.2 Emotional interest | B2.2.1Jump pass | | 3 | 16 | | 4.84 | 0.00 | | Retained | |
| | B2.2.1Monkey climbing-Forward and sideways | | 5 | 14 | | 4.73 | 0.00 | | Retained | |
| | B2.2.2Bear crawl-Forward and sideways | | 5 | 14 | | 4.73 | 0.00 | | Retained | |
| | B2.2.3Worm crawling | | 5 | 14 | | 4.73 | 0.00 | | Retained | |
| | B2.2.4Crab crawling-Front to back or sideways | | 3 | 16 | | 4.84 | 0.00 | | Retained | |
| | B2.2.5 Duck Walk | | 1 | 18 | | 4.94 | 0.00 | | Retained | |
| | B2.2.6 Leapfrog | | 1 | 18 | | 4.94 | 0.00 | | Retained | |
| | B2.2.7 Small cart | | 1 | 8 | 10 | 4.47 | 1.00 | | Retained | |
| | B2.3.1 Kangaroo jumping book | | 1 | 8 | 10 | 4.47 | 1.00 | | Retained | |
| | B2.3.2 The crab turns the book | | 3 | 6 | 10 | 4.36 | 1.00 | | Retained | |
| | B2.3.3 Turtle endorsement | | 3 | 7 | 9 | 4.31 | 1.00 | | Retained | |
| B.2.3 Voluntary interest | B2.3.4 Grab the tail | | 2 | 9 | 8 | 4.21 | 1.00 | | Retained | |
| | B2.3.5Evasive fire | | 2 | 17 | | 4.89 | 0.00 | | Retained | |
| | B2.3.6Sprint catch | | 3 | 16 | | 4.84 | 0.00 | | Retained | |
| | B.3.1 Requirements for independent exploration | B3.1.1Waist ball+crotch/8" Bridge | | 2 | 17 | | 4.89 | 0.00 | | Retained |
| | B3.1.2Cross Hip Bridge | | 2 | 17 | | 4.89 | 0.00 | | Retained | |
| | | | | | | | | | | |
| Second-level indicators | Third-level indicators | Response level N=19 | | | | | Mdn | IQR | Result | |
| B.3.2 Achievement needs | B3.1.3Virtual motion | | 5 | 14 | | 4.73 | 0.00 | | Retained | |
| | B3.2.1Gorilla Jump | | 2 | 17 | | 4.89 | 0.00 | | Retained | |
| | B3.2.2Saw | | 1 | 8 | 10 | 4.47 | 1.00 | | Retained | |
| | B3.2.3Climber two-point support | | 1 | 18 | | 4.94 | 0.00 | | Retained | |
| | B3.2.4Swallowing disturbance | | 3 | 6 | 10 | 4.36 | 1.00 | | Retained | |
| | B3.2.5Swing | | 3 | 6 | 10 | 4.36 | 1.00 | | Retained | |
| | B.3.3 Affinity Requirements | B3.3.1Road Roller | | 3 | 6 | 10 | 4.36 | 1.00 | | Retained |
| | B3.3.2Dolphin Dribble | | 1 | 18 | | 4.94 | 0.00 | | Retained | |
| | B3.3.3Rock-paper-scissors | | 3 | 6 | 10 | 4.36 | 1.00 | | Retained | |
| | B3.3.4Cross Hip Bridge | | 3 | 6 | 10 | 4.36 | 1.00 | | Retained | |
| | B3.3.5Cross Jump rope | | 3 | 6 | 10 | 4.36 | 1.00 | | Retained | |
| B.4.1 Excitatory regulation | B4.1.1Lie on your back and stretch your body | | 3 | 6 | 10 | 4.36 | 1.00 | | Retained | |
| | B4.1.2Lie on your back with alternating legs | | 3 | 6 | 10 | 4.36 | 1.00 | | Retained | |
| | B4.1.3Supine, alternate | | 3 | 6 | 10 | 4.36 | 1.00 | | Retained | |
| | B4.1.4Lie on your back and straighten your body | | 5 | 14 | | 4.73 | 0.00 | | Retained | |
| B4.1.5Supine riding | | 3 | 6 | 10 | 4.36 | 1.00 | | Retained | | |
| | | | | | | | | | | |
| Second-level indicators | Third-level indicators | Response level N=19 | | | | | Mdn | IQR | Result | |
| B.4.2 Inhibitory regulation | B4.1.6Cross-legged sitting position | | 1 | 8 | 10 | 4.47 | 1.00 | | Retained | |
| | B4.1.7Knee tuck and roll | | 1 | 18 | | 4.94 | 0.00 | | Retained | |
| | B4.1.8Lift legs up and down | | 3 | 6 | 10 | 4.36 | 1.00 | | Retained | |
| | B4.2.1Cordless jump rope | | 3 | 6 | 10 | 4.36 | 1.00 | | Retained | |
| | B4.2.2Side step arm loop | | 2 | 17 | | 4.89 | 0.00 | | Retained | |
| | B4.2.3Back kick | | 5 | 14 | | 4.73 | 0.00 | | Retained | |
| | B4.2.4Type of dead insect | | 2 | 17 | | 4.89 | 0.00 | | Retained | |
| | B4.2.5Back Cross lunge | | 1 | 8 | 10 | 4.47 | 1.00 | | Retained | |
| | B4.2.6Jumping jacks | | 1 | 18 | | 4.94 | 0.00 | | Retained | |
| | B4.2.7High kick | | 3 | 6 | 10 | 4.36 | 1.00 | | Retained | |
| | B4.2.8Military jump | | 3 | 6 | 10 | 4.36 | 1.00 | | Retained | |
| B.5.1 Emotional control | B4.2.9Superman Pose | | 3 | 6 | 10 | 4.36 | 1.00 | | Retained | |
| | B5.1.1Acrobatic Boxing | | 3 | 6 | 10 | 4.36 | 1.00 | | Retained | |
| | B5.1.2Cross elbow knee jump | | 2 | 9 | 8 | 4.21 | 1.00 | | Retained | |
| | B5.1.3Cross legs | | 1 | 8 | 10 | 4.47 | 1.00 | | Retained | |
| B.5.2 Pulse control | B5.1.4Bobbie hop | | 1 | 18 | | 4.94 | 0.00 | | Retained | |
| | B5.1.5Sliding squat against wall | | 1 | 18 | | 4.94 | 0.00 | | Retained | |
| | B5.1.6Squat and raise hands | | 1 | 18 | | 4.94 | 0.00 | | Retained | |
| | B5.2.1Stop and start high leg lift in place | | 1 | 18 | | 4.94 | 0.00 | | Retained | |
| | | | | | | | | | | |
| Second-level indicators | Third-level indicators | Response level N=19 | | | | | Mdn | IQR | Result | |
| B.5.3 Attention control | B5.2.2Stop and start lunges in place | | | | 1 | 18 | 4.94 | 0.00 | Retained | |
| | B5.2.3Quickly stop and start climbing | | | | 1 | 8 | 10 | 4.47 | 1.00 | Retained |
| | B5.3.1Sprint directional Jump | | 2 | 1 | 16 | 4.73 | 0.00 | | Retained | |
| | B5.3.2Turn forward straight arm and | | 1 | 8 | 10 | 4.47 | 1.00 | | Retained | |
| | B5.3.3Ant movement | | | | 1 | 18 | 4.94 | 0.00 | Retained | |
| | B5.3.4Jump pass | | | | 1 | 18 | 4.94 | 0.00 | Retained | |
| | B5.3.5Double Assist Jumping jacks | | | | 1 | 18 | 4.94 | 0.00 | Retained | |
| | | | | | | | | | | |

According to the above third round of Delphi results on third-level indicators, 9 indicators including C3 mental and breathing relaxation, A1.5 sprint, A2.5 straight leg, A2.7 horizontal lunge, C1.1 side neck curvature, C1.2 two fists, chin and head, B1.1.4 lying on your back and bending, B1.1.8 kneeling position with both hands, B1.4.2 Double arms circle, B2.3.5 Dodge Shooting, B4.1.3 The indicators of supine lying, alternating, B4.1.5 supine riding, B5.2.2 stop in place and start lunge jump, B5.2.3 quick stop and start climb, and B5.3.1 sprint directional jump which do not reached the second round of Delphi consensus. In the third round of the Delphi consensus, it already reached a Delphi expert consensus, with Mdn. ≥ 3.5 and $IQR \leq 1.50$.

Therefore, the indicators for the home exercise program for children with Down Syndrome, including 11 first-level indicators, 62 second-level indicators, and 146 third-level indicators, were reached by 19 Delphi experts.

Part 3: Confirmation of the developed home exercise program for children with Down Syndrome using the connoisseurship method.

The experts unanimously agree that the home exercise program is a well-rounded and practical solution for promoting the physical and psychological well-being of children with Down Syndrome. It effectively addresses common barriers, incorporates essential fitness principles, and provides a sustainable framework for long-term use.

The diagram for the home exercise program can be developed as follows:

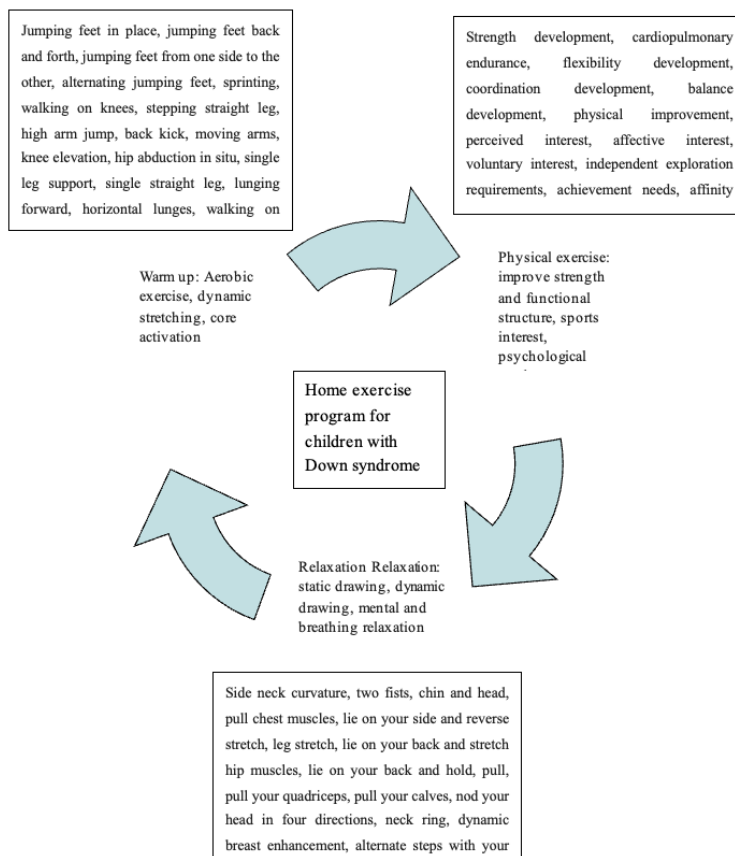


Figure 2 Diagram for home exercise program for children with Down Syndrome

Conclusion

The home exercise program has a clear goal, focusing on the family environment, and carries out movement design and creation from 5 dimensions: develop physical function, develop exercise interest,



develop psychological needs, develop psychological needs, and develop self-control. The home exercise program successfully enhances physical functions, coordination, self-control, and cognitive abilities for children with Down Syndrome. Activities are systematically designed to improve major muscle groups, balance, and motor skills while addressing both physical and psychological needs. Moreover, the program offers flexibility in exercise selection, allowing parents to easily implement activities at home based on their child's individual abilities and preferences. It breaks down barriers such as social stigma and accessibility, ensuring consistent participation without the need for specialized facilities.

In conclusion, the home exercise program developed in this research offers a comprehensive solution that meets the diverse needs of children with Down Syndrome, contributing positively to their physical, emotional, and social development. The research result showed that a home exercise program for children with Down Syndrome includes three aspects as follows:

(1) Warm-up, including 3 first-level indicators, namely, aerobic fitness, dynamic stretching, and core activation, and 24 second-level indicators.

(2) Physical exercise, including 5 first-level indicators, namely, improves strength and functional structure, sports interests, psychological needs, excitation and inhibition balance, and self-control. 17 second-level indicators and 146 third-level indicators.

(3) Relaxation extension, including 3 three-level indicators, namely, static diagram, dynamic plotting, mental and breathing relaxation, and 21 second-level indicators.

Discussion

The development of a home exercise program for children with Down Syndrome represents a vital contribution to addressing their unique physical and psychological needs. Children with Down Syndrome often face developmental delays, reduced muscle tone, and social challenges, requiring tailored interventions to support their growth and overall well-being.

The research findings demonstrate that the program effectively enhances motor skills, coordination, strength, and balance while promoting emotional well-being and cognitive development. The inclusion of psychological aspects in the exercise design is particularly noteworthy, as it helps build confidence and reduce stress, which are common challenges faced by children with Down Syndrome. In addition, research results have shown that structured physical activity improves motor skills, coordination, and strength in children with Down Syndrome (Shields et al., 2018). The developed home exercise program aligns with these findings by incorporating aerobic, strength, and flexibility exercises. The program's inclusion of psychological aspects, such as promoting confidence and reducing stress, builds on evidence suggesting that physical activity has positive effects on mental health in children with disabilities.

While the program is designed for home use, maintaining consistency may be challenging for some families due to time constraints, lack of motivation, or insufficient understanding of the exercises. Addressing this requires additional resources like follow-up support or motivational tools. Adapting the program to diverse cultural and economic contexts remains a challenge. For example, families in low-income settings may lack access to necessary equipment or space, necessitating further adaptations for inclusivity. The program's home-based format eliminates common barriers such as transportation issues, social stigma, and limited access to specialized facilities. This practical approach makes it feasible for families to implement the program in various settings. Additionally, clear instructions, visual aids, and flexibility in exercise selection allow parents and caregivers to adapt the program to their child's specific needs and abilities. According to Mahyuddin et al. (2020), home-based interventions are particularly effective in increasing participation rates among children with disabilities, as they provide a familiar and supportive environment. The flexibility and simplicity of the program ensure that it can be easily integrated into daily routines, making it accessible to a broader range of families. Providing detailed instructions, visual aids, and flexibility in exercise selection empowers parents to take an active role in their child's fitness journey. This aligns with research by Smith et al. (2015), which emphasizes the importance of parental involvement in sustaining physical activity in children with disabilities. The program's design ensures that exercises can be tailored to suit the varying abilities and interests of children with Down Syndrome. Offering a wide range of activities promotes engagement, as children can choose exercises that resonate with their preferences, further enhancing adherence and motivation.

The program's adaptability to individual abilities and needs reflects a key principle of inclusive fitness. The program's adaptability ensures inclusivity for children with different levels of ability and varying psychological and physical requirements. By offering a wide range of activities, the program allows



families to customize their exercise plans, promoting sustained engagement and long-term benefits. Studies by Rimmer and Rowland (2008) emphasize the importance of tailoring physical activity programs to meet the diverse requirements of children with disabilities. By offering a variety of exercises and progressions, the home exercise program ensures inclusivity and sustained engagement, addressing both physical and psychological aspects of development.

This home exercise program contributes to the growing field of inclusive fitness interventions, addressing the specific challenges faced by children with Down Syndrome. By creating an accessible and effective model, the program empowers families to play an active role in their child's development. Moreover, it aligns with global efforts to promote health equity for children with disabilities (World Health Organization, 2021).

The research underscores the importance of a holistic approach to designing physical activity programs for children with Down Syndrome. By focusing on effectiveness, practicality, and inclusivity, the developed home exercise program lays a strong foundation for improving their physical and emotional well-being. Further studies and refinements will ensure its continued success in meeting the needs of this population.

Recommendation

Recommendation for current research

1. Explore the adaptability of the home exercise program for children with Down Syndrome across different age groups to determine age-specific needs and effectiveness.
2. Conduct long-term studies to evaluate the sustained physical, emotional, and social benefits of the home exercise program for children with Down Syndrome.
3. Partner with special education schools to refine and expand the program, integrating insights from professionals who work closely with children with Down Syndrome.

Recommendation for further research

1. Study the impact of parent-child and sibling interactions during exercise sessions to strengthen family bonds and improve the emotional well-being of children.
2. Incorporate interactive technologies such as mobile apps, virtual reality, or wearables to provide guidance, track progress, and enhance engagement for children and parents.
3. Integrate sensory-motor activities and cognitive skill-building exercises to further address the unique needs of children with Down Syndrome.

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