

Development of rehabilitation sports services for people with disabilities: Evaluation of expert views and considerations using the Delphi.

Jiyoung Park¹, Seon-Deok Eun^{1*}, Dongheon Kang²

¹Department of Clinical Research for Rehabilitation, Ministry of Health and Welfare, National Rehabilitation Center, National Rehabilitation Research Institute, Seoul, Republic of Korea

²Department of Healthcare and Public Health Research, Ministry of Health and Welfare, National Rehabilitation Center, National Rehabilitation Research Institute, Seoul, Republic of Korea

Abstract

Physical activity is required for health, but resources to prompt physical activity (e.g. facilities, trainers, and programs) are scarce for individuals with disabilities, particularly those who require rehabilitation following discharge and those with severe disabilities. A legal and administrative framework supporting the implementation of health services for people with disabilities is not well established in Korea. Therefore, it is necessary to develop such a framework—one that is optimized by reflecting the opinions and views of all parties involved, including persons with disability, medical and physical education experts, facility managers, and government. This study aimed to establish expert consensus on the development of rehabilitation sports services (RSS) by reviewing previous studies and expert statements. Using the Delphi method, we reviewed the literature to identify the critical roles and factors for planning efficient RSS programs, including ‘coordinators’, ‘physicians’, ‘facility managers’, ‘rehabilitation exercise and physical education trainers’, and ‘integrated information systems for facilities, trainers, and programs’. We developed a Delphi questionnaire with closed-end questions based on the factors derived from the literature and supplementary open-ended questions. The questionnaire was administered to a panel of 26 experts. The panel reached a consensus on most factors (i.e. coordinators, physicians, facility managers, rehabilitation exercise and fitness professionals, and integrated systems for facilities, trainers, and programs). However, no consensus was reached regarding ‘when an applicant can continue/discontinue an RSS program’, ‘establishing information systems to manage physical fitness of people with disabilities’, or ‘joint operation of the to-be-established system by the Ministry of Health and Welfare and Ministry of Culture, Sports, and Tourism’, leaving room for further debate. By identifying the factors and roles necessary for RSS, this study is expected to offer valuable information for state-led pilot projects and contribute to promoting physical activity and quality of life among people with disabilities.

Keywords: Person with disability, Rehabilitation sports, Public service system, Service design method, Design thinking, South Korea.

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Introduction

People with disabilities, compared with their peers without disabilities, are reported to have a higher prevalence of obesity, chronic diseases, and depression while maintaining a lower level of physical activity. For people with disabilities, sports activities can be used to prevent and treat diseases associated with physical inactivity, retaining the residual functional capacity and enhancing the therapeutic effect on affected body parts. Additionally, they can experience the psychological benefits of sports activities, such as finding new hope and adapting to a new lifestyle, even when depression sets in due to physical limitations. Moreover, sports activities can facilitate the enrichment of interpersonal relationships, self-esteem, willingness to cooperate and compete, self-confidence, and pride, thereby improving their adjustment in society. Thus, from a broad perspective, parasports can be used as tools for social integration.

According to the 2011 World Report on Disability, produced by the World Health Organization [1], the health care needs of people with disabilities are very high. Similarly, their interest

in and demand for physical activity are increasing in line with their growing enthusiasm for health care. People with disabilities that have been recently discharged from care may have trouble performing day-to-day activities, adapting to the physical changes, and dealing with psychological stress. It may take them considerable time to overcome these problems, and eventually, to achieve the desired rehabilitation outcomes. However, support programs and personnel specializing in health care, as well as resources for the physical and psychological adjustment of recently discharged people with disabilities, are severely lacking. In Korea, the annual average medical expense per person with a disability is steadily increasing; it is currently 3.1 times higher than that incurred by an inpatient without disability, and 3.3 times higher than that incurred by an outpatient without disability. Therefore, it is likely that disabled people will need extensive health care, causing them to incur high health care costs.

The WHO reports that people with disabilities are more vulnerable to poor overall health with the risk of developing additional disabilities and health problems, such as secondary

disabilities and complications [1]. According to an analysis of physical examination data from the National Health Insurance Service of Korea, smoking and body mass index are significantly associated with death among people with disabilities, 65.1% of whom are physically inactive [2]. A low level of physical activity among people with disabilities leads to a loss of muscle mass and strength and decreased range of motion [3].

Parasports have been sporadically initiated at the institutional level in Korea, progressing since South Korea hosted the Seoul Paralympic Games in 1988. In preparation for the event, promising athletes were recruited to win competitions and promote national prestige and image. In the 1990s, many parasport communities-in the form of social groups, federations, and associations-began to appear. These groups focused on elite athlete development with the goal of participating in high-profile sporting events such as the Olympics, Asia-Pacific competition, and world championships for each sport. The Korean Ministry of Culture, Sports, and Tourism (MCST) launched parasport services for selected types of sports to promote both the health and recreational activities of people with disabilities. Nonetheless, these services do not meet the needs of those recently discharged. To remedy this situation and motivate people with disabilities to enhance their physical, mental, and social abilities, in December 2017, the Korean government introduced the Act on Guarantee of Right to Health and Access to Health Services for Persons with Disabilities (hereinafter 'Disabilities Act'). Although the Disabilities Act led by the Ministry of Health and Welfare (MHW) emphasizes rehabilitation sports services (RSS), the implementation of such services has not taken place in the absence of a systematic framework and government-level support. Therefore, this study aims to gather the opinions of experts and determine the consensus on factors influencing the implementation of practical and systematic RSS using the Delphi method.

Methods

The Delphi technique involves a group of experts, under the assumption that two heads are better than one. This method has been used to effectively improve decision-making in the health care and social welfare sectors [4,5]. In the present study, a Delphi survey was conducted in two stages. An unstructured questionnaire was used to gather the opinions of experts in Round 1, the exploration stage. However, as a structured questionnaire can be used to simply and systematically survey a group [6], Round 2 used a structured questionnaire. A two-stage process was used because two steps have been demonstrated as sufficient to achieve the purpose of a Delphi study [7] (Figure 1).

Expert panel selection

We used the snowball sampling method to select experts in the area of rehabilitation sports for people with disabilities. We approached 31 stakeholders, ensuring a balanced panel composition-professionals in physical education and special physical education (n=10); specialists in rehabilitation medicine (n=11); other professions, such as professors in social welfare departments, heads of social welfare organizations, personal trainers for disabled people, and employees of organizations related to fitness for disabled people (n=10). The response rate in

Round 1 was 87% (27 participants; three from the rehabilitation medicine group and one from other professions withdrew). The response rate in Round 2 was 96% (26 participants; one from the rehabilitation medicine group withdrew). Regarding education level, 18 participants (69%) had a doctoral degree, five participants had a master's degree (19%), and three participants had a bachelor's degree (12%). The mean work experience was 20.5 ± 8.03 years.

Delphi survey questionnaire

The questionnaire was designed based on statements regarding preliminary RSS, which was created through design-thinking methods and the results of the literature review, and it was evaluated by expert reviewers (four professors and six researchers in rehabilitation sports). Specifically, the Delphi questionnaire contained a set of statements and domains, developed from the previously collected information on preliminary RSS and the results of the literature review, and each survey statement and domain were presented as a closed-ended question. To overcome the limitations of closed-ended questions, an open-ended question was added to each item, seeking respondents' free comments. All closed-ended questions used a 5-point Likert scale (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree). The Delphi questionnaire was distributed to the panel through email in each round. The first-round questionnaire comprised questions representing the following eight domains: 1) roles and duties of a 'coordinator', 2) roles and duties of a 'physician', 3) roles and duties of a 'sports facility manager', 4) roles and duties of a 'rehabilitation sports trainer', 5) integrated system on facilities, trainers, and programs (tentative name), 6) information system on physical fitness of people with disabilities (tentative name), 7) access to RSS for people with disabilities, and 8) implementation of RSS. The participants were asked to rate the necessity of each item, representing a factor influencing the framework establishment for RSS, and they were requested to provide additional comments on each item (Table 1).

Statistical analysis

Open-text comments were analyzed using the NVivo program (QSR International), which is used for qualitative data analysis. Three experts with doctorate degrees reviewed words occurring more than twice to ascertain whether the inclusion of additional factors would be necessary for Round 2. Analysis of responses to closed-ended questions was performed upon completion of each round using SPSS 21, and the results of the descriptive statistics were measured as mean and standard deviation, and central tendency statistics as median and mode. As a measure of content validity index (CVI) and a relative measure of statistical dispersion, a positive coefficient of variation (CV) was calculated as the standard deviation divided by the mean [6]. The stop criterion includes a $CVI \geq .750$ (75%) based on a valid percentage of responses with a mean score ≥ 4.0 [5,8] and positive rates such as CV, a relative measure of the dispersion of data, which is calculated as the standard deviation divided by the mean [6]. We used $mean \geq 4.0$, $CVI \geq .750$ (75%; [5,8]), and $CV < .500$ as the stop criteria. Panel members were requested to provide their feedback to statements that met these thresholds, and further adjustments, if necessary, were made with the panel's consent (Table 2).

Table 1. Delphi questionnaire structure.

Important elements of the questionnaire	Number of items			Question type	
	Round 1		Round 2	Round 1	Round 2
	Closed-ended	Open-ended			
Roles and duties of a 'coordinator'	8	3	12	Closed-ended Open-ended (Additional comments)	Closed-ended
Roles and duties of a 'physician'	22	3	28		
Roles and duties of a 'sports facility manager'	4	1	4		
Roles and duties of a 'rehabilitation sports trainer'	19	3	21		
Integrated system on facility, trainer, and program (tentative name)	8	2	14		
Information system on physical fitness of people with disabilities (tentative name)	9	3	11		
Disabled people's access to RSS	2	-	2		
Implementation of RSS	-	3	12		

Table 2. Major terms used in the Delphi method.

Term	Definition
Mean	The sum of values in the panel members' responses to each item is divided by the number of members. Stop criterion: mean value ≥ 4.0 .
Standard deviation	As a measure of dispersion, it indicates the degree of spread in the panel members' responses from the mean value and is calculated as the square root of the deviation of each item.
Median	The middle value of a set of the panel members' responses, when they are ordered. If the number of responses is odd, the value of the $(N+1)/2$ th. If the number of responses is even, the value of the $(N+2)/2$ th.
Mode	The value of the most frequently appearing response in a set of the panel members' responses to each item.
CVI	A valid percent of the panel members' responses with a score of 4 or more (positive rate). Stop criterion CVI value $\geq 75\%$.
CV	As a measure of dispersion, it refers to the degree of relative dispersion of the panel members' responses and is calculated as the standard deviation divided by the mean. Stop criterion CV < 500 .

Results

The results of the first-round survey revealed a significant difference in response characteristics and comments between the physical education and rehabilitation medicine groups in the panel. Therefore, we analyzed the difference between the two groups in addition to the overall survey results, as presented in Tables 3-10. Concerning the roles and duties of a coordinator, the statement, 'identify the physical condition of service applicants and provide them with appropriate services about the information system on facilities, trainers, and programs' was found to be appropriate (mean 4.29, CV 0.16) and necessary (mean 3.96, CV 0.28). However, 'coordinator' was not considered an appropriate job title for the position described. The statement asking where coordinators can be deployed in the context of community-based public organizations had a mean score < 4 , requiring further consideration among the parties involved.

The physician must identify disability status (4.88, CV 0.06) and perform cognitive tests (4.12, CV 0.20) to ensure that applicants can perform rehabilitation sports. Regarding the statement 'making decisions on whether an applicant can continue/discontinue RSS programs', the rehabilitation medicine group saw physicians as decision makers, while the physical education-related group advocated for mutual consent between physicians and trainers to make such a decision. The rehabilitation sports trainer was expected to identify the following through a doctor's prescription: the seriousness of disability (type), comorbid diseases and necessary precautions, pain areas associated with disability conditions, functional capacity (e.g. the ability to walk and stand without aid), gait

test results, joint ROM, stiffness test results, muscle strength (upper and lower extremities), bone density test results, sensory test results, infectious disease test (e.g. hepatitis, tuberculosis), and the appropriate type of exercise when participating in rehabilitation sports programs. Furthermore, they also need to assess the present status of adult diseases (e.g. hypertension and hyperlipidaemia), psychological tests (depression, self-esteem, and quality of life), and the applicant's intention (willingness and enthusiasm) to engage in sports activities.

The sports facility manager must ensure that applicants bring a doctor's prescription (or opinion), identify when the programs are offered in the facility, and provide information on cost and how to use a program. The manager should also submit a list of applicants for the RSS to a community centre.

The rehabilitation sports trainer must verify the doctor's prescription (or opinion), perform a motor function test (baseline), and have a meeting with the applicants to choose a suitable program for them (4.77, CV 0.10). Additionally, the trainer must have a meeting with each applicant to determine their needs during the service period (4.73, CV 0.09), perform a motor function test at the end of the RSS program (post-service), and have a meeting to discuss the completed program and plans (i.e. whether the applicant needs to continue or discontinue RSS) (4.81, CV. 0.06). Finally, the trainer should submit their opinion on whether the applicant can continue or discontinue RSS to the physician. At the end of an RSS program, the trainer must introduce a new program related to sports for all projects held by the MCST to help the applicant continue with physical activities. The trainer also needs to report, to a prescribed hospital, the changes in applicants' physical condition during RSS and post-

Table 3. Survey results for the 'roles and duties of a coordinator' domain.

Items representing 'roles and duties of a coordinator'		Round 1 survey results (mean)	Round 2 survey results							
			Overall						Physical education-related group	Rehabilitation medicine group
			mean	SD	median	mode	CVI	CV	mean	mean
Necessity of a 'coordinator'	3-1-1. Necessity of 'coordinator's roles'	4.00	3.96	1.11	4	5	0.731	0.281	4.21	3.29
Necessity of existing positions that can act as a 'coordinator'	3-2-1. Rehabilitation sports trainers working at fitness training facilities, including social welfare centres	-	3.23	0.90	3	3	0.423	0.280	3.53	2.43
	3-2-2. People responsible for community-based rehabilitation (CBR) at community clinic centres	-	3.65	1.02	4	4	0.654	0.279	3.53	4.00
	3-2-3. People responsible for social welfare services at community service centres	-	2.96	1.46	3	3	0.346	0.494	2.84	3.29
Necessity of 'coordinator's' duties and job title	3-3-1. Primary task: identify the physical condition of the service applicant and provide them with appropriate services about the information system on available facilities, trainers, and programs.	4.17	4.29	0.69	4	5	0.769	0.161	4.42	3.80
	3-3-2. Job title: 'Coordinator' is an appropriate job title for the position described in the paragraph of 1-3-1	3.13	3.08	1.18	3	2	0.346	0.383	3.21	2.60
Necessity of a new job title in place of 'coordinator'	3-4. Necessity of a new job title reflecting duties of a 'coordinator'	-	3.63	0.94	4	4	0.692	0.258	3.89	2.60
Workplace for the coordinator position	3-5-1. Community clinic centre	3.79	3.88	1.01	4	4	0.731	0.262	3.84	4.00
	3-5-2. Community service centre	3.42	3.25	1.43	3	5	0.423	0.440	3.53	2.20
	3-5-3. Welfare centre	3.42	3.13	1.12	3	4	0.423	0.360	3.47	1.80
	3-5-4. Regional associations of people with disabilities	2.42	2.13	0.90	2	2	0.077	0.423	2.16	2.00
Whether or not it is appropriate to assign the duties of a 'coordinator' to the people responsible for CBR at community clinic centres	3-6. Assign duties of coordinator to CBR personnel	-	3.50	1.32	4	5	0.542	0.377	3.17	4.50

Table 4. Survey results for the 'roles and duties of a physician' domain.

Items representing 'roles and duties of a physician'		Round 1 survey results (mean)	Round 2 survey results							
			Overall						Physical education-related group	Rehabilitation medicine group
			mean	SD	median	mode	CVI	CV	mean	mean
Necessity of duties of a 'physician'	4-1-1. Identify disability status	4.74	4.88	0.32	5	5	1.000	0.065	4.89	4.86
	4-1-2. Assess the enthusiasm to perform exercises	3.63	3.73	0.92	4	3	0.538	0.246	3.79	3.57
	4-1-3. Cognitive test	4.00	4.12	0.85	4	5	0.731	0.206	4.05	4.29
	4-1-4. Balance ability test	3.70	3.88	0.99	4	4	0.654	0.255	3.74	4.29
	4-1-5. Making decisions on whether applicants can continue/discontinue an RSS program	3.70	3.81	0.95	4	4	0.769	0.248	3.68	4.14
Making decisions on whether applicants can continue/discontinue an RSS program	4-2-1. Physician makes a decision	3.22	3.31	1.07	3.5	4	0.500	0.323	3.16	1.07
	4-2-2. Trainer makes a decision	2.85	2.85	0.94	3	3	0.154	0.329	3.11	0.94
	4-2-3. Decision is made upon consent from physician and trainer	3.93	4.27	1.02	5	5	0.808	0.238	4.58	1.02

Factors to be identified by the trainer in a doctor's prescription presented by an applicant	4-3-1. Seriousness of disability (type)	4.85	4.88	0.32	5	5	1.000	0.065	4.89	0.32
	4-3-2. Comorbid diseases and precautions to be taken	4.81	4.85	0.32	5	5	1.000	0.065	4.89	0.32
	4-3-3. Pain areas associated with disability conditions	4.67	4.77	0.37	5	5	1.000	0.079	4.84	0.37
	4-3-4. Functional capacity (e.g. the ability to walk and stand without aid)	4.41	4.54	0.70	5	5	0.923	0.154	4.47	0.70
	4-3-5. Gait test results	4.15	4.35	0.75	4.5	5	0.846	0.172	4.32	0.75
	4-3-6. Joint range of motion	4.33	4.38	0.82	5	5	0.808	0.187	4.32	0.82
	4-3-7. Stiffness test results	4.26	4.31	0.79	4.5	5	0.808	0.183	4.21	0.79
	4-3-8. Muscle strength (upper and lower extremities)	4.15	4.23	0.94	4.5	5	0.769	0.221	4.11	0.94
	4-3-9. Bone density test result	3.85	4.00	0.97	4	5	0.654	0.243	4.05	0.97
	4-3-10. Electrocardiographic stress test	3.89	3.92	0.91	4	5	0.654	0.232	3.95	0.91
	4-3-11. Sensory test results	3.96	4.04	0.82	4	4	0.692	0.202	4.00	0.82
	4-3-12. Cognitive test results	3.93	3.92	0.85	4	5	0.615	0.216	3.95	0.85
	4-3-13. Infectious disease test (e.g. hepatitis, tuberculosis)	4.30	4.42	0.77	5	5	0.846	0.175	4.53	0.77
	4-3-14. Recommend the type of exercise appropriate for applicants participating in rehabilitation sports program	3.96	4.23	0.98	4.5	5	0.769	0.231	4.21	0.98
Additional factors that the trainer should identify from a doctor's prescription	4-4-1. The present status of adult diseases (e.g. hypertension and hyperlipidaemia)	-	4.50	0.61	5	5	0.885	0.135	4.58	0.61
	4-4-2. Psychological test (depression, self-esteem, and quality of life)	-	4.19	0.67	4	4	0.808	0.160	4.32	0.67
	4-4-3. Origin of disability	-	3.65	0.90	3	3	0.462	0.247	3.58	0.90
	4-4-4. Disability prognosis (Expected progression)	-	3.77	0.91	4	4	0.615	0.242	3.95	0.91
	4-4-5. Applicants' intention (willingness and enthusiasm) to participate in sports activities	-	4.04	0.83	4	4	0.808	0.207	4.16	0.83
	4-4-6. The presence/absence of family support	-	3.77	0.91	4	4	0.615	0.242	3.95	0.91

Table 5. Survey results for the 'roles and duties of a sports facility manager' domain.

Items representing 'roles and duties of a sports facility manager'		Round 1 survey results (mean)	Round 2 survey results							
			Overall						Physical education-related group	Rehabilitation medicine group
			mean	SD	median	mode	CVI	CV	mean	mean
Task appropriateness of sports facility manager	Make sure that applicants bring a doctor's prescription (or opinion)	4.62	4.69	0.76	5	5	0.962	0.162	4.63	4.86
	5-1-2. Identify when the programs are offered within the facility	4.69	4.73	0.58	5	5	0.962	0.123	4.68	4.86
	5-1-3. Provide information on cost of services	4.46	4.54	0.69	5	5	0.923	0.153	4.42	4.86
	5-1-4. Submit the list of applicants for RSS to a community centre	4.38	4.46	0.67	5	5	0.923	0.150	4.32	4.86

Table 6. Survey results for the 'roles and duties of a rehabilitation sports trainer' domain.

Items representing roles and duties of a 'rehabilitation sports trainer'		Round 1 survey results (mean)	Round 2 survey results							
			Total						Physical education-related group	Rehabilitation medicine group
			mean	SD	median	mode	CVI	CV		
Task appropriateness of rehabilitation sports trainer	Checks the doctor's prescription (or opinion), performs a quick motor function test, and meets with the applicant to choose a program for them	4.44	4.77	0.50	5	5	0.962	0.105	4.84	4.57
	6-1-2. Meets with each applicant to determine their needs during the service period	4.48	4.73	0.42	5	5	1.000	0.089	4.79	4.57
	6-1-3. Performs a motor function test at the end of RSS (post-service) and has a meeting to discuss the program completed and future plans (i.e. whether the applicant can continue/discontinue RSS)	4.48	4.81	0.32	5	5	1.000	0.066	4.89	4.57
	6-1-4. At the end of RSS, introduces a new program effective as sports for all	4.67	4.85	0.23	5	5	1.000	0.047	4.95	4.57
	6-1-5. Submits their opinion on whether the applicant can continue/discontinue RSS to the physician	4.33	4.69	0.48	5	5	1.000	0.102	4.68	4.71
Additional factors on task appropriateness of rehabilitation sports trainer	6-2-1. Reports to a prescribed hospital changes in the applicant's physical condition that have occurred during RSS	-	4.42	0.69	5	5	0.885	0.157	4.42	4.43
	6-2-2. Ability to identify and assess post-service positive changes in physical, psychological, and social aspects	-	4.00	0.66	4	4	0.769	0.164	4.11	3.71
The need for a physical performance test during the service period (interim)	6-3. Conducts a physical performance test during the service period (interim)	-	3.50	1.21	3.5	3	0.500	0.345	3.74	2.86
Appropriateness of basic physical qualities assessed	6-4-1. Body composition	4.15	4.42	0.60	5	5	0.885	0.135	4.63	3.86
	6-4-2. Muscle strength	4.56	4.65	0.54	5	5	0.885	0.115	4.79	4.29
	6-4-3. Flexibility	4.15	4.35	0.90	5	5	0.808	0.208	4.47	4.00
	6-4-4. Muscle endurance	4.22	4.35	1.12	5	5	0.846	0.259	4.47	4.00
	6-4-5. Cardiopulmonary endurance	4.11	4.23	0.84	5	5	0.808	0.198	4.42	3.71
	6-4-6. Speed	3.22	3.19	1.18	3	3	0.308	0.370	3.21	3.14
	6-4-7. Balance	4.04	4.08	0.96	4	5	0.731	0.235	4.16	3.86
	6-4-8. Power	3.37	3.27	1.18	3	3	0.346	0.362	3.21	3.43
Additional factors on the appropriateness of basic physical qualities assessed	6-5-1. Assessment method for the type of disability	-	4.04	4.04	0.61	4	5	0.731	0.151	2.71

Appropriateness of motor function test items	6-6-1. Hand function	3.96	4.04	0.82	4	5	0.692	0.203	4.32	3.29
	6-6-2. Gait and lower limb function	4.26	4.31	0.77	5	5	0.769	0.178	4.58	3.57
	6-6-3. Upper limb function	4.19	4.35	0.60	5	5	0.846	0.137	4.63	3.57
	6-6-4. Balance ability	4.15	4.12	0.76	4	5	0.769	0.185	4.37	3.43
	6-6-5. ROM (Range of Motion)	4.00	4.19	0.69	4.5	5	0.808	0.165	4.42	3.57

Table 7. Survey results for 'an integrated information system on facilities, trainers, and programs (tentative name)' domain.

Items related to an integrated information system on facilities, trainers, and programs (tentative name)		Round 1 survey results (mean)	Round 2 survey results/descriptive statistics (mean)							
			Overall						Physical education-related group mean	Rehabilitation medicine group mean
			mean	SD	median	mode	CVI	CV		
Appropriateness and necessity of 'an integrated information system on facilities, trainers, and programs' (tentative name)	7-1-1. Necessity of establishing an integrated information system on facilities, trainers, and programs (tentative name)	4.56	4.69	0.37	5	5	0.962	0.08	4.84	4.29
	7-1-2. Facility location information	4.67	4.81	0.37	5	5	1	0.078	4.84	4.71
	7-1-3. Availability of facilities used exclusively for people with disabilities	4.33	4.38	0.76	5	5	0.846	0.174	4.37	4.43
	7-1-4. Program schedules	4.78	4.77	0.45	5	5	1	0.095	4.74	4.86
	7-1-5. Information on availability of rehabilitation sports trainers	4.7	4.85	0.32	5	5	1	0.065	4.89	4.71
	7-1-6. Information on programs (differentiated according to type of disability) being offered by each facility	4.89	4.92	0.23	5	5	1	0.047	4.95	4.86
	7-1-7. Information on the graduates of professional trainer training courses	3.93	4.12	0.91	4	4	0.808	0.221	4.05	4.29
	7-1-8. Information on rehabilitation sports programs available for each type of disability	4.52	4.65	0.96	5	5	0.962	0.205	4.63	4.71
Additional factors on the appropriateness of 'an integrated information system on facilities, trainers, and programs' (tentative name)	7-2-1. Programs differentiated by gender	-	4	1.05	4	5	0.692	0.264	4	4
	7-2-2. Programs differentiated by age group	-	4.19	0.56	4	4	0.885	0.134	4.26	4
	7-2-3. Fee information	-	Mar 4.	0.76	4.5	5	0.885	0.174	4.37	4.43
	7-2-4. The number of applicants on the waiting list and the estimated waiting period	-	4.19	0.83	4	4	0.846	0.199	4.16	4.29
	7-2-5. Applicant ineligibility conditions	-	4.5	0.61	5	5	0.923	0.135	4.58	4.29
	7-2-6. Instructions for a new sport (e.g. sports for all) to continue physical activities	-	4.42	0.5	4.5	5	0.923	0.112	4.63	3.86

Table 8. Survey results for ‘an information system on physical fitness of people with disabilities’ (tentative name) domain.

Items related to ‘an information system on physical fitness of people with disabilities’ (tentative name)	Round 1 survey results (mean)	Round 2 survey results/descriptive statistics (mean)								
		Overall						Physical education-related group	Rehabilitation medicine group	
		mean	SD	median	mode	CVI	CV	mean	mean	
Necessity of the information system on physical fitness (capacity) of people with disabilities (tentative name) and appropriateness of associated statements	8-1-1. Establishment of the above system	3.93	4.15	0.7	4.5	5	0.769	0.168	4.47	3.29
	8-1-2. Results of tests conducted by the physician (sharing the applicant’s medical information)	3.59	3.73	0.93	4	5	0.692	0.25	4.26	2.29
	8-1-3. Physician’s decision on whether the applicant can continue/discontinue RSS	4.07	4.23	0.61	4	5	0.846	0.145	4.47	3.57
	8-1-4. Disclose all the information the physician has compiled on the applicant to the trainer	3.78	3.85	1.07	4	5	0.654	0.278	4.16	3
	8-1-5. Results of physical performance tests conducted by the trainer	4.37	4.5	0.58	5	5	0.885	0.129	4.68	4
	8-1-6. Content of consultations conducted by the trainer	4.15	4.23	0.83	4.5	5	0.731	0.196	4.37	3.86
	8-1-7. Trainer’s opinion on whether the applicant can continue/discontinue RSS	4.15	4.15	0.61	4	5	0.846	0.147	4.47	3.29
	8-1-8. Disclose all the information compiled by the trainer to the physician	4.07	4.31	0.77	5	5	0.885	0.179	4.47	3.86
Additional factors on the appropriateness of ‘an information system on physical fitness of people with disabilities’ (tentative name)	8-2-1. Follow-up monitoring on applicants who completed RSS (quarterly basis for up to two years)	-	3.77	0.78	4	4	0.692	0.207	3.95	3.29
Appropriateness of the ‘Central Health and Medical Center for Persons with Disabilities’ as a unit overseeing both information systems (tentatively named) on the integration of facilities, trainers, and programs and physical fitness of disabled people	8-3. Central Health and Medical Center for Persons with Disabilities as a system management unit	3.7	3.77	0.96	4	4	0.615	0.254	3.84	3.57
Management unit of the information system on physical fitness of people with disabilities (tentative name)	8-4. Joint operation/ management by the medical and physical educational organizations	-	3.81	0.69	4	4	0.692	0.181	4.16	2.86

Table 9. Survey results for the 'Disabled people's access to RSS' domain.

Items representing 'Disabled people's access to RSS'						
Ideal number of trainees for training	Analysis of round 1 survey results (overall)			Analysis of round 2 survey results (overall)		
	No.	Agreed (people)	Percentage (%)	No.	Agreed (people)	Percentage (%)
	① Disabled people ≤ 5	11	40.74	① Disabled people ≤ 5	12	46.2
	② Disabled people ≤ 10	5	18.52	② Disabled people ≤ 10	5	19.2
	③ Disabled people ≤ 15	1	3.7	③ Disabled people ≤ 15	0	0
	④ Others	10	37.04	④ Others	9	34.6
	Total	27	100	Total	26	100

Ratio between trainers and trainees for training	Analysis of Round 1 survey results (overall)			Analysis of Round 2 survey results (overall)		
	No.	Agreed (people)	Percentage (%)	No.	Agreed (people)	Percentage (%)
	① 3 disabled people: 1 trainer	7	25.93	① 3 disabled people: 1 trainer	8	30.8
	② 4 disabled people: 1 trainer	1	3.7	② 4 disabled people: 1 trainer	3	11.5
	③ 5 disabled people: 1 trainer	6	22.22	③ 5 disabled people: 1 trainer	4	15.4
	④ Others	13	48.15	④ Others	11	42.3
	Total	27	100	Total	26	100

Table 10. Survey results for 'the implementation of RSS' domain.

Items representing 'the implementation of RSS'		Round 1 survey results (mean)	Round 2 survey results/descriptive statistics (mean)							
			Overall						Physical education-related group	Rehabilitation medicine group
			mean	SD	median	mode	CVI	CV		
Ways to help trainees participate in sports for all after RSS	10-1-1. Join a peer community	-	3.77	0.98	4	4	0.615	0.259	3.79	3.71
	10-1-2. Feedback channel to gather opinions of the trainer	-	3.62	1.16	4	3	0.538	0.320	3.68	3.43
	10-1-3. Implements regular monitoring after RSS	-	3.62	1.24	4	4	0.615	0.343	3.74	3.29
	10-1-4. Information sharing between the MHW and the MCST	-	4.00	1.01	4	5	0.731	0.254	4.16	3.57
	10-1-5. Exact definitions of rehabilitation sports and sports for all	-	4.04	1.05	4	5	0.731	0.260	4.11	3.86
	10-1-6. Provide patient and caretaker with sufficient information	-	4.23	0.98	4	5	0.846	0.231	4.21	4.29
	10-1-7. Provide appropriate assistive devices and equipment	-	4.00	1.13	4	5	0.731	0.282	4.05	3.86
Ways to promote sports for all services	10-2-1. Active invitation from physicians and nurses	-	4.58	0.45	5	5	0.923	0.099	4.74	4.14
	10-2-2. Furnishing promotional materials at community-based organizations such as welfare center, clinic center, service center, and district office	-	4.50	0.69	5	5	0.885	0.154	4.58	4.29
	10-2-3. Distribution of promotional leaflets at the time of discharge	-	4.62	0.54	5	5	0.923	0.116	4.79	4.14
	10-2-4. Instructions via cell phones	-	4.12	0.83	4	5	0.731	0.203	4.16	4.00
	10-2-5. Advertising through media platforms	-	4.27	0.63	4	4	0.885	0.148	4.21	4.43

service positive changes in physical, psychological, and social aspects. Although the first survey results revealed the need for a physical performance test during the service period (interim), a consensus was reached with a mean score of 3.5. Among the basic physical qualities of applicants that the trainer evaluates pre-service, 'body composition', 'physical strength', 'muscle strength', 'flexibility', 'muscle endurance', 'cardiopulmonary endurance', and 'balance' showed mean scores ≥ 4 . Additionally, the trainer must be familiar with 'how to assess each type of disability'. The rehabilitation medicine group presented a contrasting opinion, as their mean scores of 'body composition', 'cardiopulmonary endurance', 'balance', and 'how to assess each type of disability' were less than 4. Among the factors evaluated in the motor function test-'hand function', 'gait and lower limb function', 'upper limb function', 'balance ability', and 'ROM'-ROM was found to be appropriate given the mean scores ≥ 4 . However, the rehabilitation medicine group showed mean scores <4 for these factors, yielding different results from those of the physical education-related group.

An information system on facilities, trainers, and programs should be designed to contain the following information: facility location, availability of facilities used exclusively for people with disabilities, program schedules available in each facility, and availability of rehabilitation sports trainers (differentiated according to the type of disability) being offered by each facility. It should also include the database concerning graduates of professional rehabilitation sports trainer training courses and rehabilitation sports programs available for each type of disability. It can also include information on programs differentiated by gender and age group, program fee, the number of applicants on the waiting list and estimated waiting period, applicant ineligibility conditions, and instructions for a new sport (e.g. sports for all) to continue physical activities.

The information system on the physical fitness of people with disabilities (tentative name) had a mean score of 4.15, confirming its necessity. This further suggests that the physician must decide whether each applicant can continue or discontinue an RSS program and that all information compiled by the trainer through consultations and tests or opinions about each applicant must be disclosed to the physician. However, the rehabilitation medicine group did not reach a consensus on the necessity of the information system on the physical fitness of people with disabilities (tentative name) (mean score=3.29); thus, their viewpoint differed from that of the physical education-related group. The first survey raises the need for follow-up monitoring (quarterly basis for a maximum of two years) of applicants who have completed RSS programs; nonetheless, its necessity is not supported, given the mean score of 3.77. During the questionnaire development process, ideas of selecting the 'Central Health and Medical Center for Persons with Disabilities' as a unit overseeing the two aforementioned information systems (i.e. the integration of facilities, trainers, and programs and the physical fitness of people with disabilities) were discussed. Nonetheless, a consensus was not reached in this regard (mean scores of 3.70 and 3.77, respectively, in Rounds 1 and 2), meriting further consideration.

Although the ideal number of people with disabilities attending RSS programs was found to be ≤ 5 (46.2%), the panel suggested

the need for not only adaptive programs that can be customized according to the type of disability and functional capacity but also flexible change in the maximum number of trainees, depending on the nature of the program. To encourage trainees to participate in new sports activities (sports for all) organized by the MCST upon completion of RSS, providing enough information, including expected outcomes, was considered to be important (mean score =4.23), and 'information sharing between the MHW and the MCST', 'exact definitions of rehabilitation sports and sports for all', and 'supply of proper assistive devices and equipment' were considered necessary.

To promote active participation in RSS programs among recently discharged people with disabilities, the following were identified as necessary: 'enthusiastic invitation from a physician and nurse', 'furnishing promotional materials at community-based organizations such as welfare centre, clinic centre, service centre, and district office', 'distribution of promotional leaflets at the time of discharge', 'instructions via cell phones', and 'advertising through media platforms'.

Discussion

In this study, we used a Delphi survey to gather the opinions of many experts on a preliminary framework for RSS. During the process of developing the framework based on a literature review and the experiences of people with disabilities and stakeholders, expert consensus was reached on the use of doctors' prescriptions (or opinions) in place of basic physical performance tests suggested before, during, and after an RSS program. As an exception, if the applicant has a severe disability or it is difficult to identify their motor function through the doctor's prescription, a motor function test is performed pre-service. We identified a need to establish an integrated information system that people with disabilities can access via websites, apps, telephone, or consultations with coordinators to collect information on RSS in their districts.

Physical activities performed during leisure time in parks and gyms are known to reduce musculoskeletal and neuropathic pain in people with spinal cord injuries and eventually help them improve their physical and mental health and alleviate/prevent related complications [9]. Other researchers also report that regular physical activity helps prevent and manage various physical and mental health problems [9,10]. Sallis describes exercise as a vaccine that is essential for preventing chronic diseases and premature death. Therefore, recently discharged applicants with disabilities must present a doctor's prescription to help them safely engage in physical activities at the earliest. The medical and physical education groups are divided in their opinions regarding who should decide whether an applicant can continue or discontinue an RSS program. This finding suggests the need for further exploration of real-world practices through a pilot study and subsequent discussion regarding the required adjustments [11].

The trainer is expected to identify test results and other medical information through a doctor's prescription. To help applicants undertake RSS programs safely and efficiently, the trainer should identify the following: the seriousness of disability (type), comorbid diseases and precautions to be taken, pain areas associated with disability conditions, functional capacity (e.g.

the ability to walk and stand without aid), gait test results, joint ROM, stiffness test results, motion skills such as muscle strength (upper and lower extremities), and infectious disease testing (e.g. hepatitis, tuberculosis), given its impact on physical activity and adult diseases (e.g. hypertension and hyperlipidaemia). Mood disorders, such as depression and anxiety, resulting from a stroke can be relieved with low-intensity workouts such as yoga [12]. Moreover, physical activity has been reported to have antidepressant effects that help overcome depressive symptoms [13]. Similarly, this study underlines psychological factors, such as depression, self-esteem, and perceived quality of life, as important in influencing sports activities such as RSS. Additionally, the applicant's own intention (willingness) to participate in sports activities is found to have a greater impact on motor skill improvement than an invitation from family or friends; thus, the applicant's willingness should be assessed before the RSS program. Therefore, the physician must provide all the information in the prescription that the trainer should have.

The rehabilitation sports trainer must be proactive to prevent health and accident risks by focusing on, and reporting to a hospital, any physical signs that a trainee may develop during RSS, thereby, calling for the ability to identify and assess physical and psychological changes among RSS trainees.

The results also highlight the importance of establishing an integrated information system that provides information on accessible facilities, available trainers, and programs to allow people with disabilities to access RSS easily. Particularly, this study underlines the necessity of information on qualified trainers who can help recently discharged people with disabilities and give timely updates on new programs developed by academia, R&D institutes, and community clinic centres.

The establishment of an information system on the physical fitness of people with disabilities is considered necessary to enable easy access to the results of tests/assessments conducted to assess pre- and post-RSS changes in the trainees' physical/motor functions. As physical abilities are sensitive personal information, physicians, trainers, and facility managers must have different levels of authority to access and modify the information. Given that personal information is included, some panel members opposed the establishment of information systems. However, information systems are necessary to provide RSS systematically and efficiently and to promote health among people with disabilities. Therefore, the MHW and the MCST should strengthen their cooperation to help people with disabilities continue their sports activities by participating in sports for all services provided by the latter after RSS.

Conclusion

This study aimed to develop a framework for the implementation of public services designed to promote exercise and sports activities for the rehabilitation of people with disabilities. A framework in line with the growing demand for rehabilitation exercise and sports after the enactment of the Act on Guarantee of Right to Health and Access to Health Services for Persons with Disabilities in December 2017. To achieve this objective, a Delphi method was used to gather the opinions of related stakeholders, such as people with disabilities, service providers,

and experts in the medical and physical education sectors. A consensus was reached on most statements representing RSS; however, panel members did not agree on who should decide how long an applicant can participate in RSS programs. The statements that the panel agreed on need to be explored further in terms of the experiences of service users and providers by conducting a pilot study on rehabilitation sports. Additionally, further review and discussion are necessary concerning new policies, budgets, and cooperation with other government agencies for the effective implementation of RSS programs, and future studies should address in-service education designed to promote effective roles of the involved parties, including coordinators, physicians, and trainers.

Ultimately, this study may contribute to developing RSS to effectively bridge the gap between rehabilitation therapy provided in clinical settings after discharge and sports for all services led by the MCST and, more importantly, to help people with disabilities resume day-to-day activities as soon as possible. Continuous endeavours to improve RSS programs are expected to contribute to promoting health and quality of life in people with disabilities who face difficulties in managing their health. Finally, rehabilitation exercise and sports services for people with newly acquired or severe disabilities are effective not only in increasing their ability to manage their health but also in reducing socioeconomic costs by preventing chronic diseases and complications associated with disability.

Key message

- South Korea currently lacks a robust legal and administrative framework for the implementation of rehabilitation sports services for people with disabilities. Using the Delphi method, this study attempts to establish a consensus on how best to implement such services.
- A panel of 26 experts agreed on the need for coordinators, physicians, facility managers, rehabilitation exercise and fitness professionals, and integrated systems for facilities, trainers, and programs. However, some factors, including when participation in rehabilitation sports service programs should be discontinued, remain up for debate.
- Our results can help inform pilot projects by identifying the key factors needed for successful implementation of such programs, thereby helping to promote physical activity and quality of life among people with disabilities.

Authors' Contributions

Each author made significant individual contributions to this manuscript. JP: literature review, writing, data analysis, and critical review of the manuscript; DK: literature review, data collection, data analysis, and critical review of the manuscript; SDE: supervision of the study, conception of the study, and critical review of the manuscript. All authors have read and agreed to the final version of the manuscript.

Ethical Approval

Consent to participate

Informed consent was obtained from all individual participants included in the study.

Consent for publication

The participants have consented to the submission of the survey to the journal.

Conflicts of Interest/Competing Interests

The authors declare no conflict of interest.

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***Correspondence to:**

Seon-Deok Eun
Department of Clinical Research for Rehabilitation
Ministry of Health and Welfare
National Rehabilitation Research Institute
Seoul
Republic of Korea
Tel: +82-2-901-1934
E-Mail: nrc_rehab@naver.com