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Tele-rehabilitation for children with physical disabilities: qualitative exploration of challenges in Iran

Mahta Alsadat Aarabi¹ , Kianoush Abdi^{2*}  and Farin Soleimani³ 

Abstract

Background Children with physical disabilities (Having this type of disability can be due to any of the reasons such as cerebral palsy, genetic, developmental, neurodevelopment and any other reasons that cause physical disability in the child) need rehabilitation services. Tele-rehabilitation is a practical approach to *provide* rehabilitation services for children with rapid and continuous access. This approach has been used more recently and overcomes the limitations of conventional rehabilitation, which involves wasting time, traveling distance, and cost. The purpose of this study is to examine the challenges of telerehabilitation for children with physical disabilities such as cerebral palsy and developmental delay.

Method This study was conducted with the qualitative approach of content analysis in order to investigate the challenges of tele-rehabilitation services in Tehran in 2023. Twenty-two participants were selected based on purposeful sampling with maximum variation. Data was gathered through semi-structured and in-depth interviews with children's parents and tele-rehabilitation service providers. The interviews lasted between 15 and 75 min, and MAXQDA 10 software was used for data analysis. The conventional content analysis method of Granheim and Lundman was used to analyze the data. In this research, four Guba and Lincoln criteria including credibility, dependency, conformability, and transferability were used to evaluate the trustworthiness of data. This article is part of a more extensive qualitative study that explored the barriers and facilitators of these services.

Finding For the challenges of telerehabilitation services for these children, the researcher faced with 10 categories which were obtained after the investigation. The 10 categories are as follows: unorganized internet infrastructure, lack of a developed program, inefficient technology, disregard for ethical principles, lack of therapist information, visual and auditory limitations, cultural misconceptions, weakness of empathy and therapeutic alliance, Lack of familiarity with telerehabilitation, and the other online therapy problems.

Conclusion Finally, by identifying these challenges, it is possible to provide services with higher qualities to people of this group by reducing barriers. Also, the policy makers of the mentioned area should take more effective steps in order to provide this type of services to the families of children with physical disabilities, so that it ultimately leads to basic measures to improve the condition of these children.

Keywords Tele-rehabilitation, Challenge, Barrier, Obstacle, Children with physical disability, Iran

*Correspondence:

Full list of author information is available at the end of the article



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Introduction

Rehabilitation is vital for carrying out essential daily activities, improving the quality of life and increasing the life capacity of children with disability [1]. In conventional rehabilitation approaches in clinics or hospitals, people with disabilities have to travel a long distance to receive treatment, which leads to waste of time and money [2, 3]. Especially in Iran where there are many obstacles such as difficulty of access, financial problems and lack of necessary costs to provide rehabilitation services [4]. Unfortunately, families must move considerable distances to receive services from an interdisciplinary team of rehabilitation professionals. Traditional assessment and treatment service systems require a lot of time, high energy, long distances, high costs and long waiting times for appointments. Access to these care systems is difficult and expensive for parents [5]. After the emergence of Covid-19, the clinical and professional activities of face-to-face clinics were challenged and it became a good opportunity to officially start tele-rehabilitation in Iran. Although Tele-rehabilitation services have existed for many years and there are necessary infrastructure, laws and guidelines have been considered for it, but, there are no guidelines for tele-rehabilitation services in Iran [6]. Social distancing during the covid-19 pandemic provided a golden opportunity to implement telerehabilitation for children [7, 8]. Considering the physical limitations of children with physical disabilities, tele-rehabilitation programs will be the best option for these children and their families [9]. Tele-rehabilitation is also known as one of the effective methods of providing services to children [10]. However, significant obstacles to this method prevent its widespread use. Despite researchers' support for telerehabilitation of children, this practice has not been widely implemented in clinical settings due to the gap between implementation and research. The primary barriers to implementing this method are technological and perception barriers, liability concerns, and privacy concerns [10]. In Iran, which is considered one of the low-income countries, low speed internet connection, lack of awareness and knowledge of some rehabilitation experts and participants, as well as lack of legal insurance support, can affect the use of tele services [11].

In general, telerehabilitation services lead to rapid and continuous access [12]. However, due to the recent expansion of the use of this approach and the lack of time to design the basic infrastructure and planning necessary for implementation, it also has some problems. Therefore, it is very important to examine the obstacles that lead to improving the quality of tele-rehabilitation and ultimately improving the quality of life of children with physical disabilities and their families. According to the evidence and also experiences of the authors, no

questionnaire or quantitative study is able to investigate these challenges in depth. In order to examine these obstacles in a practical and in-depth manner, we can use the experiences of people who have been encountered using these services, which we can achieve only through in-depth interviews. The purpose of this research is to identify the challenges of tele-rehabilitation services for children with physical disabilities. This is achieved by using the experiences of the providers of these services and the parents of children with physical disabilities who have experienced these services. It is expected that by conducting this study, the necessary evidence will be provided for families, therapists, policy makers, and intervention managers to improve telerehabilitation services.

Materials and methods

Study design

Conventional content analysis was used in this research. In studies with this method, the required data are collected directly from the participants without any prior hypothesis. This study was conducted in order to explore the challenges of tele-rehabilitation for children with physical disabilities, from May 22, 2023 to November 11, 2023 in Tehran (as the capital of the country and the political, commercial and economic center of the country, the high volume of immigration from all over Iran to Tehran to receive services, work and even life, and finally the inclusiveness of all Iranian strata and regiments).

Setting and participants

In this research, the purposeful sampling method with maximum variation was used until data saturation was reached. In purposeful sampling, people are selected based on predetermined criteria and relevance to the specific research question. Also, in order to saturate the data as much as possible, the participants in this research had maximum diversity. For example, parents of children with different physical disabilities at different ages, education, cultural level, socio-economic status and therapists from different fields with different experiences were used. The participants were selected through students (therapist) of related fields, faculty members and clients of specialized centers of telerehabilitation services. Our inclusion criteria included parents and providers who had at least 6 months of experience receiving and providing telerehabilitation services. A total of 22 in-depth face-to-face interviews were conducted individually with parents of children with physical disabilities and telerehabilitation providers such as occupational therapists and rehabilitation consultants.

Data collection

Data gathering was done by the main researcher through interviews from May 2023 to November 2023. Data

were collected using semi-structured in-depth interview technique to guide the interview¹. Before attending the interview, the subject and purpose of the interview were explained to the participants. Then the interviewer appeared at the participant's desired location (usually rehabilitation clinics for clients and at their workplace for therapists) and after communicating with the participant, each interview began with a main question about "participants' perceptions and experiences of the challenges of telerehabilitation". Then it continued with follow-up questions based on the answers of the participants. The main question was: "Can you explain about the problems you faced in telerehabilitation according to your experiences?". At the end of the interviews, the mentioned items were checked with the participant. The interviews lasted between 15 and 75 min (only two interviews lasted about 15 min due to the participant's low literacy and inability to provide long answers and sufficient explanations), all of them were audio recorded and transcribed verbatim.

Data analysis

To analyze the data of this study, the conventional content analysis method of Granheim and Lundman (2004) [13] was used. This approach includes three stages of preparation, organization and reporting. In the preparation stage, a unit of analysis was selected [14]. The organization stage has three steps: open coding, classification and abstraction. In the organization stage, the researcher immersed himself in the data without considering the previous classes and tried to obtain new categories from the collected data. Then he chose some names for these new groups. In the open coding step, each text was read several times and then analyzed to better understand the participants' experiences. In the classification step, the codes are classified. The last step of the content analysis was to report the findings. In this step, we provided examples for each code and category [15]. In this research, data analysis was performed by using MAX-QDA version 10 software.

Trustworthiness of data

We used the strategies suggested by Lincoln and Guba, in this study. They introduced these four criteria, credibility, dependency, conformability, and transferability, that were crucial for trustworthiness [16]. For the credibility of the data, the researcher continued interacting with the data and the participants for a period of 6 months, along with frequent interviews [17]. Additionally, dependency was investigated by member check and

peer check strategies [18]. Member checking was conducted by reflecting the interview summary to the participant at the end of the interview process and peer review was conducted by another member of the research team regarding the appearance of the data. To increase data conformability, the researcher's background and interest in the topic and the preservation of research documents were used [16]. Another faculty member checked the quality of the texts of the interviews and the extracted classes.

Ethical considerations

All participant's information was confidential. The place and time of the interview were agreed with the participants. The researcher also got permission to record the audio. Their voice was removed after implementation. In addition, informed written consent was obtained from all participants after clarifying the purpose and process of the research. This article is derived from an approved research project at the Pediatrics Neurorehabilitation Research Center of the University of Social Welfare and Rehabilitation Sciences with ethical code IR.USWR.REC.1401.239.

Results

The research findings are shown in two separate sections. First, the demographic characteristics of the participants and then the classes and subclasses of challenges obtained from the content analysis of the conducted interviews are presented.

Demographic characteristics of participants

The participants of this study were selected by purposive sampling to achieve maximum diversity. In this research, 12 therapists providing telerehabilitation services (including 5 rehabilitation consultants, 5 occupational therapists and 2 telerehabilitation specialists (That is, those who have specialized centers in the field of telerehabilitation)) and 10 parents receiving these services (including 3 fathers and 7 mothers of children with various physical disabilities) participated. First, 20 interviews were conducted, and then, in order to ensure data saturation, 2 more interviews (22 interviews in total) were conducted. Study participants were selected from those who had sufficient experience in telerehabilitation. Because the data in qualitative studies is obtained based on the experience of the participants, not their raw views. The minimum amount of experience can be one month or one year. While according to researchers' experience, clients with 6 months of experience have completed more than 20 sessions and therapists with 6 months of experience have completed more than 200 sessions and are able to provide quality information in this field. Therefore, in order to enrich the data, we considered the minimum

¹. first author, ms Mahta alsadat Aarabi conducted interviews, she has the experience of conducting a large number of interviews and qualitative research. The interviews, codes and categories were reviewed by two faculty members specializing in qualitative research.

Table 1 Description of the demographic characteristics of the participants

No.	Sex	disability	Experi- ence (month)	Job
1	male	-	60	Therapist/ Faculty Member
2	male	-	12	Therapist/Rehabilitation Counselor
3	male	-	36	therapist/occupational therapist
4	male	-	60	Therapist/manager of a telerehabilitation team
5	female	-	24	therapist/occupational therapist
6	male	-	30	therapist/occupational therapist
7	female	-	24	therapist/occupational therapist
8	female	-	42	therapist/occupational therapist
9	female	-	36	Therapist/Rehabilitation Counselor
10	female	-	72	Specialist in pediatrics
11	male	-	30	Therapist/Rehabilitation Counselor
12	female	-	48	therapist/occupational therapist
13	male	Cerebral Palsy	18	parent/father
14	female	Cerebral Palsy	18	parent/mother
15	female	Genetic disorder	24	parent/mother
16	female	Autism	24	parent/mother
17	female	Physical and mental retardation	6	parent/mother
18	female	Movement delay	24	parent/mother
19	female	Cerebral Palsy	12	parent/mother
20	male	Cerebral Palsy	12	parent/father
21	male	Autism	18	parent/father
22	female	Cerebral Palsy	24	parent/mother

experience as “6 months”. The characteristics of the participants are shown in Table 1.

As mentioned, data analysis was done according to the following steps:

- 1- Writing brief and short codes (initial codes)
- 2- Classification of primary codes
- 3- Creating subclasses
- 4- Extraction of the main classes

The result of the analysis of the obtained data was 407 primary codes after removing unrelated codes and merging these codes based on overlap. By examining the primary codes, similar codes were placed next to each other in the same class and a primary classification of codes was obtained.

Table 2 Challenges of telerehabilitation services for children with physical disabilities

Sub Categories	Categories
1. Frequent internet disconnection	Unorganized internet infrastructure
2. Low internet speed	
3. Laws related to filtering	
4. Expensive infrastructure	
1. Lack of specific protocol	Lack of developed program
2. Weakness of organizational supervision	
3. Defects in the institutionalization of telerehabilitation	
1. Inadequate knowledge of using technology	Inefficient technology
2. Limited functionality of existing software	
3. Low software security	
1. Failure to respect privacy	Ignoring moral principles
2. Weak adherence to professional ethics	
1. The low level of science of therapists	The therapist's lack of information
2. Inadequate education and training of therapists	
3. Inadequate skill and ability of therapists	
1. Inefficiency of visual communication	Visual and auditory limitations
2. Discrete or unorganized communication	
1. The therapist's resistance to online services	Cultural misconceptions - resistance to change
2. Family's mistrust of social media	
3. Family misconceptions	
1. The difficulty of establishing therapeutic rapport	Weakness of empathy and therapeutic alliance
2. Weak empathy in cyberspace	
1. Low educational level of the family	Lack of familiarity with telerehabilitation
2. Not being familiar with telerehabilitation for the family	
3. Insufficient knowledge of the family	
1. Pressure beyond the capacity of the family	Online treatment hardships
2. Difficult management of online sessions for the therapist	
3. Lack of rehabilitation equipment at home	

The obtained samples were classified into 10 groups and 28 subgroups regarding the barriers of telerehabilitation for children with physical disabilities.

Table 2 shows the challenges of telerehabilitation services for children with physical disabilities.

Challenges

In this section, the challenges mentioned by the participants have been discussed.

Unorganized internet infrastructure

Disorganized Internet infrastructure was the most frequent and most important challenge expressed by both groups; therapists and especially parents. This class includes the subclasses of frequent internet disconnections, low internet speed, filtering rules and costly infrastructure. Out of 22 people interviewed, 18 people mentioned this problem and this challenge was the most repeated and the most important in this field.

In this regard, one of the parents expressed his experience as follows: (Participant no. 18)

“The first challenge I had at the beginning of my work was the problem of filtering and the low speed of the Internet, which even forced me to use a phone call instead of using applications such as WhatsApp or Telegram. This was costly in itself.”

Lack of developed program

One of the challenges that the service providers mentioned was the lack of programs. It includes the following subcategories: Lack of specific protocol, weak organizational supervision and defects in the institutionalization of telerehabilitation. 6 participants, all of them were experts, mentioned this issue.

One of the therapists said: (Participant no. 17)

“In some cases, there are deficiencies because we do not have a clear and defined therapeutically protocol, I mean a comprehensive protocol that tells us with a series of predetermined rules what is telerehabilitation? What are its uses? What professional ethics should be considered? And in general, what should be done in this process from the beginning to the end.”

Inefficient technology

Inefficient technology was also one of the most frequent complaints of providers and recipients of this kind of services, which we discuss in this section. Inadequate knowledge of using technology, limited capability of existing software and low security of software, are all of the sub-classes of inefficient technology. 8 participants mentioned this issue.

One of the participants explained: (Participant no. 6)

“After the severe filtering situation, it became difficult to observe physical disabilities, because it was not possible to make a video call at all, unless you used special applications, which unfortunately did not have enough facilities for our work.”

Ignoring moral principles

One of the most important requirements of telerehabilitation services is the observance of ethical principles, which is unfortunately neglected by some therapists and leads to complaints from parents. Ignoring ethical principles includes the subcategories of failure to respect privacy and weak adherence to professional ethics. 9 out of 22 participants mentioned this issue.

One of the parents says the following about neglecting moral principles: (Participant no. 10)

“When you accept a person or a therapist as a family member and send them your family videos, you expect your privacy to be preserved. But sometimes, unfortunately, it is not respected. Of course, they say from the beginning that your video will not be used. But

something interesting happened to me. One of the therapists sent me some videos of other children as examples and said that delete it as soon as you see and don't keep it. I just sent it for you to see. It made me feel bad.”

The therapist's lack of information

The findings show the lack of literacy and awareness of some service providers in the field of how to provide this type of service. The low level of knowledge of therapists, insufficient education and training of therapists, insufficient skill and ability of therapists are the subclasses of this class. 6 participants mentioned this challenge in their interview.

The statements of one of the parents are as follows: (Participant no. 10)

“Unfortunately, we have many therapists who are not trained for this work, they work with families who have problems, and it is necessary to deal with them more appropriately and have a better understanding of family problems.”

Visual and auditory limitations

The visual and auditory limitations of the existing devices and applications is an outstanding challenge that most of the participants also mentioned. The category of visual and auditory limitations includes inefficiency of visual communication and discrete or disorganized communication. 7 participants of this study mentioned this challenge.

The opinion of one of the parents was as follows: (Participant no. 14)

“I think therapists need to do the exercises they give us on another child and videotape them and send them to us. Because we do the exercises based on our imaginations until we see something. That's why I have made several mistakes in doing the exercises.”

Cultural misconceptions - resistance to change

Resistance to change is one of the major challenges related to our context and culture, which was mentioned by the participants. Therapist's resistance to online services, family's mistrust of social media and family's misconceptions are subclasses of cultural misconceptions. 12 participants of the study mentioned this challenge and this challenge was one of the most important things that can be seen from interviews with the participants.

One of the participants said: (Participant no. 4)

“The challenge that exists from both the therapists' side and the family's side is distrust. Especially a family whose traditional mentality is, for example, how do I want to work online? This lack of trust and lack of knowledge can be caused by the health system.”

Weakness of empathy and therapeutic alliance

One of the important pillars of rehabilitation services is creating a therapeutic alliance, which requires face-to-face communication. The participants admit that by providing these services, we will face a decrease in the quality of empathy and weakness in the therapeutic alliance. Weak empathy and therapeutic alliance include the following 2 subcategories: difficulty establishing therapeutic communication and weak empathy in cyberspace. This challenge was raised by 8 participants and was considered as one of the relatively important concerns of clients.

The statements of one of the therapists regarding the lack of quick communication between clients and therapists were as follows: (Participant no. 2)

“We have something called the therapeutic alliance in rehabilitation; this communication is facilitated faster in a face-to-face setting. We don’t need additional work to establish this communication. It set as soon as you see them and their conditions. This intimacy and good relationship should be formed sooner, this is very important and the main point of the story, and if this good relationship does not happen, this relationship will not be given or taken.”

Lack of familiarity with tele-rehabilitation

One of the major and serious problems of families in all areas of rehabilitation is insufficient knowledge, which is more evident in this approach. Low educational level of the family, lack of familiarity with telerehabilitation, and their insufficient knowledge are the subcategories of this category. This issue was raised by 13 participants and it can be felt in the interview with other participants.

One of the participants expressed his experience in the field of family insufficient knowledge as follows: (Participant no. 15)

“The awareness of families should be raised because some of them have wrong beliefs about telerehabilitation. This awareness can be raised through television and some classes. Because some of the parents we talk to do not have enough information and knowledge about receiving this kind of services.”

Online treatment hardships

Due to the family-oriented nature of telerehabilitation services for children with physical disabilities, sometimes, they face pressure beyond their capacity, which prevents them from continuing the way or even makes it difficult for the therapist to manage the sessions. These problems are grouped into three sub-categories: pressure beyond the capacity of the family, difficult management of online sessions for the therapist, and lack of rehabilitation equipment at home. 7 participants mentioned this

issue due to the parent-centered nature (Especially in homework) of these services.

One of the participants pointed out: (Participant no. 5)
“The mission of online therapy becomes difficult because you’re supposed to train an assistant, actually train somebody to be your assistant, to be your eyes, to be your hands, and so you have to make part of the therapy easy for the family to be able to Do it. Because you are going to lead the family as a coach.”

Discussion

Due to the increasing use of tele-rehabilitation services, there is a need to investigate the challenges of this method more deeply in different groups of people in need of rehabilitation, such as children with different disabilities. In addition, this discussed field is facing rapid growth in Iran, and despite the various advantages of this method compared to face-to-face meetings, many disadvantages can also be imagined for it. The current research was conducted with the aim of investigating the challenges of tele-rehabilitation services for children with physical disabilities, and the results are as follows:

Among the obstacles of tele-rehabilitation services, we can mention the categories of unorganized internet infrastructure, lack of a developed protocol, inefficient technology, disregard for ethical principles, lack of therapist information, visual and auditory limitations, cultural misconceptions, weakness of empathy and therapeutic alliance, insufficient knowledge of family and online treatment problems.

Iranian studies

Gharib and Rahmani studies in a part of the study of tele-rehabilitation in the covid-19 pandemic listed many obstacles related to the implementation of the digital method in the country, including infrastructure, as well as things such as legal responsibility, ethical issues such as confidentiality, equipment, computer literacy and speed of the Internet. All the obstacles mentioned in this research are completely consistent with the findings of the current research and other issues have been mentioned and completed the previous ones [6].

Also, Rabbani Far et al.’s study showed that the Implementation and execution of tele-rehabilitation in Iran is faced with many serious obstacles, and they listed inadequate infrastructure and insufficient knowledge of the use of equipment as the most important obstacles to the implementation of tele-rehabilitation services, that both are completely consistent with the findings of the present study and are two important categories of the ten categories obtained in this study [19].

Also, in the study of Najafi et al. poor access to services and inattention to new technologies have been mentioned as the challenges of implementing rehabilitation

in Iran, and in the present study, the participants also pointed to technological problems [20]. This study has pointed out the challenges of face-to-face rehabilitation. But technological problems in this field are also considered a challenge.

Studies of other countries

In other studies related to tele-rehabilitation services in other developing countries such as Saudi Arabia and Malaysia, barriers such as technical issues, lack of information, lack of participation in planning, lack of exposure to electronic health care information, resistance to change, no use of hardware and software, poor connectivity, skill problems therapists, service providers' tendency to high costs and finally the effect of policy-makers' attitude on the use of tele-rehabilitation services are mentioned [21–24]. In the present study, which has been investigated in the developing country of Iran, most of the above cases have been mentioned with completely similar concepts. But the two challenges of non-participation in planning and the willingness of service providers to high costs were novel and none of the participants faced these challenges.

In a study, Annaswamy et al. similar to the study above, examined barriers to tele-rehabilitation services for people with disabilities and noted the following: operational, communication, regulatory and unique challenges, as well as barriers related to infrastructure and access [22]. In general, this study has examined the challenges in a more general way and has not dealt with its details in a practical way like the present study.

And finally, in the study of Leochico et al., the lack of an appropriate framework, lack of national policies and laws, lack of public acceptance of telehealth, lack of knowledge and skills, and concerns related to the protection and security of private data and lack of access to the Internet are the main obstacles identified in the implementation of tele-rehabilitation, which is all consistent with the findings obtained from the interview with the participants of the present study and it is interesting that the participants of this study also mentioned all these things. but it seems that acceptance in this study has a different meaning compared to our study and is not due to lack of knowledge [23].

According to the challenges presented by the participants, it is possible to help improve telerehabilitation services for these children by considering the following: upgrading the country's Internet infrastructure, providing comprehensive tele rehabilitation protocols and programs for all groups, considering ethical rules such as the principle of confidentiality, familiarizing people (especially with low literacy levels) with technology and promoting the knowledge and attitude of everyone in this field.

Conclusions

Considering the vastness of Iran's geography and scattered access to rehabilitation centers, tele-rehabilitation is an important step in our country to reduce the severity of disability. The present study showed that there are many challenges in using tele-rehabilitation services for therapists, children and their families. Especially in developing countries like Iran, where sufficient support is not provided and such services are not planned. The role of education and awareness in this field should be taken seriously. In addition, policy makers, service providers and families of these children should be aware of the challenges and pay special attention to this issue. Also, conducting more qualitative research in this field is recommended. Finally, this study showed that due to the existence of serious problems in the use of telerehabilitation services for children with physical disabilities, their families and therapists, it is necessary to take basic measures to solve these problems and make serious changes.

This study is expected to provide evidence for rehabilitation managers and policy makers to improve teleservices and ultimately help improve their conditions and quality of life.

Limitation of the study:

- One of the limitations of the study is that the experiences of other related groups such as policy makers were not used and we only used the experiences of the two main groups that directly experienced the implementation of this program.
- Another limitation of this study is that it is limited to one city and country and is considered local. These concepts can be examined at the international level as well.
- And finally, another limitation of the study is that due to the lack of direct connection between the obtained themes, the study did not move towards creating a single theme.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12887-024-05341-6>.

Supplementary Material 1

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Author contributions

All authors contributed to this project and article equally. All authors read and approved the final manuscript. first author: Mahta Alsadat Aarabisecond and correspond author: Kianoush Abdithird author: Farin Soleimani.

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Data availability

The datasets generated during the current study are not publicly available because the participants were assured in the informed consent form that their interviews will be reviewed only by the researchers and will not be made available to anyone but are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

In this research, informed consent was obtained from all participants, and also this research has the ethic code of the University of Social Welfare and Rehabilitation Sciences (IR.USWR.REC.1401.239).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

¹PhD Student, Department of Counseling, Pediatric Neurorehabilitation Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran

²Associate Professor, Department of Rehabilitation Management, Pediatric Neurorehabilitation Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran

³MD, Pediatrician, Research Professor of Developmental Pediatrics, Pediatric Neurorehabilitation Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran

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