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A role-playing program's effect on social intelligence in deaf children with cochlear implants

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Abstract: This study investigates the impact of training programs based on role-playing in improving social intelligence (SI) skills among a sample of deaf children using cochlear implants. The researchers employed an experimental method with a sample of fifteen children with cochlear implants, aged between 9 and 13 years. The results indicated that training programs based on role-playing significantly improved SI skills among deaf children with cochlear implants, as evidenced by a notable difference between pre-test and post-test scores in favor of the post-test. Deaf children demonstrated enhanced social interaction skills after the training, which can be attributed to the use of role-playing, stepwise reinforcement, and direct communication. Improvements in language, teamwork, and emotional expression highlight the program's effectiveness in fostering social integration. Training children with cochlear implants through role-playing and stepwise reinforcement effectively enhanced their SI skills. Among the research recommendations, it is suggested that the curriculum and rehabilitation plans for deaf children with cochlear implants should incorporate classroom and extracurricular social activities based on role-playing to further improve their social intelligence skills.

Keywords: *Cochlear implants, Deaf children, Role-playing, Social intelligence.*

1. Introduction

Hearing impairment affects the linguistic, psychological, social, emotional, and academic development of children. Suppose a hearing-impaired individual does not receive the necessary support, assistance, and appropriate programs to overcome the adverse effects of deafness; it can hinder their ability to understand others and successfully interact with them.

The sense of hearing plays a vital role in language acquisition, which represents the cornerstone of communication and interaction with others. Therefore, hearing loss has a significant impact on language acquisition, as it is one of the most essential means employed in acquiring and developing experiences.

The importance of this research lies in improving SI skills among deaf children with cochlear implants through training on the role-playing strategy, so they can integrate into society, interact with those around them, and enhance their social communication abilities.

Consequently, hearing loss leads to a deficiency in social skills among children, which results in a tendency toward social isolation and a reluctance to form friendships and new relationships, negatively affecting their social development and lowering their level of SI [1].

Training deaf children to acquire SI skills leads to successful positive outcomes in their social communication, reflected in their increased ability to establish healthy social relationships, their desire for social interaction, and an elevated level of SI [2].

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Due to the tremendous advancements in the field of medical technology, cochlear implants have spread as an alternative to hearing aids, used to enhance verbal communication capabilities among the deaf and assist children with cochlear implants in improving their SI.

The current research aims to present a training program based on role-playing strategies to enhance SI among deaf children with cochlear implants. SI is an essential aspect for children in general and particularly for children who are deaf and have a cochlear implant; it reflects their social compatibility and interaction with their surrounding environment. Hence, there is a necessity to offer a training program aimed at improving SI among deaf children with cochlear implants.

Through the researcher's repeated visits to the rehabilitation centre for disabled children in Riyadh, Saudi Arabia, a significant number of deaf children with cochlear implants were observed. With advanced technology in auditory aids, cochlear implants emerged to alleviate the severity of hearing impairment in these children and enhance their ability to acquire and learn language and develop their listening and communication skills.

This, in turn, helps in developing their SI skills and training them in spoken language, enhancing their hearing ability instead of relying on sign language, so they can communicate with others and build successful social relationships.

2. Literature Review

The theoretical framework for this research can be divided into three parts: deaf children, SI, and a role-playing-based training program, as follows.

2.1. Deaf Children

The sense of hearing is one of the most important senses that individuals rely on in their interactions with others during various life situations, as it serves as a gateway for receiving external stimuli, allowing individuals to coexist with others. Therefore, hearing impairment is considered one of the most severe and challenging sensory disabilities affecting individuals, as it results in the loss of the ability to speak; thus, it is difficult for the deaf to acquire language and verbal communication, which impacts their social adaptation and the acquisition of various life skills.

Due to their lack of essential means of communication and social interaction, namely verbal language, as well as the difficulty in expressing themselves and understanding others and being understood, and the challenges of verbal communication necessary for establishing social relationships, hearing-impaired individuals tend to avoid collective social interaction situations and lean towards individual interaction situations, leading to social isolation due to their feelings of not participating or belonging to other children [3].

The auditory system consists of three separate sections: the outer ear, the middle ear, and the inner ear. The Outer Ear has a function to gather sounds and transmit them to the inner ear via the eardrum, where the surrounding air carries sound through sound waves. It captures these waves and sends them through the auditory canal to the middle ear [4]. The Middle Ear consists of the malleus, stapes, and incus, and its function is to transfer sound stimuli from the outer ear to the inner ear [5]. The Inner Ear represents the inner part of the ear, containing the cochlea, which converts all sound vibrations coming from the middle ear into nerve impulses that travel along the auditory pathway to the brain for processing [6].

The cochlea is the part responsible for analysing and amplifying sound, transforming it from composite waves into neural impulses that the brain analyses and decodes [7]. The hearing process enables humans to acquire and learn language by processing sound signals received through the sense of hearing and translating them into sounds. This process allows individuals to communicate with others in various life situations. The hearing process consists of several steps, as mentioned by McKay, et al. [8].

1. The outer ear collects sound waves and directs them to the eardrum.
2. The eardrum vibrates with the sounds.

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3. Sound vibrations are transmitted to the cochlea.
4. Vibrations are converted into nerve signals received by the auditory nerve.
5. The nerve signals are sent through the auditory nerve to the brain.
6. The brain translates the nerve signals into sounds.

While a Cochlear Implant is considered one of the most important scientific achievements in the field of auditory disabilities, it serves to enhance communication with the outside world, break isolation, promote interaction with the environment, and activate verbal communication with individuals.

It is an electronic device measuring 52 mm in length and 15 mm in width, which is implanted under the skin to create auditory sensations based on electrical stimuli to the auditory nerve [9]. This device differs from hearing aids that rely on increasing sound volume; it stimulates the auditory nerves and converts nerve vibrations into sound signals, enhancing the ability to communicate with society [10]. Additionally, cochlear implantation is one of the most significant methods that aid in acquiring spoken language and processing and interpreting auditory information, thereby facilitating successful and effective communication between the deaf and other members of their community [11].

Children who receive cochlear implants early have a greater chance of acquiring language, developing auditory-verbal skills, and applying them in various life situations. The earlier the cochlear implant is performed, the greater the child's vocabulary and auditory development, allowing them to be comparable to their hearing peers and capable of processing and utilizing auditory information [12]. Thus, cochlear implants help increase children's vocabulary and enhance their ability to use acquired language for effective communication with those around them, which in turn supports the better development of their SI skills. Children's ability to communicate socially grows through the development of their verbal communication skills and understanding spoken language, enabling them to apply it in life situations, which enhances social interaction [13].

Rehabilitating deaf children through cochlear implantation is considered the best means to reduce the negative consequences of deafness; it provides children the opportunity to receive auditory stimuli close to that of a typical child, and it offers them the chance to develop language and comprehension, facilitating a more natural communication with their surrounding environment [14].

2.2. Social Intelligence (Si)

SI is a type of general intelligence that relates to an individual's ability to enter and maintain mutually positive social relationships with others, as it involves the individual's capacity to interact with others and form successful relationships. The more a person enjoys engaging in social interaction and establishing relationships with others, the more intelligent they are [15].

While some others see SI as the ability to perceive social relationships, understand people, and interact with them, as well as to behave appropriately in social situations and demonstrate wisdom in human relationships, which leads to social adaptation and the success of an individual in their social life. What a child can do today with the help of others, they will be able to do it alone in the future if given the proper attention that guides them to acquire the appropriate amount of SI skills that enable them to build constructive social relationships and live peacefully with others [16]. The interest in the topic of SI skills is evident as they represent, along with cognitive abilities, the poles of competence and effectiveness in daily life and interactions with others [17].

We can improve SI skills through educational communication during learning by employing teaching methods that focus on dialogue and interaction among all participants. This approach helps refine and enhance social communication abilities in learners, facilitating their effective integration into society. As children transition to school, their social communication skills develop alongside their social relationships within the school environment. Their need to use SI skills with peers grows, encompassing activities such as group discussions, storytelling, role-playing, and engaging in diverse activities [18].

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The lack of SI skills has negative impacts on individuals and society. Individuals who suffer from deficiencies in SI skills are unable to establish successful social relationships and cannot adapt to society. Those individuals who experience some form of maladjustment in their lives due to weak social skills are more prone to psychological and mental disorders.

The lack of these skills leads to a reduction in physical activities, initiative, and social communication, as well as a weakened ability of the individual to successfully interact socially [19]. Moreover, a high level of SI skills contributes to an increased ability to influence others through understanding the nature of social interactions, the ability to empathize with others, and the use of persuasive methods to create the maximum number of successful human relationships, and to engage in situations that require social interaction and integration with others.

The high level of SI skills is among the most crucial factors that help achieve social adjustment within the groups to which the individual belongs, and it allows them to skilfully participate in others' activities, leading to increased self-confidence and the ability to integrate into society successfully [20].

The impact of hearing impairment on SI can affect various developmental aspects of deaf individuals in all areas, and this impact is evident in linguistic, psychological, social, cognitive development, and academic achievement [21]. Based on the above, we can conclude that hearing impairment affects various aspects of development in individuals with hearing disabilities, as it impacts linguistic, psychological, social, emotional, and academic growth; therefore, they require support.

Social skills and the ability to recognize the subtle details of the social communication process are an integral part of successful communicative interactions. Deafness leads to limited SI skills [22]. Deaf children differ from other children with disabilities, as children with different disabilities can learn to communicate with the world around them. In contrast, deaf children cannot communicate with others without specific means of communication [23].

Given the impact of deafness on SI and communication skills in children compared to their typically developing peers, it requires assisting these children in acquiring the necessary skills and experiences that help them achieve social adaptation and communicate positively with others. The suffering of these individuals due to the poverty of social communication methods makes them prone to shyness and social withdrawal, characterized by ignoring the feelings of others, misunderstanding their behaviours, selfishness, emotional dissonance, low self-assertion, distrust of others, aggressive behaviour, negativity, and contradiction [6].

These children tend to isolate themselves and withdraw from social situations that require direct interaction with their peers or those around them due to their lack of experience and shortcomings in social interaction skills. Deafness leads to a clear deficiency in SI skills, making them more prone to isolation compared to their typically developing peers. They experience a stronger sense of psychological loneliness compared to both their disabled and typically developing peers, and they are less responsible and less knowledgeable about social behaviour rules [24].

Thus, these children need to develop their SI skills through suitable strategies such as peer imitation and role-playing, so they can communicate with their peers and interact with others in various life situations positively.

2.3. The Training Program Based on Role-Playing

Role-playing helps children acquire experiences that enhance their social interaction; through it, we can train the child to perform social roles and build positive relationships with their peers, which helps develop and reinforce their SI skills.

Teachers and specialists can encourage deaf children to communicate with their peers and engage in verbal and non-verbal interactions through role exchanges and participation in various activities, which leads to increased self-confidence and the development of their SI skills [25].

The role-playing strategy aligns with children's inclinations and orientations, as play is highly appealing to them and reflects their goals, interests, and attitudes, as well as contributing to improving social growth in children. Additionally, children's social maturity occurs through various social practices

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represented in role-playing, engaging in various activities, and playing with peers, which enhances social growth through the child's interaction with others [26]. In daily interactions, a person encounters many life situations that require practicing social roles that vary depending on the situation; therefore, it is essential to train children on various techniques and strategies, such as role-playing and acting, to help them successfully perform social roles.

Social interaction deficiency is a fundamental characteristic of deaf children, which necessitates training in social interaction through certain strategic activities such as playing with peers, role-playing, and dramatization [27]. Deaf children are trained in social interaction through role-playing that illustrates various life situations and relationships, aimed at developing and enhancing their SI skills.

The deficiency in a child's SI skills is a warning sign for their psychological, social, and educational development. When a child lacks one or more communication skills, they cannot, at the receptive level, understand the incoming messages, nor can they, at the expressive level, effectively communicate their messages to others [28].

Some terminology is necessary here to provide the theoretical background.

- Training Program: It is a set of organized procedures that includes planned services based on scientific principles aimed at developing children's skills so they can interact with others in social situations and build healthy social relationships.
- Role-Playing: It is defined as a process of equipping children with SI skills through role-playing to help them perform their social roles in life.
- Deaf Children with Cochlear Implants: They are individuals who have lost the ability to hear and have been fitted with a cochlear implant to enable them to hear sounds clearly.
- SI: It is the ability to interact with others, understand their moods, intentions, motivations, and feelings [29].

A designed scale by Marc [30] to enhance communication skills in kindergarteners (ages 5–6) with speech difficulties, and developed an unsupervised role-playing program to promote interaction and free expression. Using a quasi-experimental approach with 10 children, the study assessed the program's effectiveness and sustainability. Role-playing offers educational scenarios that boost communication, social skills, self-efficacy, and social integration through natural play and conversation opportunities.

Social communication skills of elementary school students were enhanced by Mallory [31] with cochlear implants through the implementation of a role-playing strategy in educational activities. The study applied a social communication skills scale to a sample of 20 fifth-grade students with hearing impairments who had cochlear implants. The results showed a significant improvement in the participants' performance on the social communication scale, with statistically significant differences between pre-test and post-test scores.

A quasi-experimental study was conducted by Ezz El-Din [32] to examine the role of role-playing in developing Islamic behavioural etiquette in 60 kindergarteners (5-6 years). Using pre-post testing with control and experimental groups, the research employed Raven's Matrices and a researcher-developed etiquette scale. Results showed significant improvement in the experimental group's post-test scores compared to controls, with maintained gains at follow-up. The study demonstrates role-playing's effectiveness for character development in Islamic early education, highlighting how play-based pedagogies can align with religious curricula while producing sustainable behavioural outcomes.

The effectiveness of role-playing strategies in improving quality of life for students with autism spectrum disorder (ASD) using a quasi-experimental design with pre-post testing by Filer [33]. The study measured outcomes through standardized quality-of-life assessments. Results demonstrated statistically significant improvements in post-test scores compared to baseline measurements, with notable differences in means and standard deviations. The findings support role-playing as an effective intervention for enhancing quality of life in ASD students, validating this approach for special education

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applications. This research contributes to evidence-based strategies for supporting neurodiverse learners through experiential techniques.

Hakimi [34] investigating kindergarten teachers' perceived role in developing social intelligence among preschoolers in Taif province was carried out by Hakimi [34]. Descriptive methodology is used; the study surveyed 176 kindergarten teachers through a researcher-developed scale. Results indicated that teachers perceived themselves as playing a very high-level role in fostering children's SI. However, the study found no significant differences based on teachers' years of experience or academic qualifications. These findings highlight kindergarten educators' strong self-efficacy in social intelligence development while suggesting these demographic factors may not substantially influence their pedagogical approaches in this domain.

The level of SI among kindergarten children was studied by Goleman [35] using a descriptive research method. The study revealed advanced developmental progression in social intelligence scores among participants. These findings contribute to our understanding of early childhood socio-emotional development, suggesting that foundational social intelligence competencies develop during the kindergarten years.

Development of SI skills among middle school students (N=60) using a quasi-experimental design was examined by Babu [36]. Analysis shows a statistically significant improvement in both SI and quality of life dimensions for the experimental group when comparing pre-test and post-test results. These findings indicate that targeted interventions can effectively enhance adolescents' social competencies while positively impacting their overall well-being.

3. Methodology

Objectives of the research can be carried out by identifying the effectiveness of a training program based on role-playing to improve SI among deaf children with cochlear implants and identifying the continuity of the effectiveness of a training program based on role-playing to improve SI among deaf children with cochlear implants. This study investigates the following research questions:

1. What is the effect of a training program based on role-playing on the level of SI in deaf children with cochlear implants?
2. Are there statistically significant differences in pre-test, post-test, and follow-up measurement scores of the SI scale among deaf children with cochlear implants?

To address these questions, this research applies the experimental method aimed to determine the effect of the independent variable (training program) on the dependent variable (SI) for the study sample among a group of children who are deaf and have cochlear implants, aged between 9 and 13 years, consisting of 15 children. The training program was designed for children at a rehabilitation centre for disabled children in Riyadh, Saudi Arabia, with cochlear implants, composed of 28 sessions, implemented twice a week over the first three months of 2024.

A research hypothesis can be extracted from the research questions to be:

1. There are statistically significant differences between pre-test and post-test scores on the dimensions of the SI scale and the total score for the experimental group in favour of the post-test.
2. There are no statistically significant differences between post-test scores and follow-up test scores on the dimensions of the SI scale.

Research Tools used for this research depend on two source scales, one is published, and the other is designed by the study researchers.

3.1. First scale: Social Intelligence Skills Scale for Children (Developed by Elburai [29])

This scale assesses the level of social intelligence skills in deaf children with cochlear implants. The Elburai scale is applied in our research because of its validity for use with deaf children aged from 9 to 13 who have cochlear implants, and due to the high reliability and validity of the scale. The Elburai scale contains 48 items divided into four dimensions: Social perception, social adjustment, social

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knowledge, and social competence. Each dimension consists of 12 items. These items are phrased in a manner appropriate for the target population.

Responses are scored using a 3-point scale: "Always" with 3 points, if the item fully applies to the subject, "sometimes" with 2 points, if the item partially applies, and "never" with 1 point, if the item does not apply. Note that on scoring, "positive items" are scored as above, and negative items are scored below (reverse-scored). The total scores ranged from 48 to 144 points.

3.2. Second Scale: Role-playing-based training program (Developed by research authors)

This program is designed to improve social intelligence skills in deaf children with cochlear implants. The program structure of 28 training sessions was conducted at Al-Amal Rehabilitation Center for Children in Riyadh—program frequency: two sessions per week for over three months. Appropriate activities are selected based on children's age and level. Introduce support with emphasis on encouragement, participation, play, and creativity.

3.3. Training Program Implementation Steps

1. Preparation & Planning includes developing scientific content for each activity, defining objectives, duration, and number of participants, and assigning roles based on children's abilities and interests.
2. Child Orientation, which includes presenting the scenario/role to be enacted and providing detailed guidance on role-playing goals and procedures.
3. Environment Setup by ensuring proper lighting, ventilation, and seating arrangements
4. Role-Playing, where every child performs roles under research supervision and guidance
5. Discussion & Evaluation by debriefing the scenario, sharing observations, and evaluating children's role-playing performance.
6. Repeat role-playing with adjustments based on researcher feedback.
7. Instructions & Summary, researchers connect role-playing to real-life experiences and identify correct behaviors for similar real-world situations.

4. Data Analysis

The validity test for the first hypothesis given above was verified by applying the SI scale to reveal the significance of the differences between the pre-test and post-test measures for the experimental group, and is summarized in Table 1.

Table 1.
Significance of the differences between the average ranks of the scores of children in the experimental group on the SI scale in the pre-test and post-test measures.

M	Dimensions	Sub .ranks	Average ranks	Z*	Sig.
1	Social Perception	49	5	2.69	0.01
2	Social Adjustment	26	4	2.36	0.05
3	Social Knowledge	29	4.5	2.31	0.05
4	Social Competence	31	5	2.1	0.05
Total	Total	49	5	2.69	0.05

Note: * Z-Table value at the 0.01 level is (2.58), and at the 0.05 level it is (1.96).

There are statistically significant differences at the (0.001) level between the average ranks of scores of the members of the experimental group in the pre-test and post-test applications in favor of the average ranks of the post-test on the SI scale, as given in Table 1. This is attributed to the effectiveness of the program used in the study, which is based on a role-playing strategy, as training the children in the experimental group on some SI skills included in the role-playing program used with cochlear-implanted deaf children has led to the refinement and positive application of their SI skills.

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Validity test for the second hypothesis verified by applying the SI scale to reveal the significance of the differences between the post-test and follow-up measures for the experimental group and summarized in Table 2.

Table 2.
Differences between the mean ranks of the scores of children in the experimental group on the SI Scale in the post-test and follow-up measures.

M	Dimensions	Sub .ranks	Average ranks	Z*	Sig.
1	Social Perception	8.3	3.7	0.7	Not sig.
2	Social Adjustment	10	4.1	0.3	Not sig.
3	Social Knowledge	1	1.02	0.4	Not sig.
4	Social Competence	21.5	4.5	0.4	Not sig.
total	total	21.5	4.5	0.71	Not sig.

Note: * Z-table value at the 0.1 level equals (2.58), and at the 0.05 level equals (1.96).

It is evident from Table 2. that there are no statistically significant differences between the mean ranks of the scores of individuals in the experimental group in the post-test and follow-up applications on the SI Skills Scale two months after the implementation of the program, which confirms the continued effectiveness of the program in improving the level of SI skills among children with cochlear implants.

5. Conclusions

Research results can be summarized in the following items:

1. High level of performance among deaf children with cochlear implants on the SI Scale, and the existence of differences between the pre-test and post-test in favor of the post-test indicates the effectiveness of the training program prepared by the researcher to improve the level of SI for all dimensions among deaf children with cochlear implants.
2. Improvement in language among deaf applicants is attributed to the effectiveness of the cochlear implant in acquiring spoken language and developing a good auditory memory that supports the development of communication skills.
3. Learning process relied on direct communication with specialists and peers and a spirit of teamwork, which leads to the development of SI skills and contributes to shaping their behaviours positively so that they can successfully perform their social roles.
4. Dividing activities into small steps, enhanced directly using physical enforcement such as candy, medals, and small plastic toys along with the use of social reinforcement, such as applause and encouraging phrases, effectively contributes to providing many opportunities to enhance the sense of success, achievement, and self-esteem, and achieving goals, fulfilling needs, and increasing the child's ability to interact with peers.
5. The role-playing strategy helped alleviate language disorders in children with cochlear implants, enabling them to interact with those around them and break free from their isolation to become sociable individuals capable of engaging with others and forming successful relationships, relying on the linguistic abilities they acquired during training while implementing the program.
6. Role-playing, which contributed to the reduction of language performance in children with cochlear implants, led to the development of their SI skills and enhanced their ability to use this language in communication with others and acquire the necessary skills for that.
7. Researchers conclude that training children with cochlear implants on the role-playing strategy has improved their SI skills and has begun to respond to each other through role play, which significantly contributed to expressing feelings and communicating with others through both verbal and non-verbal communication, enhancing their social interaction skills.

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6. Recommendations

Based on research findings, a set of recommendations and suggestions can be made that may contribute to the development of SI skills among children who use cochlear implants and increase their technological awareness.

1. The curriculum and rehabilitation plan for children with cochlear implants should include some social activities.
2. Training these children in social interaction through various classroom and extracurricular activities.
3. Providing opportunities for children with cochlear implants to use communication skills in different educational situations.
4. Working to provide these children with appropriate experiences and skills in a practical manner rather than through direct information and knowledge delivery.
5. Training teachers to teach curricula in a way that focuses on skill acquisition and application in various life situations.
6. Providing school curricula with some exercises and activities that work on developing SI skills.

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Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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