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Research Paper: The Effectiveness of Motor Therapy on Motor Skills and Bilateral Coordination of Children With Intellectual Disability

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ABSTRACT

Objectives: Motor therapy plays a key role on the bilateral coordination skills and motor activities of children with Intellectual Disability (ID). The present research aimed to investigate the effectiveness of motor therapy on motor skills and bilateral coordination skills of students with ID.

Methods: This was a quasi-experimental research with pre-test and post-test and control group design. The study participants were 26 male students with ID from 2 special schools in Tehran City, Iran. The samples were selected by cluster sampling method. They were randomly divided into the experimental and control groups and each group consisted of 13 students. In the experimental group, motor therapy was performed during 16 sessions, while the control group did not receive any trainings. Bruininks-Oseretsky Test of motor proficiency was used for measuring gross motor skills, fine motor skills and bilateral coordination skills of the students. The obtained data were analyzed using Multivariate Analysis of Covariance (MANCOVA).

Results: MANCOVA results indicated a significant difference between the gross motor skills, fine motor skills and bilateral coordination skills in the experimental group, following the intervention ($P<0.0001$).

Discussion: Motor therapy improved motor skills and bilateral coordination skills of students with ID. Therefore, taking motor therapy could have positive impacts on the motor skills and bilateral coordination skills of students with ID.

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Highlights

- Motor therapy has positive effects on motor skills and bilateral coordination of students with intellectual disabilities.
- There are significant differences between control and experimental (students with intellectual disability with training) groups with regard to the scores of motor skills and bilateral coordination.
- The changes of scores are due to the effect of motor therapy training on the experimental group.

Plain Language Summary

Children with intellectual disability are among the largest group of the children with special needs. Limitation in motor skills and bilateral coordination is a common characteristic of these children. These skills are very important for individual care activities and daily living skills, too. The motor therapy is defined as training of the basic motor skills that have significant influence on the development of more complex skills and recreational physical skills. The present research was conducted on 26 male students with intellectual disabilities from two special schools in Tehran to examine the effect of motor therapy program on them. The experimental group participated in 16 intervention sessions and trained by motor therapy program, while control group did not. Motor therapy training led to the improvement of motor skills and bilateral coordination of students with intellectual disabilities.

1. Introduction

Intellectual Disability (ID) refers to considerable problems in intellectual functioning and adaptive behavior. This disorder is developed before the age of 18 [1-3]. Students with ID have deficits in cognitive development and lack skills in various domains such as friendship [4], emotions [5], cognition, psychosocial status, language and activities [6]. Limited motor skills is an ever-present condition in these students, because ID is a condition of deficiency in brain functions, which affects the cognition as well as motor skills [7, 8].

Motor skill development includes gross motor skills, fine motor skills and bilateral coordination skills. Gross motor skills refer to large muscle movements, such as jumping, walking, climbing up and down, catching and throwing, coordination between hands and feet. Fine motor skills refer to how a child controls things and uses arms and hands. Bilateral coordination refers to how a child handles body coordination in activities, such as jumping up and around, finger-tapping, and toe-tapping movements. These skills are very important in self-care activities and daily living skills. Children with ID have many physical problems that influence their motor skills. For example, such children need help with the gross motor activities like vacuuming and sweeping or with fine motor activities like zip up/unzip or a button/unbutton [9].

For many years, it has been believed that individuals with ID could not learn and live in seclusion [10]. Currently, social attitudes have changed and it is recognized that individuals with ID can learn if taught appropriately [1]. In addition, intellectually disabled students frequently have problems in motor activities [11] which are constantly reported by parents and professionals [12, 13].

Motor therapy is defined as training the basic motor skills that significantly influence the development of the more complex skills such as playing games, active playing, dancing, performing sports activities, gymnastics, and recreational physical skills [14]. The principles of motor therapy were derived from contemporary neuroscience, occupational therapy, and developmental psychology [15]. Motor therapies are progressively applied by therapists for managing the children with intellectual disabilities. These therapies encourage skills and activities that are thought to handle the sensory neural system by providing proprioceptive, vestibular, tactile and auditory inputs. Balls, swings, brushes, and other particularly intended or recreational therapeutic equipment are used for reinforcing these inputs [9].

Evidence demonstrates that the motor skills of students with ID are considerably poor and delayed [16]. A research investigated the effect of Spark exercise program on improving manipulative skills of students with developmental coordination disorder. The results demonstrated that Spark exercise program significantly improved manipulative skills in the experimental group, compared

to the control group [17]. Another study investigated the effect of fundamental movement skills program on improving the adaptive behavior, social skills and motor skills of 4-year-old children with autism spectrum disorders. Their results indicated that the motor skills significantly improved in the experimental group. In addition, there were no considerable changes in adaptive behavior and social skills [18].

Another research assessed the effectiveness of Spark program on the improvement of gross motor skills in children with ID. Their findings indicated that this program can improve gross motor skills in students with ID [19]. Another research investigated the effects of teaching basic motor skills to 6-year-old boys and girls. The results indicated that motor therapy improved gross and fine motor skills in children with ID [20].

A study investigated the effectiveness of perceptual motor activities on auditory and visual attention of children with Attention-Deficit/Hyperactivity Disorder (ADHD). Their results demonstrated a significant improvement in visual and auditory attention performance in the experimental group [21]. A study examined the effect of sensory-motor interventions on the attention span of students with learning disabilities. Results indicated that sensory-motor interventions increased the attention span of these students [22].

Another study investigated the effectiveness of creative movements on the attention span of students with autism spectrum disorders. Their results presented a significant improvement in the attention span of the experimental group [23]. Another research investigated the effectiveness of improving gross motor activities on the attention processing of students with Down Syndrome. Results of their study indicated that improved gross motor activities increased the attention processing of the subjects [24].

According to some studies, students with ID show delays in the motor skills development [8, 25-27]. Moreover, the results of some studies demonstrate that the rates of cognitive and motor activities are related with each other in students with ID [8, 27]. Children with ID have problems in sensory integration which negatively affects their gross and fine motor skills. In addition, studies reveal that children with ID have low levels of motor skills in comparison with normal children.

Considering this, motor therapy is very beneficial for them. Motor skills and daily activities improved in students with ID, after attending a motor skills program. In addition, students with ID process similar steps of motor functions and develop in the same order as normal students. However, stages may be obtained later and may not be developed for some activities and skills [16]. Therefore, this research aimed to determine the effectiveness of motor therapy on motor skills and bilateral coordination of students with ID.

2. Methods

This was a quasi-experimental research with pre-test, post-test and a control group design. The study participants were 18 elementary school students with ID from Tehran City, Iran. The subjects were selected by cluster sampling method. Out of all elementary schools, 2 schools were randomly selected. The students were randomly divided into the experimental and control groups and each group consisted of 13 children. We required 12 subjects for the experimental and control groups, based on the mean of the subjects in 3 recent research studies in this area. Sample size was calculated equal to 13, by the following formula:

$$n=\frac{\sigma^2(z_1-a/2)^2}{d^2}=(22.07)^2\times(1.96)^2/(12)^2=13$$

The inclusion criteria were being diagnosed with mild ID, living with parents, being between 8 and 10 years old and studying at second to fourth graders. The subjects would be excluded from the research if they had any symptoms of neurodevelopmental disability or significant health problems. Also, those who were currently receiving similar training programs were excluded from the research. The importance of this study was described for the mothers of subjects and school counselors. The subjects' mothers provided their informed consent. Then, the experimental group participated in 16 motor therapy sessions and the control group participated in the routine program of school.

To evaluate the motor skills and bilateral coordination, Bruininks-Oseretsky Test of motor proficiency-short form (BOT-2) was used. This is well-known test for assessing motor proficiency. It was designed to obtain useful information about the motor skills of children aged 4.5 to 14.5 years. BOT-2 included 14 items and 8 subscales [28]. In this study, 3 subscales of BOT-2 were used to evaluate fine motor skills. The applied subscales included fine motor integration, fine motor precision, and manual dexterity. Four subscales were used to assess gross motor skills, including balance, speed and agility, upper-limb coordination, and strength. Also, bilateral coordination subscale was used to evaluate both gross motor skills and fine motor skills. The test-retest reliability coefficient of BOT-2 is reported to be 0.86 [29].

Table 1. The content of motor therapy program sessions

Session	Objects	Context of Sessions
1	Identification of child situation	Physical exercises, individual and group activities
2	Coordination of gross motor	Activities such as sit down/stand up, bending and straightening the body , hands movement
3	Reinforcement of gross muscles	Drawing, pushing and moving utensils with and without a wheel in direct and indirect paths
4	Reinforcement of body harmony and stability	Walking on a direct line, jumping in rings, jumping in color circles
5	Reinforcement of static and dynamic balance	Single-leg stand up on toes and heel of foot, moving back and forth, single-leg and both leg jump
6	Reinforcement of attention and motor skills	Single-leg stand up at various times, ball throw in various paths, ball pass between trainer legs
7	Reinforcement of hand and trunk muscles	Concurrent moving of hands and trunk in various paths, hand walking while trainer holds the legs
8	Increasing attention span and eye and hand coordination	Activities such as wear attaching clothes, throw coins into till, screwing and unscrewing bolts and conducting same activities
9	Reinforcement of tactile sensory and body awareness	Activities such as playing with clay and paste, finding things, hiding things in grit and sand, rolling on grit and sand
10	Coordination of fine and complex skills	Activities such as ball rolling on ground and passing through obstacles, sorting play, play with passel and logo
11	Reinforcement of body balance and stability	Walking and running in various positions through paths such as line path or lining placement and jumping over obstacles
12	Coordination of complex motor	Activities with cage, legs, hand and arm muscles such as aerobic movements
13	Reinforcement of orientation and active motor coordination	Twosome races in activities such as catching a ball without falling, fast movements for reaching the ball
14	Concurrent reinforcement of attention span and dynamic balance	Holding water glass on palm in standing and movement positions, carrying several water glasses with platter
15	Increasing eye and hand coordination and aiming	Use utensil such as bubble making, throwing up bladder and hit with hand to under it, throwing ball into quadrille on wall
16	Reinforcement of orientation and selective attention	Hitting balls with a club, tracing colored lights in a dark room, tracing hanging colored balls and hitting those with certain regularity

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The motor therapy program was used in the present research. The experimental group received motor therapy in 16 sessions (3 times a week; 45 minutes each), while control group did not receive such program. Motor therapy program was designed based on Spark motor program [29]. This program has been applied in several research studies [19, 22, 24]. The content of motor therapy sessions were as follows (Table 1).

To assess motor skills and its subscales (gross motor skills, fine motor skills and bilateral coordination skills) in students with ID, BOT-2 was used as the pre-test. Then, the experimental group participated in 16 intervention sessions. In the final stage of the research, each of the 2 groups were assessed by BOT-2 as the post-test. The obtained data were analyzed by Multivariate Analysis of Variance (MANOVA) using SPSS.

3. Results

The mean age of experimental and control groups were 8.71 and 8.73 years and their mean IQ scores were 61.35 and 62.02, respectively. A comparison was made using descriptive statistics with respect to each group's scores on the motor skills and gross motor skills, fine motor skills and bilateral coordination skills subscales. Mean±SD scores for each group were considered as overall group indexes (Table 2).

Multivariate Analysis of Covariance (MANCOVA) was used because of the presence of an independent variable and several dependent variables and adjusting pre-test effect. After checking and confirmation of the normality of research variables, Box's test approved the equality of variance-covariance matrices (P>0.05). In addition, the assumption of variance equality was approved using Levene's Test (P>0.05). Therefore, MAN-

Table 2. Descriptive statistics for motor skills and subscales in study groups

Subscales	Stage	Experimental		Control	
		Mean	SD	Mean	SD
Gross motor skills	Pre-test	34.51	5.15	33.65	4.85
	Post-test	44.89	5.65	34.84	5.80
Fine motor skills	Pre-test	29.62	3.72	29.25	3.25
	Post-test	39.47	3.15	29.65	3.42
Bilateral coordination skills	Pre-test	8.05	2.78	8.23	2.65
	Post-test	12.35	2.31	8.85	2.87
Total motor skills	Pre-test	72.18	7.76	71.13	7.92
	Post-test	96.71	8.92	72.98	8.84

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COVA could be applied. The overall score of Wilk's lambda was significant, ($F_{4, 17}$=4.02, P=0.0001), indicating that the experimental and control groups had a significant difference, at least in one variable. In order to determine differences among the scores of motor skills and subscales (gross and fine motor skills and bilateral coordination skills) between the control and experimental groups, MANCOVA was used, which the results are presented in Table 3.

To analyze the obtained data, pre-test variable was moderated because of its correlation with post-test. According to Table 3, the type of the group affects post-test scores significantly, and there are significant differences among the scores of motor skills and gross motor skills, fine motor skills, and bilateral coordination skills subscales, between the experimental and control groups (P<0.0001). As per Table 3, the results of MANCOVA indicated that motor therapy had a positive and significant effect on the gross motor skills (F=30.84, P<0.0001), fine motor skills (F=33.01, P<0.0001), bilateral coordination skills (F=24.35, P<0.0001) and motor skills (F=29.12, P<0.0001). According to eta square (η^2), this could be explained that 60%, 57%, 51% and 54% of the variation in each variable of gross and fine motor skills, bilateral coordination skills and motor skills, respectively, are due to the effectiveness of motor therapy in the experimental group.

Table 3. Summary of MANCOVA results

Source	Dependent Variable	SS	df	MS	F	Sig.	η^2
Pre-test	Gross motor skills	25.58	1	25.58	7.93	<0.001	0.170
	Fine motor skills	27.65	1	27.65	10.70	<0.0005	0.210
	Bilateral coordination	18.07	1	18.07	4.38	<0.05	0.140
	Motor skills	24.51	1	24.51	6.54	<0.001	0.170
Group	Gross motor skills	197.27	1	197.27	30.84	<0.0001	0.600
	Fine motor skills	167.55	1	167.55	33.01	<0.0001	0.570
	Bilateral coordination	89.98	1	89.98	24.35	<0.0001	0.510
	Motor skills	160.11	1	160.11	29.12	<0.0001	0.54

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4. Discussion

This study was conducted to investigate the effect of motor therapy on motor skills of children with ID. In addition, the present research evaluated the effectiveness of motor therapy on bilateral coordination skills of students with ID in the two groups (experimental and control) before and after the intervention.

The present study supports the effectiveness of motor therapy on gross and fine motor skills, bilateral coordination skills and total motor skills of students with ID. The results of this research were consistent with Sadati Firoozabadi and Abasi, stating the effect of sensory motor integration training program on the motor skills in children with learning disorders [30]. The obtained results were in line with Amel and Amira study which investigated the effect of sensory integration training program on motor skills in students with autism spectrum disorders [9]. They reported a statistically significant difference between the experimental and control groups in gross and fine motor skills after intervention. Current study results were consistent with the findings of Shahbazi, Rahmani, and Heyrani, representing the effectiveness of sensory motor integration program on reaction time and balance in students with developmental coordination disorder [31].

Results of the current research were in line with the study of Top, that investigated the effects of swimming exercises program on the motor development levels in teenagers with ID and stated a statistically significant difference between the experimental and control groups in fine motor integration, fine motor precision, and bilateral coordination skills [8]. Moreover, Top concluded that there were no differences in the experimental and control groups in gross motor skills and total motor skills at pre-test and post-test. This part of their results were inconsistent with the present study [8]. Moreover, the present research results were consistent with the results of Parhoon, Parhoon, and Movallali. They investigated the effect of sensory motor program on gross motor skills among students with Down syndrome aged 5-7 years. They reported a statistically significant difference between the control and experimental groups, in gross motor skills after intervention [32].

The findings of this research were in line with the study by Westendorp, Houwen, Hartman and Visscher [6]. They reported that in children with mild ID , the scores of the gross motor skills of the experimental group in sports were significantly higher than that of the control group. Furthermore, the present study was consistent with the results of Vuijk, Hartman, Scherder and Visscher [27]. They concluded that motor performance in students with borderline intellectual functioning and mild ID increased after intervention. Present study results were consistent with the findings of Surtchi, Sazande, Nori, and Jadidi, stating the effectiveness of sensory integration program on fine and gross motor skills, for 5- to 7-year-old children with Down syndrome [33]. Moreover, this result was similar with the study of Bouffard [26]. They concluded that there was a significant difference in the motor skills of individuals with educable ID after intervention.

To explain these finding, it can be stated that motor therapy included training the basic motor skills that significantly influence the later development of higher level activities [14]. Motor therapy is used for managing motor skills in students with ID [9]. Thus, it is expected that motor therapy improves motor skills and bilateral coordination skills. To clarify, at birth, the actions and movements of a child depend on input from sensory channels. When child grows up and his or her interaction with environment improves, the visual and auditory system become very important and are accompanied by other sensory systems. Hand and eye coordination requires provision of many sensory inputs for direct movements towards the target. When a baby' hand contacts the target, baby integrates tactile information regarding object's texture via visual proprioceptive about size, color and shape.

More contact with the object, assemble information feedback from baby's hand movements in respond to the object, which may help to explain data regarding the shape and size of that object [34]. Also, appropriate operation tasks are used for students with sensory processing problems to help decrease defensiveness, as well as improve their arousal and attention. Increased fine and gross motor skills in students will allow them to perform various considerable operation activities [9]. In addition, motor therapy plays a key role on the motor skills and bilateral coordination skills of children. Although a few children with ID obtain appropriate motor activities through observation and imitation of classmates and other children in classroom and community, it is important that parents and teachers engage these children in acquiring of motor skills, directly and indirectly. As a result of this improvement in motor skills, it can be assumed that motor therapy program can have positive and significant effects [16].

Motor skills training increase the neuroplasticity of nervous system in children, leading to improvements in desirable skills and behaviors and learning capacity.

Furthermore, motor therapy programs emphasize on proprioceptive, tactile, and vestibular system. Accordingly, it improves spontaneous reaction, muscle tone and emotion regulation [9].

5. Conclusion

It is expected that motor therapy improves motor skills and bilateral coordination skills. Motor therapy also facilitates the improvement of motor skills and bilateral coordination skills in students with ID. Thus, paying attention to motor therapy plays a crucial role for enhancing motor skills and bilateral coordination skills in students with ID. Ultimately, the present research demonstrated that significant improvement in motor skills and bilateral coordination skills of students with ID were reinforced after receiving motor therapy intervention.

Several limitations of the current research should be noted. The rate of learning differs in students with ID. It is difficult to ascertain the achievement of these students in motor skills. Moreover, we disregarded the socioeconomic status of students' parents. Therefore, cautious should be taken in the generalization of these research findings to other students. In addition, the sample size was small. Because each group consisted of 13 students, it is difficult to relate these results to other children with special needs. Moreover, because of the time limitation, opportunity for a follow-up stage was not provided.

Ethical Considerations

Compliance with ethical guidelines

This research was approved by the Human Ethics Research Committee of Isfahan University and the Exceptional Education Organization of Iran.

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Authors contributions

The authors contributions is as follows: Conceptualization: All authors; Methodology: Mohammad Ashori and Seyyedeh Somayyeh Jalil-Abkenar; Investigation: Mohammad Ashori and Ghasem Norouzi; Writing-Original Draft: All authors; Writing-Review & Editing: Mohammad Ashori; Resources: All authors; and Supervision: Mohammad Ashori and Ghasem Norouzi.

Conflict of interest

The authors declared no conflict of interest.

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Research Paper: Effect of Cognitive Behavioral Therapy on Social Competence in Physically Disabled Adolescents

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ABSTRACT

Objectives: This study aimed to evaluate the effect of social group work interventions with cognitive behavioral approach on social competence in physically disabled adolescents.

Methods: This was a quasi-experimental study with a pre-test and post-test and control group design. The statistical population included physically disabled adolescents aged 13-18 years who were referred to the Center of Rehabilitation and Vocational Training in Sanandaj City, Iran, to participate in educational programs. To this end, 30 physically disabled adolescents were selected based on inclusion criteria and were divided into 2 matching groups (intervention and control). Social competence questionnaire was completed by both groups at the beginning and at the end of training. The intervention group was trained for 8 weeks in terms of social competence, whereas the control group received no special training. The obtained data were analyzed using SPSS. The Chi-square, Independent samples t-test, and Paired t test were used to verify the study assumptions.

Results: Comparing the intervention group with the controls before and after training reveled that teaching patients with cognitive behavioral strategies had a significant impact on increasing their social competence (Mean±SD, 181.66±17.88 versus 120.93±10.47; P=0.0001) and its dimensions (cognitive, behavioral, emotional and motivational) of the former group.

Discussion: It seems that one of the efficient methods to increase social competence among physically disabled adolescents is cognitive behavioral therapy within the social group work. Thus, coaches and teachers of this group are recommended to use this method, to increase their social competence and subsequently increasing their presence in public areas.

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Highlights

- Social competence refers to the quality of peer communication and social behavior in social settings.
- Children's social competence is one of the most important predictors of children's development.
- Adolescents with early problems in social behaviors are at risk for experiencing negative consequences.

Plain Language Summary

People with disabilities need to adapt with their environment. However, family members of disabled people might take an avoidance attitude, rejection, or too much support that add to already many problems for these people. Disabled people in dealing with these issues may develop negative attitudes, prejudices, discrimination, and maladaptive behaviors. The consequences of these issues are psychosocial barriers and deficiencies in health and social capabilities. Thus, the disabled people have lower self-esteem and self-confidence and in general have less social interactions. Some of these factors can be explained by lower "social competence" in persons with disabilities.

1. Introduction

Disability goes beyond physical dysfunction and includes activity restrictions, stigma, discrimination, and social participation limitations [1]. The Global Burden of Disease (GBD) has defined disability as the loss of health in areas such as mobility, cognition, hearing, and vision [2]. More than 15% of the world population suffer from disabilities that restrict their function in family, community, and politics. Eighty percent of them live in low- and middle-income countries [3]. According to the International Classification of Functioning, disability and health (ICF), social stigma and discrimination are considered as significant 'environmental factors' that contribute to disability [2, 4, 5].

As the National Information Center for Children and Youth with Disabilities (2015) describes, a physical disability is defined as a physical condition that negatively affects at least one main living activity of an individual [6]. People with disabilities need an ability to be compatible and adapt to their environment. Moreover, because of unfavorable attitudes in society, the family members of physically disabled people are avoidant, rejectful, or too much supportive to them, that creates many problems. Once dealing with such issues, disabled individuals may experience negative attitudes, prejudice, discrimination, and maladaptive behaviors that affect various aspects of their lives. The consequences of these issues are psychosocial barriers and deficiencies in health and social capabilities. This leads to lower self-esteem and self-confidence in this population, compare to other healthy people. It also makes them uncomfortable in social communication, ultimately resulting in less social interaction. Some of these factors can be explained by lower "social competence" in persons with disabilities.

Social competence is a basic characteristic of child's psychological adaptation [7]. It refers to the ability to interact positively and get along well with others [8]. In other words, social competence is described by a set of essential social skills to interact well with others and act effectively in peer groups. Children with inadequate social skills are more exposed to various adverse social outcomes in subsequent lifetimes [9]. Children's social competence is among the most important determinants of children's development [10, 11]. Moreover, adolescents with early problems in social behavior are at risk of negative consequences such as academic failure, peer rejection, and delinquent behavior [12].

In the current study, we conducted Cognitive Behavior Therapy (CBT) to reduce emotional distress and behavioral problems in persons with physical disabilities, in order to increase their social competence. The efficacy of CBT on social work domains is evident by the constant increase in the number of therapists who consider CBT as their preferred approach of practice [13]. In the CBT approach, clients are assumed to participate in their own changing process. CBT is an empowering model [14].

There is a wealth of literature describing positive consequences of CBT in emotional distress and behavioral problems such as anxiety, depression, and aggression [15-17]. However, there is a gap in investigating the positive consequences of CBT with regard to social factors like social competence. On the other hand, various

studies have reported that social competence can play a substantial role in the social life of disabled persons [18-20]. Thus, this study evaluated the effect of CBT (including assertiveness skills, self relaxation techniques, cognitive restructuring, stress inoculation training, and self-efficacy) on social competence in physically disabled adolescents.

2. Methods

Study design

The study was designed as a pre-test and post-test with a control group and was conducted at a single site (Center of Rehabilitation and Vocational Training) in Sanandaj City, Iran from June to August 2016.

Study participants

As shown in Figure 1, from the 34 prospective participants recruited from the center of rehabilitation and vocational training, 4 participants were excluded because of not meeting the inclusion criteria. By matching allocation (based on age, gender, education and type of disability), 15 disabled persons were assigned into the intervention group and 15 others into the control group. The inclusion criteria were physically disabled adolescents being 13 to 18 years old, having normal IQ, being educated, and having physical ability to attend the training sessions. The excluding criteria were unwillingness to participate and absence in more than 2 training sessions. The objective and protocol of the study were described to the participants before signing the written informed consent. In addition, one of the physically disabled adolescents, who was close with other members and had a training experience, served as the facilitator in the training sessions.

Intervention plan and study tools

The tools employed in the current study were demographic data questionnaire and Felner social competence scale [21]. The socio-demographic data questionnaire included data on age, gender, educational level, and disbility type. In addition, Felner social competence scale contained 47 questions in 4 dimensions of cognitive (e.g. sense of responsibility and criti-

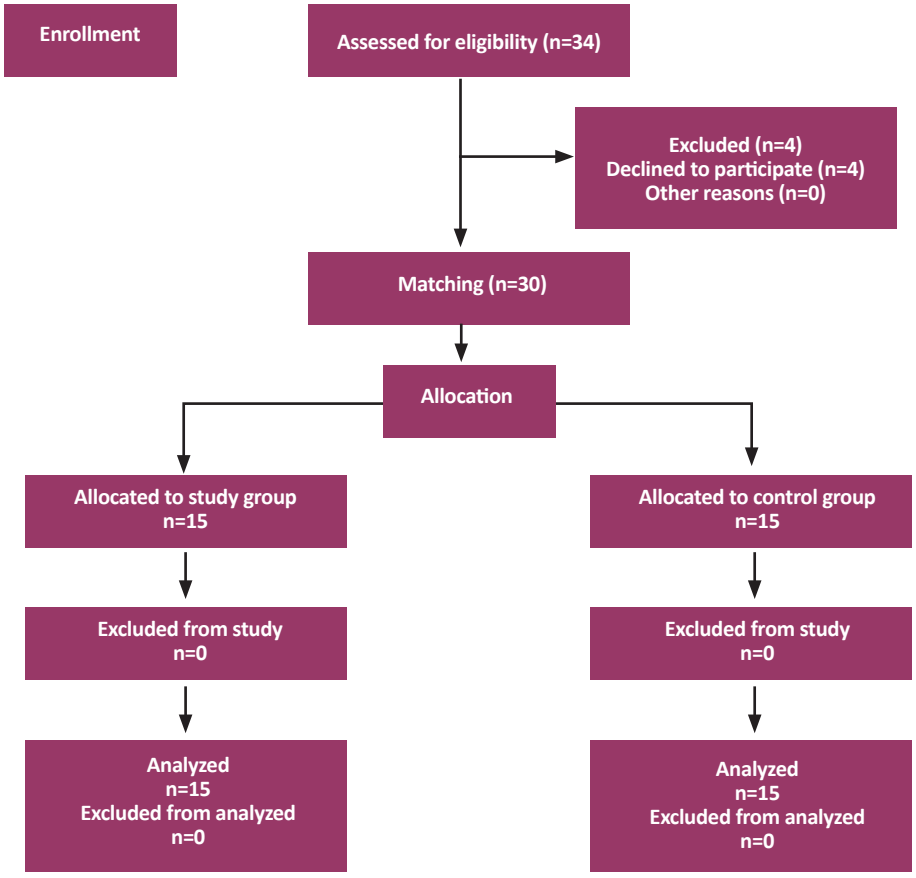

Figure 1. Flowchart of the study

cal reception), behavioral (e.g. escape from school and completing homework), emotional (e.g. affection for parents and friends), and motivational skills (e.g. doubt in personal abilities and optimism about the future). It had a Likert-type Scale with 7 response options ranging from "strongly agree" to "strongly disagree". The validity and reliability of the questionnaire has been confirmed in previous studies [21, 22].

The social competence questionnaire was completed by the groups both at the beginning and the end of training program. The intervention group was trained for 8 weeks in terms of assertiveness skills, self-relaxation techniques, cognitive restructuring, stress inoculation training, and self-efficacy. The control group received no special trainings. Each session content included the following items:

First week: Creating a positive and supportive relationship among members and the social worker, as well as creating positive impressions among group members. Second week: Promoting trust and group interactions, creating a positive environment for the members, and implementing group activities to enhance member confidence. Third week (skills related to the cognitive dimension): Understanding the efficient and inefficient beliefs when working on issues, educating the participants about cognitive restructuring to change the beliefs and perceptions about problems and inefficient behaviors. Fourth week (skills related to the behavioral dimension): Assertiveness training through role playing exercises. Fifth week (skills related to the motivational dimension): Educating participants about self-efficacy and its stages (self-regulation, succession experiences, and self-talk), and helping members with creating life purpose, and self-regulation. Sixth week: Making progress in training regarding the previous session. Practicing self-talk techniques in a challenging situation. Seventh week (skills related to the emotional dimension): Stress inoculation training, and practicing self-relaxation techniques. Eighth week: Finalizing the teamwork and reviewing the whole process.

All techniques were applied for all 15 participants in the intervention group and in a similar manner. Training sessions lasted 60 minutes and were held once per week. All training sessions were held in the Center of Rehabilitation and Vocational Training in Sanandaj. A trained social worker delivered the intervention sessions. All of the participants completed the treatment protocol. There was no missing data on the intervention sessions.

Data analysis

The obtained data were analyzed using SPSS. Descriptive statistics including mean and standard deviation scores were computed for all variables. In addition, the Chi-square, Independent samples t-test, and Paired t test were used to verify the study assumptions. The significance level was set at $P<0.05$.

3. Results

According to the demographic findings, the Mean±SD age of the intervention and control groups were 15.47±1.40 and 15.80±1.56 years, respectively. The participants included 8 boys and 7 girls in both groups. In the intervention group, 27% were educated up to the elementary school, 60% intermediate school, and 13% high school. In the control group, 27% were educated up to the elementary school, 46% intermediate school, and 27% high school. In addition, 80% of participants suffered from congenital disabilities and 20% were disabled because of accidents (in both groups). In terms of type of disability, 20% of the participants in the intervention group suffered from ataxia, 47% from Cerebral Palsy (CP), 13% from Spinal Cord Injury (SCI), 13% from amputations, and 7% from poliomyelitis. While in the control group, 13% suffered from ataxia, 54% from CP, 13% from SCI, 13% from amputations and 7% from poliomyelitis. According to the Mann-Whitney U Test and Chi-square Test results, both groups had the same type of disability and educational level. Moreover, no significant difference was observed between the intervention and control groups in terms of demographic data (Table 1).

The results of Independent samples t test were calculated based on the differences between mean scores of social competence and its dimensions in pre-test and post-test, obtained from the intervention and control groups (first P) (Table 2). As a result, the mean score of social competence and its dimensions were higher in the intervention group compared to the control group (P=0.001).

As presented in Table 2, it is suggested that social group work interventions and CBT had a positive effect on social competence (and its cognitive, behavioral, emotional and motivational dimensions) in the intervention group. In order to confirm the validity of the results, the means score of all 5 main variables were evaluated. According to Table 2, the differences were significant in the intervention group (second P).

Table 1. Demographic information of the intervention and control groups[a]

Demographic Factors		Intervention	Control	Total	P
Gender	Male	7(46.7)	8(53.3)	15(50)	1
	Female	8(53.3)	7(46.7)	15(50)	
	Total	15(100)	15(100)	30(100)	
Type of disability	Ataxia	2(13.3)	3(20)	5(16.7)	0.761
	Cerebral Palsy	8(53.3)	7(46.7)	15(50)	
	Spinal cord injury	2(13.3)	2(13.3)	4(13.3)	
	Amputations	1(6.7)	1(6.7)	2(6.7)	
	Poliomyelitis	2(13.3)	2(13.3)	4(13.3)	
	Total	15(100)	15(100)	30(100)	
Educational level	Elementary school	4(26.7)	4(26.7)	8(26.7)	0.438
	Guidance school	9(60)	7(46.7)	16(53.3)	
	High school	2(13.3)	4(26.7)	6(20)	
	Total	15(100)	15(100)	30(100)	
Age, y	Mean±SD	15.47±1.40	15.80±1.56	15.64±1.48	0.652

a: Data are presented in No. (%) or Mean±SD.

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Table 2. Independent samples t-test results of differences between the study variables in the intervention and control groups (N=30)

Group		Mean±SD		P[a]	Mean±SD	P[b] [Confidence Interval]
		Pre-Test	Post-Test		Difference	
Social competence	Intervention	124±14.16	181.66±17.88	<0.001	57.66±3.72	<0.001[53.89, 61.38]
	Control	123.66±16.85	120.93±10.47	0.93	-2.73±-6.38	
Cognitive dimension	Intervention	8.40±3.60	12.46±2.77	<0.001	4.06±-0.83	<0.001[3.79, 5.89]
	Control	7.73±2.52	8.40±2.32	0.75	0.67±-0.20	
Behavioral dimension	Intervention	87.20±13.02	132.8±14.12	<0.001	45.60±1.10	<0.001[44.50, 46.70]
	Control	88.93±12.81	88.06±8.85	0.14	-0.87±-3.96	
Emotional dimension	Intervention	8.46±2.94	11.46±3.16	<0.001	3.00±0.22	<0.001[2.78, 3.22]
	Control	8.06±3.03	7.46±2.32	0.08	-0.6±-0.71	
Motivational dimension	Intervention	19.94±2.71	24.93±4.74	<0.001	4.99±2.03	<0.001[2.96, 7.02]
	Control	18.93±2.49	17±1.32	0.09	-1.93±-1.17	

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P[a]: Test mean score during time by paired sample t-test; P[b]: Test mean score based on the differences between the two groups using student's t-test.

4. Discussion

In this study, the CBT improved social competence among physically disabled adolescents, so that after CBT, social competence significantly improved in the intervention group compared to the controls. This finding is in agreement with the results of similar studies conducted in this field [22-25]. Momeni et al. reported the positive impact of life skills training on enhancement of social and emotional competence in students [22]. It seems that CBT has a positive effect on social competence among physically disabled adolescents. The results also revealed that social work interventions using the CBT had a significant effect on all cognitive, behavioral, emotional, and motivational dimensions among adolescents with physical disability. This finding complies with the results of some studies such as Evans and Allze, Jansson et al. and Hronis et al. For example, Evans and Allze (2018) demonstrated that CBT decrease the client's feelings of anger and increase their self-esteem [26-28].

Previous studies have mainly focused on the role of CBT in reducing psychological and behavioral problems in the normal population. However, the current study focused on the effect of CBT on social competence in physically disabled adolescents.

There are not sufficient supportive recourses in the developing countries to address the needs of people with disabilities. In addition, disabled people face more social stigma in these countries and are seldom present in public areas. Therefore, applying assertiveness, self-relaxation, cognitive restructuring, stress inoculation, and self-efficacy techniques as a social group work intervention can be an effective way to promote the social competence. It could subsequently increase their attendance in educational and occupational fields. Therefore, social workers and professionals are recommended to benefit from these trainings to support physically disabled persons.

Although this study has accomplished its goals, a number of limitations need to be noted. The lack of a follow-up measure to examine whether the results are maintained in the future was among the main limitations. Another limitation in this study relates to the lack of standard training programs for social group work in physically disabled persons.

Further study should focus on the social dimensions of disabilities in order to better know about the effects and dimensions of this issue. Evaluation of the effectiveness of the intervention package introduced in this study with the aim of improving social competence in other groups of adolescents and comparing them with people with disabilities are also suggested. A follow-up evaluation should be conducted to assess the validity of obtained results.

5. Conclusion

CBT within the social group work is an efficient method to increase social competence among physically disabled adolescents. Thus, the coaches and teachers of such adolescents are recommended to make use of this technique to increase their social competence and subsequently increase their presence in public areas.

Ethical Considerations

Compliance with ethical guidelines

The purpose and protocol of the study was fully explained to the participants and all of them provided a written informed consent. Furthermore, upon completion of the study, the control group received CBT with the same order. The study was approved by the Ethics Committee of the University of Social Welfare and Rehabilitation Sciences (IR.USWR.No.700.240).

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Authors contributions

Study concept and design: Faeze Seyedi, Mansour Fathi, Asghar Dadkhah, Seyed Hossein Mohaqeqi Kamal; Interpretation of data: Poria Reza Soltani, Faeze Seyedi; Manuscript preparation: Seyed Hossein Mohaqeqi Kamal.

Conflict of interest

The authors declared no conflict of interest.

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Research Paper: Comparing Verb and Object Naming Between Patients With Parkinson Disease and Patients With Cortical Stroke

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ABSTRACT

Objectives: Based on recent studies, verb naming is more impaired than noun naming in patients with Parkinson Disease (PD). Noun and verb retrieval problems has been well documented in patients with cortical damage. To explore the possible contribution of cortex and subcortex areas in word finding test performance, we studied verb and object naming in patients with cortical and subcortical lesions.

Methods: In this cross-sectional study, object and verb naming were examined in two patient groups, including patients with PD and patients with cortical stroke. The healthy control group was also matched on age and education with the patients. The non-parametric tests were performed to investigate the obtained data.

Results: Both the PD patients and patients with cortical stroke presented a significant impairment in their capacity to name objects and verbs, compared to the healthy controls ($P<0.05$). Both patient groups did not statistically perform differently on these tasks ($P>0.05$). There was also a significant difference between verb naming and object naming in both patient groups ($P<0.001$).

Discussion: The similarity between two patient groups and the difference between them and healthy individuals in language output, can denote the role of both cortical regions and basal ganglia in the language processing.

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Highlights

- We compared object naming and verb naming between Parkinson Disease (PD) patients, stroke patients, and normal people.
- Verb naming and object naming scores in the stroke patients were lower than those in PD group but this difference was not statistically significant.
- A significant difference between the normal and PD groups in language processing (noun and verb naming) was seen.

Plain Language Summary

The difference in verb and object naming between two groups of patients (PD patients and stroke patients) and healthy group can denote the role of both cortical regions and Basal Ganglia (BG) in the language processing.

1. Introduction

The role of Basal Ganglia (BG) in language processing has been investigated and debated since many years ago [1]. Parkinson Disease (PD) is a neurodegenerative disease caused by decreased dopamine in BG. The main PD motor symptoms, reported in many studies, are rigidity, bradykinesia, and tremor [2]. There are also non-motor symptoms including cognitive impairment and dementia [3], pain, sleep disorders, depression [4], executive function deficits [5], and language deficits [6].

Language impairment in PD includes spontaneous speech decline [7], sentence comprehension deficits [8], syntax comprehension impairments [9], and semantic deficits [10]. Many investigations have reported verb comprehension and verb production deficits in PD patients [11, 12]. As a case in point, Contelli et al. studied action and object naming in patients with PD. They concluded that PD participants were significantly impaired in action naming and object naming [13]. Similarly, Fernandino et al. reported that patients with PD had more difficulties in action verbs processing than abstract verbs processing [14].

Different brain regions are involved in noun and verb processing. Specifically, noun deficits are related to lesions in the left anterior temporal region and verb deficits are related to the lesions in the left inferior frontal region [15]. According to Colman et al., language problems in PD patients are due to the cortico-striato-cortical circuits' degeneration [16]. Thus, it is supposed that verb processing deficit in PD is caused by the prefrontal network dysfunction [17]. Moreover, there is considerable evidence of the disturbance of retrieving nouns and verbs after brain damage [18].

The connections between the BG and the cerebral cortex, particularly with the frontal lobe, have been argued in literature [19, 20]. Cardona et al. proposed a motor-language network model in BG, composed of 2 major frontal and temporal subcomponents in action/verb processing [21]. Likewise, Macoir et al. concluded that the lower performance of PD patients in verb conjugation compared to the control group revealed the role of BG in language processing [22]. Furthermore, Cotelli et al. assessed memory, executive function, and verbal fluency in patients with PD. They reported deficiencies in both action and object naming in PD patients. They concluded that action naming impairment could be indicative of prefrontal dysfunction [13].

Rodríguez-Ferreiro et al. examined action and object naming in 2 patient groups including PD and Alzheimer's Disease (AD). They concluded that the AD participants were outperformed by the PD and control groups, and PD patients had naming impairment on both tasks, compared with the controls [23]. The current study evaluated noun and verb naming in 3 groups; patients with PD, patients with cortical stroke, and healthy individuals. We aimed to explore the potential differences in object naming and verb naming in patients with PD and patients with cortical stroke.

2. Methods

Twenty PD patients and 15 patients with cortical stroke and 20 healthy control participants, who matched with age and education level, participated in the present study. All the subjects were native Persian speakers, right-handed with normal vision (or corrected normal vision)

and normal hearing. The control participants had no history of neurological and psychiatric disorders.

The patients were recruited from Hazrate-Rasule Akram Hospital and Rehabilitation Centers in Tehran City, Iran. The patients with PD had no history of other neurological and psychiatric disorders. They were evaluated using the Hoehn and Yahr (H & Y) Scale [24]. They were medicated with levodopa and underwent medical assessments in the hospital. All of PD patients were on dopaminergic medication at the time of testing. Their Mean±SD, PD stage was 2.1±0.5. Their cognitive performance was assessed using the Mini-Mental State Examination (MMSE) [25] to check the adequate cognitive function in participants. Their Mean±SD MMSE score was 26.9±1.58. Language abilities were evaluated using the Persian version of the Western Aphasia Battery (WAB) [26]. Their Mean±SD WAB score was 88.01±9.89.

The patients diagnosed with depression were excluded from the study. The minimum education level of patients was high school diploma. There were no significant differences between the patients with the cortical stroke and PD patients in the mean years of education (P=0.56).The patients with cortical stroke were in the chronic stage (2 to 11 years prior to their participation in this study) and were selected based on the CT scan or MRI reports. Inclusion criterion was cortical stroke without subcortical white matter damage. The participants with cortical stroke suffered from stroke to frontotemporoparietal, temporoparietal, frontotemporal, parietooccipital. Their Mean±SD WAB score was 83.13±20.84. There were no significant differences in mean WAB scores between the patients with the cortical stroke and PD patients (P=0.88).

The Mean±SD age of the PD patients and patients with cortical stroke were 60.9±9.8 and 52.2±10.9 years, respectively. There were statistical differences in the mean age of the two groups of patients (P=0.01). Two different tasks were used for evaluating noun and verb naming in this study. The picture naming subtest of Persian Aphasia Battery [26], containing 50 pictures. The verb naming subtest of Persian Aphasia Battery with 50 pictures. All participants were assessed in convenient conditions (with minimum noise and enough light). Their answers were recorded using a digital voice recorder (Kingston-DVR-902) [27].

Statistical analysis

In this cross-sectional study, statistical analysis was carried out using SPSS. The mean and standard deviation scores for age, duration of illness, MMSE, WAB, and naming tasks were calculated for each group. We conducted a Kolmogorov-Smirnov Test at P>0.05 to assess normal distribution of data. Nonparametric tests were performed through Kruskal-Wallis test to compare the naming performance in the three groups. Mann-Whitney U Test was used to compare the two groups; the correlation was analyzed by the Spearman's coefficient. Friedman test was conducted to compare 2 tasks in each group. The significance level was set at P<0.05.

3. Results

Thirty-five patients (20 with PD and 15 with chronic cortical stroke) and 20 normal subjects (control group) participated in this study. The PD patients consisted of 4 (20%) patients at H&Y stage 1-1.5, 14 (70%) patients at H&Y stage 2-2.5 and 2 (10%) patients at H&Y stage 3. The patients with cortical stroke consisted of 6 (35.7 %) Right Hemisphere Damage (RHD) and 9 (64.3%) Left Hemisphere Damage (LHD).

Table 1 lists the descriptive statistics of study variables. Analytical statistics were also calculated. The Spearman's coefficient suggested a positive correlation between object naming scores and verb naming scores in the the patients (ρ=0.83, P=0.001). Similarly, Spearman's coefficient revealed a positive correlation between object naming scores and verb naming scores in the PD patients (ρ=0.53, P=0.01). Moreover, the Kruskal-Wallis test suggested a significant difference between the patients and controls in the object naming scores (P=0.003) and verb naming scores (P=0.001).

The Mann-Whitney U Test indicated a significant difference between the patients with the cortical stroke and controls in object naming scores (P=0.001) and verb naming scores (P=0.001). Similar results were also obtained for the patients with PD and control group in object naming scores (P=0.001) and verb naming scores (P=0.001). However, the Mann-Whitney U test showed no significant differences between the two groups of patients in object naming scores (P>0.05) and verb naming scores (P>0.05). The Friedman test showed a significant difference between object naming scores and verb naming scores in the PD patients (df=1, P=0.001), and patient with cortical stroke (df=1, P=0.001).

4. Discussion

In the current study, we examined object naming and verb naming in the two groups of PD patients and patients with cortical stroke. Object and verb retrieval performances were the same in both patient groups,

Table 1. The descriptive statistics of variables

Participants	N		Variables	Mean	SD
Patients with PD	20	Male=17 Female=3	Age, y	60.9	9.8
			Duration of illness, y	9.2	5.08
			MMSE* score	26.9	1.5
			WAB** score	88.01	9.89
			Object naming score	48.6	1.6
			Verb naming score	41.9	4.1
Patients with cortical stroke	15	Male=9 Female=6	Age, y	52.2	10.9
			Duration of illness, y	4.60	2.9
			MMSE score	24.80	5.45
			WAB score	83.13	20.84
			Object naming score	46.7	5.2
			Verb naming score	39.5	9.9
Control group (Healthy people)	20	Male=11 Female=9	Age, y	49.6	7.4
			MMSE score	28.6	1.2
			WAB score	100	0
			Object naming score	49.9	0.4
			Verb naming score	49.4	0.8

* Mini-Mental State Examination; ** Western Aphasia Test Battery

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and they were outperformed by the healthy controls on these tasks. Our findings revealed that the mean verb naming scores and object naming scores in the patient with cortical stroke were lower than that of PD group. However, this difference was not statistically significant. Rodríguez-Ferreiro et al. reported that the performance of AD group was lower than PD group in action and object naming tasks [23].

A positive correlation between object naming and verb naming scores in both patient groups manifested that with increasing the object naming scores, verb naming scores increase too. A similar impairment was observed in the patients with cortical stroke and those with neurodegenerative subcortical illness (Parkinson's disease), compared with the controls. This is the most important result of the current study, which can be an evidence for the role of both cortical and subcortical areas in language processing. In addition, there was a significant difference between the normal and PD groups in language processing (noun and verb naming), which highlights the role of dopaminergic pathways of BG and cortical areas in the language processing.

The same result was obtained for the patients with cortical stroke. The mean verb naming score was lower than the mean object naming score in both patient groups. Breedin et al. and Marshal et al. suggested that verb retrieval is more difficult than noun retrieval in aphasic patients [28, 29]. Several surveys reported verb production deficits in PD patients as well [11-14].

According to Cardona et al. both BG and cortical regions are involved in action/verb processing [22]. Herrera et al. investigated verb naming performance in PD patients and concluded that the motor control area functionally could contribute to semantic processing of verbs [30]. There were some limitations to our research. First, because of the time limit, our study was conducted on a small size of patients. The low frequency of patients with cortical stroke without subcortical white matter damage was the second study limitation.

5. Conclusion

The similarity between two patient groups (the cortical damage group and the PD group) in action and object naming, and the difference between them and the healthy group in the naming task, can denote the role of both cortical regions and BG in the language processing. Therefore, language processing requires normal cortical and subcortical functions.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Iran University of Medical Sciences research ethics committee and Informed consent was obtained from all individual participants included in the study. The subjects voluntarily participated in this study and were allowed to withdraw as desired at any stage.

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Authors contributions

The authors contributions is as follows: Conceived of the study, formulated its design and data collection, drafted the manuscript, approval of the final version of the manuscript: Zahra Mohamadi; conducting the study, contributed in the conception of the work, assisted in interpreting the data, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work: Nahid Jalilevand; performed the statistical analysis, approval of the final version of the manuscript, and agreed for all aspects of the work: Masoud Roudbari; and participated in the design of the study, approval of the final version of the manuscript, and agreed for all aspects of the work: Azar Mehri.

Conflict of interest

The authors declared no conflict of interest.

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Research Paper: Reliability of Persian Handwriting Assessment Tool in Iranian Primary School Students

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ABSTRACT

Objectives: Handwriting problems are among the most frequent reasons for case referrals to school-based occupational therapy centers. Persian Handwriting Assessment Tool (PHAT) is a valid tool available in Iran to evaluate handwriting components in school-aged children. However, its reliability has not been investigated yet. This study aimed to determine the reliability of the PHAT in Iranian primary school-aged children.

Methods: The current methodological study was performed in Tehran City, Iran during 2015-2016. In total, 208 primary school-aged students participated in this study that aimed to investigate the internal consistency of the PHAT. Forty-eight students were also recruited to examine the intra- and inter-rater reliabilities of the PHAT. Selection of the schools and sampling were conducted using the random cluster sampling method.

Results: Results suggested good to excellent internal consistency (α=0.84 to 0.99) for the measures of PHAT in dictation and copying domains. Intra-rater reliability of the PHAT ranged from 0.87 to 1.00. Furthermore, PHAT inter-rater reliability ranged from 0.7-1.00.

Discussion: The PHAT is a reliable tool to evaluate handwriting components in primary school-aged children. It can also be useful for Iranian therapists to identify primary school students with handwriting problems.

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Highlights

- The Persian handwriting assessment tool has good to excellent internal consistency.
- Intra- and inter-raters of the Persian handwriting assessment tool show its high reliability.

Plain Language Summary

Handwriting is an essential skill for children to use in school activities. Handwriting problems are one of the most common reasons for referral to school-based occupational therapy. Assessing the handwriting performance by standardized tools is necessary for scientific research and clinical assessment. The Persian handwriting assessment tool has been developed for primary school-aged children (grade 2 and 3). This tool evaluates legibility, the speed of handwriting and orthographic mistakes in copying and dictation areas. The purpose of this study was to determine the external and internal reliability of the Persian handwriting assessment tool. According to the results, it is a reliable tool and can help therapists, teachers and other specialists identify students with handwriting problems.

1. Introduction

Handwriting as a visible form of spoken language [1] is an essential skill for children to develop in school activities [2, 3]. Failure to attain handwriting competency in school has far-reaching negative impacts on academic success, participation, and the self-efficacy of students [4]. Handwriting problems are observed in a significant number of cases referred to school-based occupational therapy [5]. Evaluation of handwriting function using standardized measures is required in both research and clinical settings [6, 7]. A number of handwriting evaluation tools are developed in different languages. However, they are inapplicable to evaluate Persian handwriting [8-10], because handwriting is a language dependent skill [11].

A few research studies have been performed to develop measures for assessing handwriting in Iran. However, they are weak and fail to assess students' handwriting performance comprehensively [12-14]. Furthermore, most of the existing tools are limited to research on psychometric properties [12-15]. According to Feder and Majnemer, it is necessary to use comprehensive tools to evaluate handwriting performance [8]. Moreover, researchers or clinicians should ensure about the reliability and validity of a measuring instrument before drawing any conclusion or inferences from the collected data [16].

In the absence of comprehensive and standardized handwriting assessment tools in Iran, Havaei et al. (2016) developed the Persian Handwriting Assessment Tool (PHAT) for primary school-aged children (grades 2 and 3). The PHAT evaluates the legibility, speed of handwriting and orthographic mistakes in near-point copying and spelling. Ergonomic factors are also controlled in the evaluation process of this tool [17]. Developing a valid and reliable measure includes different procedures which are used sequentially at various stages of the measure construction [18].

Development processes, content validity and construct validity (discriminant validity and factor analysis) of the PHAT were reported previously. However, the reliability of PHAT is unclear [17]. This information is required before considering the PHAT as a useful tool for future clinical and research assessments. This study aimed to determine the reliability of the PHAT (i.e. internal consistency, & inter- and intra-rater reliability), in primary school children.

2. Methods

Study design and participants

Participants of this methodological study conducted during 2015-2016 were of grades 2 and 3 children (age range: 8 to 10 years). The participants were selected from 3 governmental primary schools by the random cluster sampling method out of 12 schools in the central region of Tehran City, Iran. Monolingual Persian speaking students with no history of neurological or bio-psychological impairments were included. Subjects were excluded if they had high stress and attention and concentration problems during test administration (7 students), and were bilingual students (14 students). A minimum sample size of 70 individuals was needed to examine the internal consistency [19].

Due to the effect of sample size on internal consistency results, this measure of the PHAT was investigated in 208 students (104 students from a girls' school and 104 students from 2 boys' schools). According to this method, a sample size of 30 to 50 is suitable to evaluate the intra- and inter-reliability [19]. Apart from samples used to survey the internal consistency, 48 students were recruited to evaluate the inter- and intra-rater reliability of PHAT. The samples were matched on gender and education. There was no missing value in the present study.

Data collection

The PHAT evaluates the legibility, speed of handwriting and orthographic mistakes in primary school-aged children (grades 2 and 3). This tool was developed by Havaei et al. in 2016 and focuses on words readability in spelling and copying domains, as well as the speed of handwriting in copying domain. In addition, the orthographic mistakes are examined in spelling domain [17]. The legibility is evaluated considering the components of formation, alignment, space, size and text slant. Scoring of the legibility components are performed using a 5-point Likert-type Scale ranging from very poor to very good. The size of a word is scored from very small to very big. The subject score is the mean score of words in each component. The orthographic mistakes in spelling assignment are also recorded. Speed of handwriting is evaluated by 2 methods; 1. The required time to write copy assignment; and 2. The number of letters written per minute, calculated by a formula [17].

PHAT items in the copying and dictation domains are separately loaded into 3 components. This 3-D structure was designated and confirmed by exploratory and Confirmatory Factor Analysis (CFA and EFA), respectively. Content and discriminant validity of the PHAT is evident [17]. A silent and well-lighted room is needed for PHAT administration. The height of the table and chair should be appropriate for the participants. The required equipment include pencil (HB model), clipboard, eraser, sharpener, and a piece of printed lined A4 paper. An antislip writing aid should also be located on the table to prevent clipboard movement. The clipboard must be parallel to the forearm of the writing hand. This paper position enables the participant to see her/his writing assignment and to prevent smearing her/his writing [17].

In the current study, the participants were requested to copy 12 words (46 letters) from a near-point sample, while sitting on a desk in a silent room at school. The time spent to complete the task was recorded for each student to calculate speed of writing. Then, the student was asked to dictate 12 words (50 letters) on the paper. They were asked to write as "your usual good handwriting". The PHAT was individually administrated on each subject by an occupational therapist. The PHAT is not a self-report tool, thus the rating of writing assignments was performed by pediatric occupational therapists with 12 years of working experience. The examiners received adequate training for rating children's writing assignments.

Reliability

To determine the PHAT's internal consistency, correlation between the words in writing assignments was investigated (each variable separately). For intra-rater reliability, the scoring of writing assignment was done by an occupational therapist in 2 weeks interval. For the evaluation of inter-rater reliability, scoring was performed by 2 pediatric occupational therapists under the same working experience and educational degree conditions.

Statistical analysis

Based on the Kolmogorov-Smirnov Test, the obtained data were normally distributed. The PHAT internal consistency was examined using the Cronbach alpha coefficient. Intraclass Correlation Coefficient (ICC, an index of relative reliability) analysis and Standard Error Measurement (SEM, an indicator of the absolute reliability) were used, to evaluate the intra- and inter-rater reliabilities. Data analysis was performed using SPSS [19].

3. Results

To determine the PHAT internal consistency, 208 students of grades 2 and 3 (104 boys, 104 girls; Mean±SD age: 8.99±0.653 years), participated in this study from 3 governmental primary schools. Also, 48 students (24 boys, 24 girls; Mean±SD age: 9.1±0.575 years) were recruited to examine the inter- and intra-rater reliabilities of PHAT.

The PHAT internal consistency was determined using the Cronbach alpha. Results indicated good to excellent internal consistency (α=0.84-0.99) of the PHAT in dictation and copying domains (Table 1). The intra-rater reliability of PHAT as rated by an experienced occupational therapist with a 14-day interval varied from 0.87 to 1.00. The relevant results were reported through the ICC and SEM in Table 2. The degree of agreement among raters for inter-rater reliability of PHAT ranged from 0.7 to 1.00 (Table 3).

Table 1. Internal consistency of PHAT measurement items (n=208)

Variable	Domain	Cronbach Alpha
Formation	Copy dictation	0.88
Space	Copy dictation	0.91
Alignment	Copy dictation	0.84
Size	Copy dictation	0.99

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4. Discussion

The reliability is an important property of appropriate tools in research and clinical assessments. The internal and external reliability of tools must be assessed prior to use. For this purpose, we examined the internal consistency, inter-and intra-rater reliabilities of the PHAT. Results indicated good to excellent internal consistency for the measurements of PHAT in dictation and copying domains.

A sample size of >50 is required for analyzing the internal consistency reliability. It also has an important role in the reliability coefficient. The large sample size of the current study (208 students) explains the favorable obtained results. Tseng (2013) reported moderate internal consistency (0.65) for measuring items of Chinese Handwriting Analysis System (CHAS). She discussed that handwriting is a complicated skill requiring cognitive, perceptual and sensory motor components. Thus, each item of a handwriting assessment tool may be influenced by different components, including planning, orthographic-motor integration, the character production of rapid movement sequences, self-monitoring, memory, and ideation [9, 20].

Rosenblum (2008) reported good internal consistency (0.9) for Handwriting Proficiency Screening Questionnaire. She mentioned that the bio-emotional status of participants, experienced rater, and large sample size influence the results [21]. Appropriate sampling according to the in-

Table 2. Intra-rater reliability of the PHAT in dictation and copying domains (n=48)

Domain	Items	ICC	95%CI	SEM
Copy	Formation	0.93	0.9–0.94	0.074
	Space	0.94	0.93–0.95	0.088
	Alignment	0.91	0.87–0.93	0.094
	Size	0.91	0.87–0.94	0.158
	Text slant	0.87	0.87–0.91	0.149
	Speed (second)	1.00	-	-
	Speed (number)	1.00	-	-
Dictation	Formation	0.92	0.89–0.94	0.083
	Space	0.95	0.94–0.96	0.068
	Alignment	0.94	0.91–0.95	0.073
	Size	0.88	0.82–0.92	0.184
	Text slant	0.9	0.85–0.93	0.129
	Orthographic error	1.00	-	-

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Table 3. Inter-rater reliability of the PHAT in dictation and copying domains (n=48)

Domain	Items	ICC	95%CI	SEM
Copy	Formation	0.85	0.61–0.91	0.108
	Space	0.8	0.63–0.88	0.158
	Alignment	0.78	0.58–0.87	0.141
	Size	0.89	0.79–0.93	0.178
	Text slant	0.71	0.48–0.83	0.206
	Speed (second)	1.00	-	-
	Speed (number)	1.00	-	-
Dictation	Formation	0.84	0.21–0.9	0.153
	Space	0.78	0.55–0.87	0.17
	Alignment	0.83	0.63–0.9	0.119
	Size	0.89	0.78–0.93	0.182
	Text slant	0.7	0.45–0.84	0.194
	Orthographic error	1.00	-	-

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clusion and exclusion criteria and rating the children's assignment via expert occupational therapist may explain the good to excellent internal consistency in our study. Words selection (assignment) based on experts' opinion and item analysis may have influenced the results. Our findings are significant when comparing the PHAT with other handwriting assessment tools. Most studies overlooked the internal consistency of tools and researchers relied on the expert opinion in the tool developing process [8].

Intra-rater and inter-rater reliability were assessed to examine the external reliability, because the PHAT is not a self-report tool. According to the results, the intra-rater reliability of the PHAT was good to excellent in copying and dictation domains (0.87 to 1). Duff (2010) reported an unacceptable intra-rater reliability for some variables of the Evaluation Tool of Children's Handwriting (ETCH). He mentioned that long time for scoring, insufficient training of raters, unequal environmental conditions while scoring, and the complexity of handwriting assignment may explain the results. In Duff's study, the lowest reliability related to writing from memory domain which is not recommended for handwriting assessment [22].

The low volume of the writing assignments of the PHAT reduces the scoring time. PHAT does not evaluate the handwriting components in writing from memory domain. It is also effective in reducing both administration and scoring time. Furthermore, scoring the assignments in the same context by a trained and expertise pediatric occupational therapist and selecting the appropriate words in writing assignment may have contributed in the present study findings. Joyce (2009) and Tseng (2013) reported that the working experience of raters is really important to evaluate students' handwriting performance [9, 23]. Reisman (1993) also in her study about the development and validation of the Minnesota Handwriting Assessment (MHA) mentioned that the good results of the intra-rater reliability of MHT were due to the experience of therapist or rater and short scoring time [24].

Inter-rater reliability of the PHAT was lower than its intra-rater reliability (0.7 to 1). According to the literature, scoring handwriting legibility has a subjective nature [8, 22, 25]. Thus, the raters may consider different writing assignments. In our study, perhaps this has led to low scores compared with intra-rater reliability. Duff (2010) reported moderate inter-rater reliability for ETCH. Scoring ETCH is performed by total and analytic methods. Total scores suggested unacceptable reliability levels which is not a recommended tool [22]. Graham also mentioned that the total scoring method has a negative effect on the results of inter- and intra-rater reli-

abilities [26]. However, in the present study, scoring was performed by the analytic method (5-point Likert-type scale). This scoring method is more accurate than the total scoring method. Therefore, the inter-rater reliability of the PHAT was higher than the above-mentioned studies. Adequate training and experience of the rater also affect the results.

The subjective nature of scoring handwriting components may be the reason for the difference between the intra-rater and inter-rater reliability in the current study. In consistent with our study, Reisman (1993) in her study on the development of MHT and Feder (2003) in his review also, reported that intra-rater reliability was higher than inter-rater reliability [8, 24]. In the investigation of intra- and inter-rater reliability of the PHAT, reliability coefficients were 1 for speed (second and number) and orthographic mistake variables, because the rater did not interfere with scoring these variables [17]. The study limitations were as follows: the poor cooperation of some school administrators, time limitation in assessing participants, environmental noise, and the necessity of gender matching on the examiner and participants.

Appropriate sample size and scoring with analytic methods by expert raters and using writing assignment with confirmed words qualitatively (expert panel) and quantitatively (item analysis) are among the strong points of this study. This study could be more comprehensive if the scoring of teachers were compared with each other as well as therapists, to examine the inter-rater reliability of PHAT. Additionally, the internal consistency of the PHAT should be examined, when the teachers are raters. It is suggested to consider the test-retest reliability of PHAT, because personal and environmental characteristics affect handwriting performance.

5. Conclusion

PHAT is a reliable tool to evaluate handwriting components in primary school-aged children (grades 2 and 3). It can also be useful for Iranian therapists to identify elementary school students with handwriting problems.

Ethical Considerations

Compliance with ethical guidelines

The study protocol was approved by the Ethics Committee of Iran University of Medical Sciences (Code: IR.IUMS.REC.1394.9211525209). Informed consent was obtained from the parents or teachers of each participant. We ensured children that withdrawal from the study was voluntary.

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Authors contributions

The authors contributions is as follows: Conceptualization: Naser Havaei, Akram Azad, Mehdi Alizadeh-Zarei and Abbas Ebadi; Methodology: Naser Havaei, Akram Azad and Abbas Ebadi; Investigation: Naser Havaei, Akram Azad and Mehdi Alizadeh-Zarei Writing–original draft: Naser Havaei, Akram Azad and Abbas Ebadi; Writing–review & editing: Naser Havaei and Akram Azad; and Supervision: Akram Azad.

Conflict of interest

The authors declared no conflict of interest.

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Research Paper: Health-Related Quality of Life of Mothers of Children With Intellectual Disability

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ABSTRACT

Objectives: Disability occurs as a sudden and unexpected incident, and coping with it depends on the conditions and lifestyle, the remaining abilities, cooperation of other family members, and the role of rehabilitation team. Rehabilitation work includes medical, professional and social rehabilitation teams. The family is also defined as an essential member of the social rehabilitation team. The present study aimed to assess the quality of life of mothers of children with intellectual disabilities, as an important member of the social rehabilitation team.

Methods: In this analytical and descriptive study, statistical population consisted of all Mothers of Mentally Retarded Children (MMRC) (educable, trainable and isolated), and Mothers of Children with Normal Intelligence (MCNI) in Shahr-e-Kord City, Iran. Total sample size was considered to be 306. For gathering data, the 36-Item Short Form Health Survey instrument, validated in Iran, and for analyzing the data 1-way ANOVA, linear regression and discriminant analysis were used.

Results: In terms of all quality of life dimensions and total score, there was a significant difference between the two groups (P<0.001) and MCNI group scored higher compared to MMRC group. The greatest difference between the two groups was related to physical function (effect size=40.7%), and the least was related to limitations in usual role activities because of emotional problems (effect size=30.9%).

Discussion: Mothers are an important mediator in providing rehabilitation services (secondary or tertiary prevention) to their children. Once their roles are neglected in the rehabilitation team work, the secondary and tertiary prevention activities for the disabled child will not be effective, and in the near future, mothers will be among the most vulnerable groups requiring rehabilitation services. Therefore, during the provision of secondary and tertiary prevention services for children, mothers' health status should also be monitored for the purpose of primary prevention.

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Highlights

- The quality of life in 46.8% of mothers of children with intellectual disabilities was low.
- About 96.5% of mothers of healthy children described their quality of life as moderate to high and only 3.5% of them had a poor quality of life.
- The quality of life of mothers with healthy children was higher in all 8 dimensions compared to mothers of children with intellectual disabilities.

Plain Language Summary

According to our survey, 46.8% of mothers of children with intellectual disabilities complained of their low quality of life. On the contrary, 96.5% of mothers of healthy children described their quality of life as moderate or high and only 3.5% of them reported a poor quality of life. The quality of life of mothers with healthy children was higher in all 8 studied dimensions compared to mothers of children with intellectual disabilities.

1. Introduction

Disability usually occurs suddenly and unexpectedly as an undesired incident [1]. According to the World Health Organization statistics, a disabled child is born every 8 minutes in the world [2]. Three to 7 children per 1000 are born with Intellectual Disability (ID) [3]. In developing countries, 10 to 15% of people are affected with disabilities [4], from which, 1 to 3% suffer from ID. ID refers to individuals with an IQ of less than 70 with impaired adaptive functions that has been occurred before the age of 18 years [5]. In Iran, a massive amount of more than 1.5 million people suffer from disabilities. Three percent of these people have severe disability, and according to the 2006-2011 censuses, ID accounts for the highest rate of disabilities [6].

Coping with this crisis depends on personal characteristics, lifestyle type, remaining abilities, cooperation of family members, and the role of rehabilitation team [1]. Parents, among family members, are the principle models of understanding and acceptance for the disabled person. Therefore, parents' response to their children's mental retardation plays a vital role in creating a favorable atmosphere for the disabled child and other family members [7]. Parents' reactions to their child's condition also vary according to their personality characteristics, time, and so on [7]. One of the most important determinants in this regard is the Quality of Life (QoL) of mothers, as the main caregivers of the disabled children [8].

In recent years, QoL, and in particular, the health-related QoL, has been significantly considered as an important indicator in assessing people's well-being [9, 10]. The QoL is the people's perception and understanding of their position in relation to their goals and values according to the objective living conditions [3]. While QoL includes many aspects, health-related QoL is mainly related to biopsychological health [11] and expresses the functional effects of illness and its outcomes on people's perceptions.

The QoL is affected by different living conditions of people at individual, family and social levels [12]. One of these stressful situations is the birth or presence of a disabled child; particularly a child with ID in the family [13]. Caring for children with a disability with specific physical, emotional and social needs often affects family functions and is associated with many emotional and behavioral problems for parents and especially mothers [14-16]. A disabled child refers to a child with a mental or physical disorder or a combination of both [17]. Such children might be considered disable by the community due to their appearance or behavior and functional/activity limitations, or be formally identified as such [18].

Studies suggest that biopsychological health and consequently the QoL of mothers with disabled children are significantly lower than those with healthy children [19-23]. Moreover, parents of children with ID appear to tolerate more stress and anxiety than other parents [5, 24]. Such stress and anxiety may be related to their children's future problems, disability costs, people's

impressions and attitudes towards the children, parent's wishes, etc. that greatly affect the parents' QoL.

In Iran, a number of studies also identified a difference between the QoL of mothers with disabled children and mothers of healthy children [25-27]. This also applies to mothers of children with ID [28]. Children with ID have more needs than other healthy children [5, 13, 24]; they impose more emotional and economic burden on parents [6], and their mothers are often the ones to bear the most burden, because of their close relationship with their children. Thus, they tend to endure more problems than other mothers.

In the rehabilitation services (secondary and tertiary prevention levels) aimed at disabled people, teams of medical rehabilitation, professional rehabilitation and social rehabilitation, work together and the disable person's family is also part of the social rehabilitation team [1]. Investigating QoL is important in parents with disabled children [29]. The concept of QoL depends on the socio-cultural context. The number of disabled people is growing in Iran. There are limited studies on the QoL of mothers of children with ID. Thus, this study was conducted to evaluate the QoL of mothers of children with ID in Shahr-e-kord City, Iran.

2. Methods

This descriptive and analytical study was conducted in Shahr-e-kord City, Chaharmahal and Bakhtiari Provh ince from October 2015 to June 2016. Samples include ed 2 groups of mothers. Group A) Mothers of Mentally Retarded Children (MMRC) including educable intellectually disabled with an IQ of 50 to 70, trainable children with an IQ of 25 to 50, and isolated children with an IQ of >25 [30]. According to State Welfare Organization of Chaharmahal and Bakhtiari, the number of children with ID has been 1125 persons since 2016. Group B) Mothers of Children with Normal Intelligence (MCNI).

Based on a moderate effect size of 0.3, a statistical power of 0.80, alpha of 0.05, equal proportion of 2 groups of mothers, as well as considering an additional 10% samples in each group, the final sample size was considered to be 306 people. Mothers having children of under 18 years of age in group A were selected by convenience sampling method from Nikan comprehensive rehabilitation center, Mehregan comprehensive center and Bording center of Ferdows for caring of intellectually disabled children. Mothers of children below 18 years of age in group B were selected by random sampling method. The samples of group B were assessed at their place of residence.

Mothers' QoL was measured by the 36-item Short Form Health Survey (SF-36). Its validity and reliability have been confirmed on the Iranian population by Montazeri and colleagues [31]. The SF-36 contains 36 questions that are used to compute scores on 8 components. Its components include physical functioning, role limitation because of physical health problems, bodily pain, general health, vitality, social functioning, role limitation due to emotional health problems, and mental health. Its scores range between 0 and 100, with a higher score representing a better health related QoL [31].

In the current study, the Cronbach alpha coefficients of all dimensions were ≥0.735. Subjects completed the study tools with an informed consent and full knowledge of the research objectives. The obtained data were analyzed by 1-way Analysis of Variance (ANOVA), multiple linear regression and discriminant analysis in SPSS.

3. Results

The Mean±SD age of mothers of educable, trainable, isolated children and normal children were 42±1.56, 46.7±1.65, 44.5±1.58 and 35.9±0.89 years, respectively (ANOVA results: $F[3,294]=18.03$, $P<0.001$). Mothers and their spouse's educational level, as well as Socioeconomic Status (SES) of the family with respect to the children's condition are presented in Table 1. The Chi-Square Test results revealed a significant relationship between the 3 variables and the child's condition (Table 1).

Initially, we estimated adjusted scores for each dimension and the total index of QoL by 4 predictive variables (i.e. mothers' age, educational level of mothers and spouses and SES) in a multiple linear regression model (Formula 1). Then, we compared the QoL status among the 4 groups of mothers. ANOVA results are presented in (Tables 2 and 3.

Formula (1): Adjusted score=Constant-β_1(age)+β_2 (Mother's educational level)+ β_3(Spouse's educational level)+ β_4(SES).

According to between-groups 1-way ANOVA results, there was a statistically significant difference at $P<0.05$ in all dimensions and in the total score of QoL for the 4 groups of mothers (Tables 2 and 3). Post-hoc comparisons using Tukey's HSD (Honestly Significant Difference) Test indicated that the mean score of mothers of normal children was statistically different from the

Table 1. Sociodemographic characteristics of the studied samples

Factors	Group	MA and Higher	Associate Degree	Diploma	Secondary School Degree	Elementary School Degree	Illiterate
Mother's educational level (%)	Educable (n=50)	8	4	12	22	26	28
	Trainable (n=50)	6.1	4.1	2	14.3	10.2	63.3
	Isolated (n=50)	14	6	14	10	18	38
	Normal (n=150)	41.5	20.4	22.4	6.1	6.8	2.7
		$x^2(18)=129.1, P<0.001$, Cramer's V=0.387					
Father's educational level (%)	Educable (n=50)	14.6	4.2	20.8	10.4	25	25
	Trainable (n=50)	19.1	2.1	21.3	2.1	14.9	40.4
	Isolated (n=50)	4.2	8.3	14.6	22.9	4.2	45.8
	Normal (n=150)	38.2	22.2	27.8	6.3	2.1	3.5
		$x^2(15)=125.9, P<0.001$, Cramer's V=0.383					

Factors	Groups	Very High	High	Middle	Low	Very Low
Socioeconomic status (%)	Educable (n=50)	0	14	40	30	16
	Trainable (n=50)	0	8	54	28	10
	Isolated (n=50)	6	16	34	18	26
	Normal (n=150)	6	34	51.3	7.3	1.3
		$x^2(12)=69.8, P<0.001$, Cramer's V=0.278				

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The numbers in the cells are in percentage.

other 3 groups. There was no significant differences among 3 groups of mothers of children with ID. As a result, four groups of mothers were divided into 2 homogeneous groups as follows: A. MMRC; B. MCNI. According to eta-squared (as an effect size measure), the greatest difference between group A and B related to "physical functioning" (eta-squared=40.7%) and the least to "role limitations due to emotional problems" (eta-squared=30.9%). A discriminant analysis was used to simultaneously examine the differences between two groups based on 8 dimensions of QoL. Results indicated that about 39% of difference between the two groups could attribute to the 8 dimensions of QoL.

The mothers'QoL status, which was computed by quartiles (25th, 50th, and 75th percentiles), are presented in Table 4. Based on SF-36, the higher the person's score, the better the QoL status. Therefore, the 25th quartile indicates the lower status and the 75th reflects the highest. The obtained results suggested low and moderate, and moderate to high percentages for all dimensions and total score in the MMRC and MCNI groups, respectively. The Chi-square test results revealed a statistical significant difference between the two groups in all comparisons.

4. Discussion

The current study aimed to evaluate the health-related QoL in mothers of children with ID and compare it with mothers of healthy children in Shahr-e-kord, Iran. Interquartile range was used to evaluate the level of QoL among mothers. The results indicated that, the QoL in 46.8% of mothers of children with ID was low. While 96.5% of mothers of healthy children described their QoL as moderate and high and only 3.5% of them had a poor QoL. This finding is consistent with the results of other studies [26, 27, 32].

Table 2. One-way ANOVA results of comparing QoL among the 4 groups of mothers

Groups		Mean	SD	F, Eta-Squared	Tukey's Test
Physical functioning	Educable (A)	59.85	17.05	51.18*, 35.9%	D
	Trainable (B)	53.30	15.60		D
	Isolated (C)	59.18	16.86		D
	Normal (D)	80.27	14.54		A, B, C
Role limitations due to physical health	Educable (A)	43.35	15.36	63.88*, 40.7%	D
	Trainable (B)	38.74	13.97		D
	Isolated (C)	42.94	16.07		D
	Normal (D)	63.28	10.94		A,B,C
Role limitations due to emotional problems	Educable (A)	42.50	17.92	40.05*, 30.9%	D
	Trainable (B)	42.12	14.88		D
	Isolated (C)	41.72	18.18		D
	Normal (D)	62.03	12.63		A,B,C
Energy/fatigue	Educable (A)	43.75	12.85	46.77*, 34%	D
	Trainable (B)	42.50	10.14		D
	Isolated (C)	45.55	13.34		D
	Normal (D)	59	9.14		A,B,C

*P<0.001

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Assessing the dimensions of QoL in the current study revealed a significant difference between the QoL of mothers of children with ID and mothers of healthy children. In addition, the QoL of mothers of healthy children was higher in all 8 dimensions. This result is in line with the findings of Mubaraki and Bagheri [33], Malekshahi et al. [6] and Haqh-Ranjbar et al. [34] who examined the QoL of mothers of children with ID. Findings of this study are also consistent with the studies that examined the QoL of mothers of disabled children in general term [5, 13, 25, 26, 35]. The greatest difference between the 2 groups related to the dimension of physical role (40.7%). This data suggests that, mothers of disabled children were facing more physical limitations in their role.

The slightest difference between the 2 groups related to the dimension of emotional role (30.9%). This finding means that although mothers with disabled children are facing more limitations in their emotional role than those of healthy children, the two groups have the least differences in this dimension of QoL compared to other dimensions.

The QoL in all 3 groups of mothers of children with ID was not at a good level. However, the QoL of mothers of educable children was lower than that of mothers of trainable and isolated children. However, there were no significant differences among three groups of mothers in terms of dimensions of QoL and overall score. Such data indicated no significant difference between the severity of ID of children and QoL of mothers. These findings are inconsistent with the studies by Maleshahi and Fallahi [6], Amiri-Majd et al. [36], Ahmadi et al. [13], and Fadakar sogheh et al. [24]. This discrepancy is probably due to controlling other underlying and social variables in those studies. In the current study, before controlling and modifying the score of other variables, a significant difference was also found between the severity of disability and QoL.

Limitations of this research include selecting mothers of children with ID by convenience sampling method. Furthermore, the used tool in this study was designed for measuring QoL in the general population. However, the mothers of children with ID might have had condi-

Table 3. One-way ANOVA results of comparing QoL among the 4 groups of mothers

Factors	Groups	Mean	SD	F, Eta-Squared	Tukey's Test
Emotional well-being	Educable (A)	51.92	10.91	50.79*, 36.6	D
	Trainable (B)	49.51	8.93		D
	Isolated (C)	53.50	11.51		D
	Normal (D)	65.59	8.07		A,B,C
Social functioning	Educable (A)	51	13.01	50.79*, 35.7	D
	Trainable (B)	48.85	10.84		D
	Isolated (C)	51.20	13.24		D
	Normal (D)	66.86	9.26		A,B,C
Bodily pain	Educable (A)	51.78	14.65	54.10*, 37.5	D
	Trainable (B)	47.63	13.47		D
	Isolated (C)	51.70	15.41		D
	Normal (D)	70.73	11.92		A,B,C
General health	Educable (A)	40.46	13.83	56.42*, 37.6	D
	Trainable (B)	37.73	12.60		D
	Isolated (C)	39.90	13.94		D
	Normal (D)	57.50	9.87		A,B,C
QoL/total score	Educable (A)	49.34	14.26	56.88*, 37.6	D
	Trainable (B)	46.09	12.68		D
	Isolated (C)	48.78	14.66		D
	Normal (D)	67.15	10.79		A,B,C

*P<0.001

Table 4. Frequency distribution of the QoL in the two groups of mothers

Dimension	Group	QoL Status (%)			Chi-Squared Test
		High	Moderate	Low	
Physical functioning	MMRC	9.5	44.5	46	78.33*
	MCNI	40.3	56.1	3.6	
Role limitations due to physical health	MMRC	8.6	45.7	45.7	85.25*
	MCNI	42.1	55	2.9	
Role limitations due to emotional problems	MMRC	7.3	46	46.7	75.55*
	MCNI	36.7	58.3	5	
Energy/fatigue	MMRC	10.1	44.9	44.9	73.21*
	MCNI	40.3	56	3.7	
Emotional well-being	MMRC	10	44.3	45.7	75.33*
	MCNI	40	56.3	3.7	
Social functioning	MMRC	9.4	44.6	46	78.86*
	MCNI	40.6	55.8	3.6	
Bodily pain	MMRC	8.5	46.1	45.4	81.56*
	MCNI	42.6	54.5	3	
General health	MMRC	9.8	44.1	46.2	79.38*
	MCNI	40	56.4	3.6	
QoL/total score	MMRC	9.2	44	46.8	84.05*
	MCNI	41	55.6	3.5	

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* P<0.001

Abbreviations: MMRC: Mothers of Mentally Retarded Children; MCNI: Mothers of Children with Normal Intelligence

tions affecting their QoL, which have not been included in SF-36. Furthermore, some personality traits of the mothers might have affected their QoL which were overlooked in this study.

5. Conclusion

Considering the above limitations, it can still be concluded that the QoL of mothers of children with ID and mothers of healthy children are completely different. Mothers of children with ID have lower self-esteem and lower functional level, due to physical problems, anxiety, stress, and depression caused by having a disabled child. Therefore, they have lower QoL. Only few studies reported contradictory results which can be contributed to the socio-cultural conditions of the studied communities. Findings of this study suggested that the mothers of children with ID (as members of the so-

cial rehabilitation team) are affected by their children's care burden and this influences their QoL.

Mothers are important in the provision of rehabilitation services (secondary or tertiary prevention) to their children. Once their role in the rehabilitation team is ignored, not only the secondary and tertiary prevention activities for the disabled child will not be effective, but mothers may also become a primary recipient of rehabilitation services and among the vulnerable groups in near future. Therefore, during the provision of secondary and tertiary prevention services to children, mothers as the primary caregivers to children should be monitored with the aim of primary prevention.

Ethical Considerations

Compliance with ethical guidelines

Prior to study, all participants signed a written informed consent, approved by the Ethics Committee of the University of Social Welfare and Rehabilitation Sciences.

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Authors contributions

The authors contributions is as follows: Conceptualization, investigation, writing original draft, writing-review and editing: All authors; and methodology and analysis: Gholamreza Ghaedamini Harouni.

Conflict of interest

The authors declared no conflict of interest.

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Research Paper: The Effect of Elementary School Teachers' Knowledge of Learning Disabilities on Referring Afflicted Students to Speech Therapy

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ABSTRACT

Objectives: Learning disabilities can cause serious communication and socio-emotional disorders in students. Teachers, as specialists who are in direct contact with students on a daily basis, have an important role in identifying and referring students suspected of these disabilities. Therefore, this study investigated the role of primary school teachers' awareness and attitude about the signs and symptoms of learning disabilities on the referral of students of Ahvaz City, Iran to speech therapy centers.

Methods: This case-control study was conducted on 165 elementary school teachers in Ahvaz in 2016-2017. The teacher's awareness questionnaire was used to determine the teachers' awareness level. A logistic regression test was used to explore the role of teachers' attributes on the referral of students to speech therapies.

Results: The mean total score of teachers' awareness about students' learning disabilities was significantly different in the case and control groups ($P<0.05$). Teachers' awareness scores had a direct and significant relationship with working experience ($P<0.05$) and participation in educational workshops ($P<0.05$). However, there was no significant relationship between the teachers' awareness score with age and gender ($P>0.05$).

Discussion: Teaching experience, educational level, history of participation in educational workshops and the teachers' awareness of learning disabilities are critical factors in referring students to speech therapy centers. It is recommended that teachers participate in workshops at regular intervals to update their knowledge on this topic.

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Highlights

- Teachers' experience, their level of education, participation in workshops, and awareness of learning disabilities can directly affect their referral of students to speech therapy centers.

- The age and gender of teachers did not affect the rate of referral of students with learning disabilities to speech therapy centers.

Plain Language Summary

Learning disability of educational skills can cause communicational, emotional and social disorders. Teachers play a key role in diagnosing this problem in their students and referring them to special therapy centers. In this study, we considered those variables related to the teachers' awareness on learning disability. Teachers' work experience, their educational level, participation in educational workshops and awareness level of learning disability had main effect on referring students to speech therapy clinics.

1. Introduction

Learning disabilities are neurodegenerative disorders with a prevalence rate between 3% and 12% in elementary school students [1-4]. This rate was 11.4% among the third, fourth and fifth grade primary school students in Iran [5]. This rate was similar to that found in America [6]. Genetic factors and prenatal and postnatal conditions may cause learning disabilities [7].

The term "learning disability" was introduced by Samuel Kirk in 1962 [8]. According to the fifth edition of Diagnostic and Statistical Manual of Mental Disorders (DSM-V-TR, 2013), learning disabilities refer to the conditions when academic skills are greatly below the average range of expected scores based on the chronological age (e.g. at least 1.5 SD below the population mean score for age). The difference between intelligence and academic achievement scores in standardized reading, mathematical tests, and written expressions is basically lower than the chronological age, intellectual, and educational level. Learning disabilities significantly affect the academic achievement and daily living activities requiring reading, math or writing skills [9].

Lingeswaran (2013) introduced factors such as a history of language impairment, inability to carry out and maintain activities, weak purposefulness and novelty and the lack of socio-emotional maturity as predictors of learning disabilities [7]. Students with learning disabilities are usually not identified before the third and fourth grades. Consequently, they may miss learning and education opportunities due to secondary problems such as lack of concentration, hyperactivity, communication disorders and depression caused by learning disorders [5].

Most of the students with severe learning disabilities attend exceptional schools due to a misdiagnosis of intellectual disabilities. Those who attend public schools face many challenges in educational progress, which, unfortunately, is the result of 40% academic failure of these children [3, 5]. The later the disabilities are identified, the harder the rehabilitation will be. However, the identification and treatment of such children will lead to their 70% recovery [3, 4]. For this reason, since 1994, the training of students with special needs has become an international concern. Also, countries around the world have committed themselves to provide equal education services for students with special needs as their normal peers [5].

One of the most important strategies for an early age identification of these abnormalities is referring them (by primary school teachers) to rehabilitation practitioners including speech therapists, for accurate and comprehensive assessment and the final diagnosis of childhood learning disorder. This requires that teachers be aware of the signs and symptoms of the disorder and even carry out initial screening of the students [10]. Otherwise, the evaluation and diagnosis may be delayed or lead to undesirable outcomes. Therefore, the awareness and attitudes of primary school teachers about learning disorders are very important [11].

Some studies have reported that the teachers' awareness of learning disabilities is low that results in many challenges in academic achievement of students [12-14]. Kataoka et al. (2004) studied the perception of teachers

and principals about learning disabilities in Japan. In total, 128 principals and 123 teachers participated in that study. They reported that both principals and teachers need to obtain more knowledge about learning disabilities [12]. Khatib and Jamal investigated the knowledge of teachers in Jordan. They studied 405 elementary school teachers in 3 districts. All of the teachers completed a researcher-made test that included 40 items. They demonstrated that teachers had moderate knowledge about learning disabilities [15].

Abdi et al. reported that teachers' awareness about identification, categorization and the total awareness of learning disabilities was significantly higher in female teachers than male teachers. However, there was no significant differences on the knowledge of rehabilitation between male and female teachers. They concluded that teachers with higher academic education had more awareness about learning disabilities [13]. Arjmandi and Kakabarei reported no significant differences between female and male teachers on the knowledge about learning disabilities. They also reported that academic education had no effect on the knowledge about learning disabilities [2]. Moothedath and Narasimha Vranda (2015) also conducted a study on the knowledge of primary school teachers in India. In total, 200 teachers from 16 schools completed a questionnaire about teachers' knowledge of learning disabilities. They emphasized that teachers should increase their identification knowledge of students with learning disabilities [14].

In many countries, workshops and in-service programs are held for teachers in order to educate children with special needs including learning disabilities in public schools. Such programs help with identifying and diagnosing these disorders in a timely manner [11]. There is still a lack of time management for referring many students with learning disabilities in Iran. It can be because of the low awareness of teachers about these conditions. Therefore, the present study investigated the role of awareness and attitude of primary school teachers as well as other demographic characteristics on the referal time of students with learning disabilities to speech therapists.

2. Methods

The participants of the present study were the elementary school teachers in Ahwaz City, Iran. The sample size required for the current study was determined using the sample size determination by G*Power (α=0.05, β=0.95, d=0.71). Finally, 165 teachers participated in this case-control study and completed the questionnaire of knowledge and attitudes of teachers of children with learning disabilities. Initially, 59 students who were referred to speech therapy clinics with the diagnosis of learning disabilities by school teachers were selected by convenience sampling method. Gender, age, and educational background were identified. Then, the teachers who identified these students and referred them to speech therapy services were identified. A total of 45 elementary public school teachers were identified and enrolled into the case group. A demographic data questionnaire was completed by them.

Characteristics such as teaching experience, degree, gender, and history of participation in workshops constructed the main aspects of this questionnaire. Also, 120 primary school teachers of public schools were randomly selected as the control group who completed the demographic data questionnaire, as well. There were also teachers in the control group who had a history of students' referral to the speech therapy centers, as well as teachers without such history. After collecting the demographic data, all teachers in the two groups completed the questionnaire for determining the knowledge and awareness of elementary school teachers of students with learning disabilities.

Psychometric properties of the questionnaire were investigated by Abdi et al. in Iran (2010). This questionnaire consists of 3 subscales, including teachers' knowledge of the a. learning disabilities symptoms; b. symptoms categorization; and c. existing therapeutic approaches, to improve learning disabilities in elementary school students. This instrument consists of 34 items. The correct and incorrect answers to each question are scored 1 and 0 respectively. The total score indicates the level of knowledge and awareness in elementary school teachers of student learning disabilities. Thus, a score of 0-10 reflects low awareness, 11-20 moderate awareness, 21-30 desirable awareness, and over 30 very good awareness [13].

All of the teachers provided a consent form for participation in the current study. We explained the purposes of our study to them. SPSS was used for statistical analysis. Considering the normal distribution of data, Independent t-test was used for between-group comparisons of continuous quantitative variables. Spearman's correlation coefficient was used to determine the correlation between teachers' characteristics and their awareness level and attitude. Binary logistic regression was used to determine the role of teacher's characteristics on the referral or non-referral of the students to speech therapies. The teachers' gender, level of education, awareness level and attitude scores, and their attendance to workshops

were separately entered into the logistic regression equation. The significance level was set at P<0.05.

3. Results

The baseline characteristics of both groups of teachers are presented in Table 1. Table 2 presents the total mean and standard deviation scores of awareness and attitude of teachers of students with learning disabilities in the case and control groups. There was a significant difference between the scores of groups in the questionnaire (P<0.001).

According to Table 3, in both case and control groups, the awareness and attitude scores of teachers had a direct and significant relationship with the working experience (P<0.001) and the history of participation in workshops (P<0.001). In addition, in the control group, the awareness and attitude scores of teachers had a direct and significant relationship with their level of education (P=0.04). However, in the case and control groups, there was no significant correlation between the awareness score of teachers, and age. Furthermore, in the case group, there was no significant correlation between teachers' awareness scores and educational level (P>0.05).

After performing initial analysis, the logistic regression test was used to determine the weight and role of each characteristic of the teachers on the referral or non-referral of students (Table 4). As presented, teaching experience, teacher's educational level, awareness test scores and a history of workshop participation significantly affected the referral of students with suspected learning disabilities to speech therapies (P<0.003). However, the age and gender of teachers did not affect the rate of referral of students with learning disabilities to speech therapies (P>0.05).

4. Discussion

The current study determined the effective factors on the timely referral of students suspected of learning disabilities to speech therapy centers by elementary school teachers. The obtained results indicated that the level of awareness and attitude was different between the case and control groups regarding learning disabilities in the three areas of identification, classification, and rehabilitation (Table 2). Therefore, the Iranian teachers had a relatively low awareness of students' learning disabilities.

This finding is in line with the studies by Kataoka et al. (2004), Moothedath and Narasimha Vranda (2015),

Table 1. Description of subjects' demographic characteristics

Demographic Particulars	Components	Groups		Test for Differences
		Case (n=45)	Control (n=120)	
Age, y	Mean±SD	43.5±4.4	44.1±3.9	t=0.55, P=0.67
Gender	Female	30(66.7%)	78(65.0%)	χ^2=4.11, df=1, P=0.04
	Male	15(33.3%)	42(35.0%)	
Work experience, y	Mean±SD	12.5±4.9	11.5±4.0	t=0.77, P=0.65
Educational level	Graduate	34(75.6%)	98(81.7%)	χ^2=5.22, df=1, P=0.03
	Postgraduate	11(24.4%)	22(18.3%)	
Workshop attendance	Yes	43(95.6%)	77(64.2%)	χ^2=3.95, df=1, P=0.03
	No	2(4.4%)	43(35.8%)	

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Table 2. The teachers' general awareness and attitude about learning disabilities

Groups	Total Scores of Teacher's Awareness (Mean±SD)	P
Case (n=45)	29.5±2.5	<0.001
Control (n=120)	20.5±5.5	

Note: df=1; t=5.18

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Table 3. Correlation coefficients of teachers' awareness and attitude scores with other independent variables

Teachers' Scores	Age	Gender	Work Experience	Educational Level	Workshop Attendance
Awareness test score of teacher's viewpoint (case group)	r=0.06, P=0.54	r=0.05, P=0.60	r=0.53, P<0.001	r=0.11, P=0.42	r=0.29, P<0.001
Awareness test score of teacher's viewpoint (control group)	r=0.05, P=0.66	r=0.04, P=0.55	r=0.61, P<0.001	r=0.40, P=0.04	r=0.35, P<0.001

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Table 4. Logistic regression analysis and predictors of student referral to speech therapy by teachers

Predictor Factors	Referring or Not Referring Students to Speech Therapy by Teachers			
	B	SE	df	P
Age	0.189	0.121	1	0.20
Gender	0.100	0.324	1	0.22
Work experience	0.480	0.101	1	<0.001
Educational level	0.299	0.106	1	0.041
Workshop attendance	0.348	0.119	1	0.003
Awareness test score of teacher's viewpoint	0.512	0.100	1	<0.001

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and Abdi et al. who found that primary school teachers had a low level of awareness about learning disabilities [12, 14]. However, these data were inconsistent with Jamal and Al-Khatib study findings. In this study, teachers had a moderate knowledge about learning disabilities The reason of this result is the interaction of teachers with those who had activities in the field of learning disabilities, participating in training courses and, getting information from workshops, TV programs, radios, and learning disability journals [15].

The low level of teachers' awareness can be attributed to the incapability of teachers to identify invisible disabilities. Studies have reported that in the curriculum intended for Indian teachers, there are no specific curriculum or a workshop on signs and symptoms of children with learning disabilities. This can lead to a lack of awareness among teachers and consequently, lack of timely referral of students with special needs [13]. The case group teachers had a history of referring a student suspected of learning disabilities to speech therapies.

To determine the reason of significant difference between the two groups, the subjects' backgrounds were investigated. Comparisons revealed that factors such as teacher's gender, educational level, and history of participation in workshops were different between the two groups (Table 1). In addition, the correlation analysis suggested a direct and significant correlation between the level of awareness and attitude of teachers with their work experience, educational level and workshops attendance. In addition, there was no significant correlation between the level of awareness and attitude of teachers, and age and gender (Table 3).

This finding is in line with Abdi et al. and Arjamndi studies [2, 13]. However, it was inconsistent with Bhavya and Kamala study [16, 17]. They also reported teachers with higher educational level had higher knowledge about learning disabilities. Arjmandi and Kakabarei also reported similar findings. They stated that education and gender had significant effects on teachers' knowledge about learning disabilities [2].

Kamala reported that gender had no effect on teachers' knowledge. He also demonstrated no significant differences between teachers with 1-5 years of teaching experience and those with more than 5 years of teaching experience in terms of knowledge about learning disabilities [17]. Bhavya also reported that educational level

and gender had no effects on teachers' knowledge about learning disabilities [16]. Lingeswaran also reported that teaching experience had no effects on teachers' knowledge about learning disabilities [7].

The regression analysis suggested that teachers' teaching experience, their level of education, history of participation in workshops, and their awareness of learning disabilities can directly affect the referral of students to speech therapy centers by teachers. Obviously, teachers' participation in workshops can familiarize them with the diagnoses, causes and the specialists for resolving learning disabilities [11]. Moreover, teachers with higher educational level learn more about the educational issues and learning conditions among student, in addition to their specialized courses [8]. Teaching experience is another important factor illustrating the impact of managing students' issues. Certainly, one should not simply ignore the unique experiences of each teacher in dealing with students. The literature has also emphasized on the importance and impact of this issue on teachers' awareness of the different conditions of students [13, 16].

To explaining the reason for this finding, it can be said that recognizing the field of learning disabilities in the education system of Iran is relatively new. In addition, it can be indicative of the neglect of educational planners to update teachers' knowledge and motivation for self-learning [13]. Finally, the obtained results revealed that the higher the level of awareness and attitude of teachers about student learning disabilities, the more the students will be referred to appropriate centers. Therefore, it is important to increase the awareness of teachers by holding workshops, improving the educational level of teachers, and increasing their job experience besides increasing their awareness and attitudes about students' learning disabilities. The aforementioned actions may lead to the timely referrals of such children to specialized centers to overcome their disabilities.

5. Conclusion

Teachers directly address the educational and behavioural issues of students. Thus, they play a key role in diagnosing, referring, and solving students' problems. Creating a proper vision of these students is essential to have a suitable function for them. Treatment of these students will be a result of interaction between the family, teacher and therapist. Therefore, it is desirable for primary school teachers, as the most important levels of education, to have a thorough awareness of recognition of learning disabilities. This can be achieved through modification of teacher training programs and informing them via media on the needs of such children. In order to achieve this goal, workshops at regular intervals could be held. In addition, careful planning and the comprehensive support of the relevant authorities are required. Further research is required to more accurately assess teachers' awareness. The lack of teacher awareness measurement subtests was a limitation to this study.

Ethical Considerations

Compliance with ethical guidelines

The present study was approved by the Ethics Committee of University of Ahvaz Jundishapur Medical Sciences (Code: IR.AJUMS.REC.1396.559).

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Authors contributions

The authors contributions is as follows: Conceptualization: Peyman Zamani, Neda Tahmasebi and Negin Moradi; Formal analysis, investigated, writing review & editing: Peyman Zamani and Neda Tahmasebi; Writing-orginal draft preparation: Akram Ahmadi and Ebtesam Hozeily.

Conflict of interest

The authors declared no conflict of interest.

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Research Paper: The Effect of Family-Centered Nature Therapy on Interactions Between Parent and Child With Autism Spectrum Disorder

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ABSTRACT

Objectives: Parents of Autism Spectrum Disorder (ASD) children often have a negative attitude towards themselves. They are often negatively affected by these challenges and the failure of their children. Thus, their interaction with their children is negatively influenced. The present study aimed to investigate the potential effect of family-centered nature therapy on the interaction of parents with their children.

Methods: The present research was a quasi-experimental study with pre-test and post-test design and a control group. Statistical population included all ASD children aged 3-7 years in Tehran City, Iran. A sample of 14 children with ASD were selected through convenience sampling method. The subjects were non-randomly assigned into either the experimental or control groups. The necessary data were collected through Parent-Child Relationship Scale (PCRS) and the program of nature therapy developed on the basis of the current theoretical frameworks and research findings. The collected data were subjected to descriptive statistical analyses and Analysis of Covariance (ANCOVA).

Results: The obtained results suggested that the Mean±SD score of experimental group on PCRS after the treatment was 100.14±11.82. While the Mean±SD score of the control group was 84.14±3.93. Moreover, the results of the statistical tests revealed that the difference between the experimental and control groups was statistically significant, indicating that the family-centered nature therapy was effective in improving the parents' interactions with their ASD children. In addition, the ANCOVA results indicated that the estimated F (13.32) was statistically significant at P=0.001, indicating that the treatment had a positive effect on the dependent variable.

Discussion: Family-centered nature therapy was effective in improving the parents' relationship with their children. The ASD children had fewer conflicts with their parents, enjoyed a positive relationship with their parents, and showed lower dependence on their parents after receiving the treatment. Therefore, this therapy can be a complementary method along with other standard treatments received by ASD children. It is an effective, simple and readily accessible option to improve the interaction of parents with their ASD children.

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Highlights

- Family-centered nature therapy is effective on children with autism.
- Nature therapy improves parent-child relationship for autism children.
- Nature therapy increases autism children's interactions.

Plain Language Summary

Study population comprised all autism children aged 3-7 years living in Tehran City, Iran. According to the study results, the difference between the experimental and the control groups was statistically significant, indicating that the family-centered nature therapy was effective in improving the parents' interactions with their autistic children.

1. Introduction

According to the Fifth Edition of Diagnostic and Statistical Manual for Mental Disorders, the diagnostic criteria for Autism Spectrum Disorder (ASD) include persistent deficit in social interactions in various contexts, along with the current or past restricted repetitive patterns of interests, behavior and activities observed in the early stages of development, which cause clinically important problems in one's current functioning. The symptoms widely vary based on the severity of ASD, developmental stage, and biological age of the patient [1].

The primary cause of this disorder remains unclear. However, genetic factors play a comparatively important role in autism occurrence. ASD occurrence is critically rising, as 1 in each 68 children is diagnosed with ASD [2]. The frequency and type of interactions in ASD children with their parents, negatively affect the relationship between them [3]. Parents often report high degrees of anxiety, depression, isolation, separation and aggression in their ASD children. These behavioral problems lead to personal distress in parents. The gradually exacerbating temper of parents of ASD children, negatively impacts parent-child interactions.

Investigating parent-child relationship in families with an ASD member started in 1980s. The relevant results revealed that the parents of ASD children were under stress and faced with a variety of life challenges. Issues such as socio-behavioral problems, bad-temperedness, self-injury, other injury, and verbal problems that cause changes in the interaction between ASD children with their parents and even with other family members [4, 5]. Such problems complicate child raising for the parents, thus negatively influence the parent-child interactions [6, 7].

The developmental characteristics of child and parents' characteristics are important and form the nature of parent-child relationship. In the theory of systemic family therapy, all family members are believed to be involved in the parent-child relationship [8]. Thus, using parents as therapists in the treatment of ASD children seems to be a logical effective strategy. Such strategy provides the parents with a chance to be more active in taking care of their children and have a better understanding of their children's desires and real needs.

A variety of treatment methods have been implemented by experts to improve the quality of the development of ASD children through eliminating the problems. The use of special treatment for ASD children initiated in 1960. Psychoeducational, medical, complementary or alternative treatments are currently available. However, nature therapy has been introduced since 1992, as a type of ecopsychology approach [9].

Nature therapy refers to all treatments in which a variety of activities are performed in nature, outdoors, and green areas [10]. This treatment approach is followed in an experimentally creative manner in the nature. Nature therapy extends our classic understanding of place as a static concept into a dynamic one under the control of the therapist. Such place is used to form the structure, conditions, and process of treatment [11]. In nature therapy, a number of interventions are made by the therapist, including animal assisted intervention, horticultural therapy, farming, performing art in or with nature, wilderness therapy, adventure therapy, and green exercise therapy [12].

Much research indicate that experiencing and interacting with nature have positive effects on cognitive, physical, social and emotional development of children. However, the lack of relation with nature is associated with adverse effects on the development and health of children. For example, studies in the field of education revealed that nature has positive effects on the cognitive, emotional, and social development in children with attention deficit disorder, as well as attention deficit hyperactivity disorder [13].

Similarly, a study conducted by the Psychotherapy Center [14] reported that exposing hospital patients to beautiful natural sites have some positive benefits for them like reduced stress, increased self-esteem, weight loss, and reduced substance abuse. Moreover, Culture and Wilkins (1992) applied nature therapy to cure ASD children, abnormal growth, conduct disorder, disregard disorder, severe emotional disorders, and learning disorders. Their obtained results included a reduction in aggressive and hostile behavior, developing cooperative behavior with peers, as well as increase in social skills and self-confidence [15, 16]. Moreover, being attracted by the nature can be considered as a type of self-therapy. Nature therapy increases sensory stimulation, attention, care, a sense of security, happiness and well-being. It also decreases stress level, and mental fatigue.

The integration of nature therapy and family-centered approach could be applied in the treatment of children with ASD. Such integration provides a chance to experience nature, and enables parents to improve the quality of their interaction with their ASD children in the calmness of nature [17]. Thus, the present study aimed to investigate the potential positive effect of family-centered nature therapy on the parent interactions with their children with ASD.

2. Methods

This quasi-experimental study was of pretest-posttest control group design. The statistical population included all ADS children aged 3-7 years referred to rehabilitation centers and clinics in Tehran City, Iran. A sample of 14 ASD children were selected from 3 health centers (Health Center of Seda-o-Sima, Zafar, Padideh). Samples were non-randomly assigned to either the experimental or the control groups, by convenience sampling method. After the children were diagnosed with autism by a psychiatrist in the relevant centers, the parents were briefed on the purpose and conditions of the study. They were explained that the presence of both parents or one parent in all treatment sessions was necessary. Finally, the parents of 14 ASD children (12 males and 2 females) without any mental disorders, attention deficit disorder, and hyperactivity disorder agreed to participate in the study. There were 6 males and 1 female in each group.

The exclusion criteria were any mental disorder identified as the primary diagnosis, absence from 2 or more sessions, and any physical illness. The study participants had received psychological therapies at the clinics before and during the course of the present study. The participants attended ten 3-hour long treatment sessions in 3 months at Savan Nature School in Tehran. The introductory session for the parents of the experimental group was held at TV Health Center building in June 2017 in the presence of the specialist and all staff of the center. The written informed consent was obtained from all parents of the subjects after being informed about the purpose of the study and confidentiality of their information. Then, 10 treatment sessions were held in the nature. In each session, some predetermined tasks and activities as introduced in Table 1 were performed.

Before conducting the study, the parents of both groups were required to complete the Child-Parent Relationship Scale (CPRS) (Pianta, 1994) as the pretest. Because in every session, the parents and children were present in the nature, the researcher requested the staff of the center to cooperate with the parents as facilitators, to provide more safety for the parents and children. At the beginning of every treatment session, the researcher explained the relevant tasks and activities in details for the parents and facilitators. The parents were required to cooperate with the facilitator and their children to complete the assigned activities.

In some activities, the parents had to work alone with their children to complete the assigned activities. Ten days after the last treatment session, the CPRS was completed by the parents of both groups as the posttest. The same scale was again completed by the parents after 3 months as the follow-up test. The present study was confirmed by the Ethics Committee of Islamic Azad University, Science and Research Branch, Tehran and the Health Center of Seda-o-Sima in Tehran.

Study tools

Child-Parent Relationship Scale (CPRS) developed by Pianta (1994), was translated into Persian by Abareshi, Tahmasian, Mazaheri, and Panahi (2007). The validity and reliability of the translated version of the scale was confirmed by specialists. This scale is among the most powerful measures of parent-child relationship, and es-

Table 1. Tasks assigned in the treatment sessions

Session	Completed Tasks
First	Being in the nature (getting interested and mentally involved in the nature without the direct guidance of the trainer) Performing a variety of tasks, including sitting on lawn, lying on lawn
Second	Repeating previous session tasks and performing special activities with a focus on visual, tactile, and vestibular stimulation. Walking along an imaginary path and collecting stones along the road and putting them into a bag, covering the body with soil and mud, performing balance activities
Third	Repeating previous session tasks and performing activities focused on auditory, taste, tactile, and olfactory stimulation. Collecting wood to start a fire, roasting potatoes on fire, peeling and eating potatoes, smelling the bread heated on fire, walking on dried tree leaves
Fourth	Repeating previous session tasks and performing activities focused on vestibular stimulation. Keeping the body in different positions in the air, touching animals, hugging animals, making mud and putting mud on hand, trunk and the leg
Fifth	Repeating previous session tasks and performing activities focused on sight and tactile stimulation. Playing Haft Sang (Persian game), playing bowling using wood pieces, hiding the body under the sand and gravels
Sixth	Repeating previous session tasks and performing activities focused on vestibular stimulation. Touching dried tree leaves with the body, performing activities like jumping, running, etc. Collecting small and big stones, picking up dried leaves from the lawn, feeding animals, cooking Mirzaghasemi (a Persian dish) with the help of parents
Seventh	Repeating previous session tasks and performing activities focused on auditory, sight, and tactile stimulation. Leaning against a tree and scratching the back with the tree, sitting by a stream and listening to the sound of running water
Eighth	Repeating previous session tasks and performing activities focused on olfactory, vestibular, and sight stimulation. Collecting vegetables, smelling vegetables, climbing a spider web while maintaining balance
Ninth	Repeating previous session tasks and performing activities focused on sight and olfactory stimulation. Walking on the edge of stones around raised garden beds, watering tomato plants using a glass
Tenth	Repeating previous session tasks and performing activities focused on taste, tactile, and olfactory stimulation. Going into the birds and rabbits cage, hugging them, and feeding them, smelling burned wood, making bread (mixing flour with water)

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pecially mother-child relationship. It consists of 30 items organized in 3 different subparts of conflict (items 6, 28, 27, 26, 25, 24, 23, 21, 19, 17, 14, 12, 7, 4, 2), positive relationship (items 8, 5, 3, 1, 30, 29, 22, 16, 13, 10), and dependence (items 20, 18, 15, 11, 9), with the Cronbach alpha of 0.84, 0.69, 0.46, respectively. This scale measures parents' understanding of their relationship with their children. This scale can be self-administered to measure parent-child relationship, based on a 5-point Likert-type scale, with 1 indicating "definitely apply" and 5 indicating "definitely does not apply" [18, 19].

Family-centered Nature Therapy Program consists of 2 different stages; 1. Making children interested and mentally involved in nature; 2. being present in nature and performing certain predetermined activities and tasks. The first stage contains free activities which are not under the direct control of researcher. However, the second stage consists of 3 parts, as follows: completing horticultural therapy activities, establishing relationship with animals in the natural environment, and performing physical activities in the nature. In each part, certain activities are performed.

The physical activities consisted of 6 groups of activities, each focuses on 1 of the 5 senses of sight, hearing, olfactory, taste, and the vestibular sense. The activities performed in each stage are confirmed by 5 different specialists. All of the aforementioned activities and tasks were based on the documentation mentioned in other research studies. The validity of the program was confirmed by relevant professors and specialists and occupational therapists, and their content was content.

3. Results

The collected data were analyzed by descriptive inferential statistics including Analysis of Covariance (ANCOVA). Tables 2 and 3 summarize the measures of central tendency and dispersion for the PCRS obtained

scores. Those tables also present the follow-up test results for the experimental and control groups.

As per Table 2, the Mean±SD scores for the 3 subparts of the scale are presented separately. The scores of the experimental group on the PCRS yielded Mean±SD score of 83.14±8.13. However, after the treatment, the experimental group obtained Mean±SD score of 100.14±11.82 on PCRS. The control group demonstrated Mean±SD score of 88.71±7.83 on the scale before conducting the study. In addition, the Mean±SD score of PCRS was 87.14±3.93, after the treatment. Also, the Mean±SD score of the follow-up test for the experimental group revealed a negligible difference with those obtained in the post-test. Before running the parametric ANCOVA, the normality of dispersion and the assumption of homogeneity of variance were confirmed through Kolmogorov-Smirnov Test and the Levene's Test.

According to Table 3, the obtained F-value of 13.32, was statistically significant at P=0.001. Given the fact that the significance level selected for the present study was P=0.05, the obtained F-value was definitely significant. Such finding indicates that the treatment provided (independent variable) for the experimental group was effective in modifying parent-child interaction (dependent variable). Thus, the obtained results suggested that family-centered nature therapy improved the parent-child interaction in the experimental group. In other words, the provided treatment (independent variable) explained

Table 2. The Mean±SD of the pre-test and post-test scores of the experimental and control groups based on PCRS and follow-up data

Subparts	Group	Test	No.	Mean±SD	Min	Max
Conflict	Experimental	Pre-test	7	30.57±9.3	31	52
		Post-test	7	41.29±7.25	16	40
Follow-up				40.41±6.59		
	Control	Pre-test	7	25.71±6.63	15.00	37.00
		Post-test	7	22.00±5.39	14.00	29.00
Positive relationship	Experimental	Pre-test	7	24.86±6.23	16.00	32.00
		Post-test	7	33.300±5.13	25.00	39.00
Follow-up				34.00±5.65		
	Control	Pre-test	7	22.00±2.77	18.00	26.00
		Post-test	7	21.71±4.11	14.00	26.00
Dependence	Experimental	Pre-test	7	10.29±3.40	5.00	16.00
		Post-test	7	13.00±2.24	9.00	15.00
Follow-up				12.00±2.51		
	Control	Pre-test	7	7.14±2.54	4.00	12.00
		Post-test	7	6.29±2.87	4.00	12.00
Parent-child relation	Experimental	Pre-test	7	83.14±8.13	70.00	94.00
		Post-test	7	100.14±11.82	82.00	116.00
Follow-up				97.00±11.59		
	Control	Pre-test	7	88.71±7.83	77.00	99.00
		Post-test	7	78.14±3.93	81.00	92.00

Table 3. The results of the ANCOVA (the effect of nature therapy program on parent-child relationship)

Source of Variance	SSE	df	MSE	F	Significance Level	Eta-Squared
Experiment	430.61	1	430.61	13.32		0.55
Error	355.51	11	32.32			
Total	872.93	13			0.001	

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55% of the observed variance of the scores related to the dependent variable.

4. Discussion

The present study mainly aimed to investigate the potential effect of family-centered nature therapy on parent-child interaction patterns among families with ASD children. The results revealed that the posttest mean score of experimental group was significantly higher than that of the control group. These data suggest that the treatment provided to the experimental group was effective in modifying the interactions between parents and their ASD children. In other words, the family-centered nature therapy significantly improved the parent-child interaction pattern. However, the improvement in parent-child interaction takes place when there is a mutual emotional expression and interaction between them.

There are a number of factors which facilitate the mutual emotional child-parent interactions. Perhaps the most important factor is their well-being. Firstly, the children feel well when the parents are actively present and involved in training them. in that the parents' presence fosters close emotional relationships between the parents and the kid, thus helping the child to feel safe and secure [20, 21]. Secondly, as the results of the present study indicate, the presence of parents and children in the nature improves the social, communicative and other skills in the children.

The ASD children's parents are under extreme amount of stress due to the specific challenges and problems associated with ASD children, including social, and unpredictable behavioral problems. However, when they are actively engaged in the treatment process, they can have more interaction with the specialists. Thus, they can be better informed about the real needs, desires, strengths and weaknesses of their child. The ASD children's parents are supposed to have constant relationship with their children throughout their lives. Therefore, it is important for them to be actively engaged in the process of training their children and supporting them. In this way, they feel in control of the situation, have more self-confidence in establishing and adjusting their interactions with their ASD children. As a result, they feel less stressed due to feeling more intimate emotional bond with their children, and an improved interaction with their children [22]. Moreover, when children with ASD perform different activities in the nature in the presence of their parents (e.g. climbing a tree), they ask for their parents help. Thus they have a chance to improve their relationship with their parents [23].

Studies focusing specifically on the effect of family-centered nature therapy on the parent-child interaction are scarce. The majority of studies available have focused on the participation of parents in other training programs, with few studies investigating the nature therapy. However, the results obtained in the present study are in line with those by Selinger and Elder [24], Par, Grey, Wigham et al. [25], Fiona, Lacroix and Luis [26], and Lunsky and Weiss [27].

In their study on ASD children, Selinger and Elder [24] reported that the participation of parents in training interventions decreased the undesirable behavior in ASD children, thus improved the parent-child interaction. The study by Par et al. [25] revealed that a family-centered approach for the treatment of ASD children had a positive effect on the parent-child interaction and improved the self-confidence in parents.

Fiona, Lacroix and Luis found that playing with sand considerably improved interactions between ASD children and their parents and others [26]. Lunsky and Weiss investigated parent-child interaction among children with ASD and reported a high level of stress in the mothers of ASD children due to the challenging behavior of their children [27]. They reported a positive correlation between the psychological problems of ASD children and the stress level their parents undergo. This issue has direct negative influence on the interaction of these parents with their autistic children.

5. Conclusion

The results suggest that the provision of family-centered nature therapy for ASD children results in a considerable improvement in the parent-child interaction. There are however some limitations to the present study. Because the presence of parents were necessary, the number of treatment sessions was limited, and the parents could not attend more sessions due to their employment conditions.

It is suggested that the family-centered nature therapy be used as a complementary treatment along with other treatment strategies for children with ASD of all ages, and even for children with other special needs, to improve the growth of these children, and improve the mental health of their families.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of Islamic Azad University of Science and Research Branch.

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Authors contributions

All authors had contribution in writing this paper, and for it was prepared and analyzed according to the opinion of all authors.

Conflict of interest

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Research Paper: Comparing Time-Use Estimates of Two Different Time Diary Methods

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ABSTRACT

Objectives: Time-use has become an important field of research in social and medical sciences. Time diary is the most popular method for measuring time-use that has 2 different methods of administration including yesterday and tomorrow diary. The present study aimed to compare these methods of measuring time-use.

Methods: This cross-sectional comparative study was conducted on 256 under 5-year-old healthy children that were selected using multistage stratified cluster sampling method in 2017. Data were analyzed using Kolmogorov-Smirnov Test, Pearson correlation coefficient, Spearman correlation coefficient, 2-way ANOVA, Independent t-test and Mann–Whitney U Test.

Results: Participants spent 1476.23 min/d on aggregate daily occupations, according to the yesterday-diary estimate, and 1492.14 min/d according to the tomorrow-diary. In one area of occupation, the yesterday and tomorrow diary estimates differed slightly. Two-way ANOVA found no significant interaction between diary method and age category ($F_{5,234}$=1.222, P=0.300) and no significant main effect of diary method ($F_{1,234}$=0.830). While, the ANOVA revealed a significant main effect for age category ($F_{5,234}$=4.91, P=0.00). There were no significant mean differences in the number of occupational repertoires between the participants of yesterday and tomorrow diary groups. Likewise, there were no significant differences in the number of verbatim of the two groups.

Discussion: The findings of our study indicated no difference between yesterday and tomorrow diaries estimates in terms of measuring under 5-year-old children's time-use.

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Highlights

- The tomorrow method of time-use dairy were slightly better than yesterday-diary approach in terms of aggregate time estimates for daily occupations.

- The mean number of occupational repertoires measured by yesterday-diary was a little higher than that obtained by tomorrow-diary approach.

- From the point of view of caregivers, time estimates of tomorrow-diaries have better quality and are more valid.

Plain Language Summary

In our research, time use is the amount of time a child uses for various activities throughout the day and night. In this study, two methods of administration of time-use diary were compared in terms of quality and quantity of data. We found that although the data from tomorrow method is slightly higher than yesterday method of diary, there is no significant difference between them. Our findings indicate that participants can choose one of the two diary methods. These findings are important in helping researchers decide on how to use the time use diary more appropriately.

1. Introduction

In recent decades, there has been a growing interest in the study of time-use. Measurement of time-use in clinical practice is receiving interest, too [1, 2]. Time-use studies provide information about the nature, duration, and context of all activities carried out by the people during a certain period of time [3-5].

Several methods for assessing time-use are available. These include time diary [3, 6, 7], the Experience Sampling Method (ESM) [4, 7, 8], stylized approach [4, 9], and continuous observation [8, 10]. Time diary is the most prevalent method as it has a higher level of validity and reliability [11]. Robinson (1999) suggested that time diaries can accurately represent an individual's behavior. All activities performed at a given time interval are recorded using time diary, along with a potentially rich array of contextual information, such as where and with whom they were performed, and whether they paid for it [3, 12].

Time diaries can be administered by 2 different methods of "tomorrow" and "yesterday" diaries. In the tomorrow-diary method that is also called "current", or "left-behind" diary approach, interviewers leave time-use diaries behind for the participant to be completed after an initial face to face interview, on the following day(s). The interviewers will collect and check the time diaries at a time and place of participants' convenient [13-15].

In the "yesterday" or "retrospective" diary method, the respondent is required to recall recent events and record activities performed over a specified period that is usually yesterday. In other words, respondent recalls the activities of the past 24-hours. This method may also be administered via computer assisted telephone interviewing [8, 16].

These two methods of the time-use diary have some advantages and limitations. Tomorrow-diary is appropriate for participants with high literacy rates, and it is considered less intrusive, does not require the same level of recall ability as collecting data by an interview in yesterday-diary. It probes 5 to 10% more activities than yesterday-diary method. However, this method is not feasible for low-literate participants, is more expensive compared to yesterday-diary approach [3, 17, 18], and is associated with a greater risk of social desirability effects [19].

On the contrary, yesterday-diary approach is very appropriate for low-literate participants and usually has a higher response rate. However, it has some limitations, including memory recall errors, normative editing, and underreporting of quick activities [3, 9, 20]. Considering these advantages and disadvantageous, the question is which method generates more valuable results. Some studies compared these 2 methods and demonstrated that both produced similar time-use estimates [21-23].

Tomorrow-diary method yields more events. However, research suggests that the difference in the number of events (an increase in the order of 10%) fails to justify the additional cost of obtaining tomorrow's diaries [24-

26]. In conclusion, the literature on these two methods of diaries are very limited, and there is no consensus on this method.

Time-use diary has received much attention by researchers as an instrument of data gathering in the field of time-use [27, 28]. However, only few studies have carefully assessed the relative strengths and weaknesses of the existing methods of measuring time-use [3, 13, 15]. These investigations compared diary estimates based on studies conducted many years ago [3, 20, 23]. Furthermore, previous studies compared the methods of administration of time-use diary in terms of adults [3, 24]. However, these studies overlooked children as the target population in this regard.

There is not enough available data to directly compare yesterday and tomorrow diary estimates for the children. Thus, such data are required to make an optimal diary approach selection. It is unclear that which time diary method is more applicable and economical. Therefore, the current study compared the two time-use methods of yesterday's and tomorrow diary approaches.

2. Methods

Research design

The present cross-sectional comparative study was conducted in the Takestan County, Qazvin Province, Iran, between May 22 and December 22, 2017.

Sampling

Using multistage stratified cluster sampling method, 256 under 5-year-old healthy children were recruited in the study. Children with severe mental or physical illnesses needing hostelry special care services (The children living in the institutions) were excluded from the research process.

The participants were selected from all regions of the county. In the first stage, representative areas were selected from similar socio-economic regions of urban and rural areas. Then, 7 rural health centers and 3 urban health centers were selected consisting of 16 rural health centers and 8 urban health centers. Subsequently, equal number of girls and boys were selected from various rural and urban healthcare centers based on the population density of children under 5 years old and in proportion to the number of children per each seven age groups (under 1 month, 2-3 months, 4-6 months, 7-12 months, 1-2 years, and 3-5 years).

Research tools and procedures

The version of the time-use diary that was applied in this research included 4 main open-ended questions on the beginning and end of primary activity. It also explored any other activities including where and with whom activities took place. The time-use diary which was either interviewer-administered or self-reported investigated the child's flow of activities over a 24-hour weekday period. We used an open response time-use diary and selected open interval via per 3 hours. Yesterday-diaries were completed based on face to face interviews (and an additional phone interview as necessary). Also, tomorrow-diaries were left behind to main caregivers after a preparative interview. All data were gathered by 3 professionally trained staff that participated workshops about time-use mythology, administration of time-use diary and an interview method of assessment.

Data analysis

Contrary to previous time-use studies, in this study, tomorrow and yesterday diaries estimates of time-use were investigated based on 8 areas of occupations, which were classified based on the Occupational Therapy Practice Framework: Domain and Process, 3rd Edition (OTPF3) [29]. Other indicators that were compared in this research included frequency of verbatim, occupational repertoire, co-occupations time estimates, and concurrent occupations time estimates.

The interpretation of the diaries were performed in several stages. In the first stage, verbatim was extracted and the number and duration of each were determined. In the next stage, the frequency and duration of the tasks, activities, and daily life occupations were determined according to the OTPF3. In the next stage, the time allocated to each area of occupations was determined based on the OFPF3. In addition, the number of occupations in occupational repertoire, the time allocated to the concurrent occupations, the time devoted to the child care activities (both interactive and physical child care) are specified.

Data were analyzed using Kolmogorov-Smirnov Test to check the normality assumption. Also, the Pearson correlation coefficient and Spearman correlation coefficient were applied to measure the association between variables. Two-way Analysis of Variance (ANOVA) in accordance with age category (under 3 months, 2-3 months, 4-6 months, 7-12 months, 13-24 months, 25-60 months old), diary methods (yesterday and tomorrow diaries approaches), Independent samples t-test and

Mann–Whitney U Test were used for the analysis of differences in SPSS.

3. Results

Table 1 lists descriptive data of respondents' time spent on daily occupations in a 'normal' weekday and weekend both for the total samples and for girls and boys, separately. On average, our respondents spend 1476.23 min/d on daily occupations, according to the yesterday-diary estimate, and 1492.14 minutes according to the tomorrow-diary estimate. The yesterday and tomorrow diaries estimates significantly differed between girls and boys.

It may seem irrational that the average duration of daily occupations is more than 24 hours (1440 min). It can be explained that the duration of aggregate daily occupations is calculated by the sum of several areas of occupation, including activities of daily living, instrumental activities of daily living, rest and sleep, play, leisure, social participation, education and work. In addition, the times of play, leisure and social participation may have been calculated more than once and, the time of concurrent activities could have been considered more than once.

Table 2 presents separate tests for different age subgroups, indicating that the estimates of yesterday-diary significantly differed from that of tomorrow-diary. Table 3 indicates the time budgets for the areas of occupation. For the one area of occupation, the yesterday and tomorrodiary estimates differ only quite marginally. Thus, the differences observed between total occupation time were the result of summing up all the inconsistencies for the single areas of occupation that constitute total occupations.

Table 4 presents the number of occupational repertoires and verbatim results from yesterday and tomorrow diaries methods. Two-way ANOVA revealed no significant interaction between diary method and age category ($F_{5, 234}$=1.222, P=0.300) and no significant main effect of diary method ($F_{1,234}$=0.830). While, ANOVA suggested a significant main effect for age category ($F_{5,234}$=4.91, P=0.00) (Table 5).

Table 6 indicates no significant mean differences in the number of occupational repertoires between the participants of yesterday and tomorrow diaries groups. Similarly, there was no significant differences in the number of verbatim between the two groups.

Using a phone interview, 60 participants (30 caregivers from each group), who were randomly selected, were asked of their perception about the quality of time-use data (that they reported). In total, 50% of caregivers who participated in completing yesterday time use diary, described the quality of information as good, 23.33% described the quality of information as acceptable, and 26.67% described the quality of information as poor. While, of caregivers that completed tomorrow diary, 70% described the quality of information as good, 16.67% described the quality of information as acceptable and 13.33% described the quality of information as poor. In total, 16.15% of the participants in the tomorrow-diary group did not return the completed forms.

4. Discussion

The comparison of two administration methods of the time-use diary was the aim of the present study. The obtained results indicated that the estimates of tomorrow method of time-use dairy were slightly higher than yesterday-diary approach in terms of aggregate time estimates for daily occupations. However, this difference was not statistically significant. Although no differences were found between the estimates of two diary methods, there was a statistically significant difference between age categories in terms of daily occupations.

Table 1. Average time spent on daily occupations on 'normal' weekdays in minutes

Descriptive Statistics	Diary					
	All		Girls		Boys	
	Yesterday	Tomorrow	Yesterday	Tomorrow	Yesterday	Tomorrow
Mean	1476.23	1492.14	1469.73	1501.55	1482.41	1483.19
SD	241.52	231.61	261.23	233.23	223.29	231.63
Correlation	0.052		0.064		0.064	
n	115	119	56	50	59	61

Table 2. Average time spent on daily occupations on 'normal' weekdays in minutes for age subgroups

Age Groups	Aggregate Occupations			
	Variable	Mean	SD	n
Under 1 month	Yesterday	1292.86	80.45	7
	Tomorrow	1272.43	107.58	7
	Total	1282.64	91.88	14
2-3 months	Yesterday	1473.33	182.55	6
	Tomorrow	1262.5	134.72	8
	Total	1352.86	185.24	14
4-6 months	Yesterday	1394.67	102.36	6
	Tomorrow	1541	285.47	8
	Total	1478.29	231.43	14
7-12 months	Yesterday	1490.19	220.7	16
	Tomorrow	1434.29	145.22	18
	Total	1460.65	183.86	34
13-24 months	Yesterday	1432.11	193.09	27
	Tomorrow	1482.09	285.88	22
	Total	1454.55	237.87	49
25-60 months	Yesterday	1528.28	284.78	53
	Tomorrow	1567.95	205.62	56
	Total	1548.66	246.93	109
Total	Yesterday	1476.23	241.52	115
	Tomorrow	1492.14	231.61	119
	Total	1484.32	236.16	234

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Table 3. Average time spent on single area of occupations on 'normal' weekdays in minutes

Component	Variable	Mean	SD	Correlation Coefficient	n
Activities of daily living	Yesterday-diary	221.65	67.123	0.078	116
	Tomorrow-diary	248.29	74.682		121
Instrumental activities of daily living	Yesterday-diary	45.47	46.212	-0.14	116
	Tomorrow-diary	45.14	36.4		119
Play	Yesterday-diary	241.04	110.702	-0.03	116
	Tomorrow-diary	238.16	97.259		121
Rest and sleep	Yesterday-diary	718.05	122.250	-0.071	116
	Tomorrow-diary	699.90	107.633		121
Leisure	Yesterday-diary	133.15	124.209	-0.048	116
	Tomorrow-diary	140.62	110.630		121
Social participation	Yesterday-diary	115.13	98.238	0.015	115
	Tomorrow-diary	117.02	92.944		121

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Table 4. Average number of occupational repertoires and verbatim on 'normal' weekdays

Component	Variable	Mean	SD	Correlation Coefficient	n
Occupational repertoire	Yesterday-diary	13.06	3.937	0.026	116
	Tomorrow-diary	13.24	5.063		121
Verbatim	Yesterday-diary	18.16	4.888	-0.106	116
	Tomorrow-diary	18.18	6.654		119

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Table 5. Two-way ANOVA results with factors of age category and diary method

Tests of Between-Subjects Effects				
Source		df	F	Sig.
Dependent variable: Occupations	Diary	1	0.046	0.83
	Age_c	5	4.91	0.00
	Diary*age_c	5	1.222	0.300

*Design=diary-method age-categories diary*age_c

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These findings were consistent with Robinson (1985) that reported substantial similarity in time-use patterns based on yesterday and tomorrow diaries. However, the tomorrow-diaries captured 5 to 10% more activities compared to the yesterday-diaries [3, 24]. The obtained results indicated the mean number of occupational repertoires measured by yesterday-diary was a little higher than those obtained by tomorrow-diary approach. while there was no significant differences between yesterday and tomorrow methods of the time-use diary in terms of the mean number of occupational repertoires and verbatim.

Results of phone interview about the quality of time-use information revealed that from the point of view of caregivers, time estimates of tomorrow-diaries have better quality and are more valid. According to Robinson [24, 30] and Gershuny [18], recalling challenge is a serious treat to the quality of the estimates of yesterday time-use diary.

Our research clearly has some limitations. The most important limitation was the impossibility of administrating 2 methods of time-use diary of yesterday and tomorrow on a single group of participants. Additionally, we found that time-use data is age-related, therefore the findings might not be transferable to other age groups. We applied a novel method of time-use data coding based on OTPF, that have more sensitive definitions than other methods and can be more applicable in clinical settings [31]. No previous research has been done on the time-use of under 5-year-old children [31]. Thus, the results of this research can provide a basis for future studies in this field.

5. Conclusion

In conclusion, the present study revealed no differences between yesterday and tomorrow diary estimates for measuring under 5-year-old children's time-use. This suggests that the 2 methods of time diary administration

Table 6. Mean score difference in the number of occupational repertoires and verbatim between the participants of yesterday and tomorrow-diary groups

Characteristic	Yesterday-Diary (n=116)	Tomorrow-Diary (n=121)	P
Occupational repertoires	118.83	119.18	0.969
Verbatim	120.51	117.55	0.739

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can be used interchangeably. Further investigations are required to make a comparison of yesterday and tomorrow methods of time diary in other age groups, and especially among children and adolescents.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of University of Social Welfare and Rehabilitation Sciences (code: IR.USWR.REC.1395.193). Also, We obtained written informed consent from children's parents before their participation.

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Authors contributions

All authors contributed to this project and article. All authors read and approved the final manuscript.

Conflict of interest

The authors declared no conflict of interest.

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Research Paper: Psychoeducation on Improving Mental Health Literacy and Adjustment to Illness in Patients With Type 2 Diabetes: An Experimental Study

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ABSTRACT

Objectives: The present study investigated the role of psychoeducation in improving mental health literacy and adaptation in patients with type 2 diabetes.

Methods: The present study was an interventional study with pre-test, post-test and follow-up design with a control group. The study population included patients with type 2 diabetes who referred to Iran Hospital. Based on the research method and considering the missing data, a sample size of 80 people was considered. In total, 40 patients were selected as the intervention group and 40 subjects as the controls by purposeful sampling method. The subjects were randomly assigned into the two groups. The obtained data were collected by O'Connere and Casey's mental health literacy questionnaire and psychosocial compatibility questionnaire of Moro and colleagues. The purpose of psychological education in this study, which was used as the intervention, was Cognitive Behavioral Therapy (CBT). Training was performed in a group format. Therapeutic sessions were 11 one-hour sessions.

Results: The obtained results suggested that the effect of intervention in the post-test phase was 57% on mental health literacy and 48% in follow-up. In addition, the effect of intervention on adjustment in the post-test phase was 39%, and in the follow-up phase 38%.

Discussion: Psychological trainings like CBT can predict the information that is more important in diabetes self-management. Increasing the mental health literacy rate for psychiatric disorders associated with type 2 diabetes, improves compatibility, which will improve the quality of life and lifestyle of people with type 2 diabetes.

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Highlights

- Cognitive behavioral therapy can predict the more important information in diabetes self-management, increase mental health literacy, and improves adaptability and quality of life.

- Cognitive behavioral models can improve beliefs and attitudes, and increase the sense of pain control, use of positive coping strategies, and reduction of negative emotional states in patients.

- Cognitive behavioral therapy can spot the role of cognitive factors in inefficient thoughts, underlying assumptions, and disordered information processing in diabetes pathology and the incidence of depression and compatibility problems in these patients.

Plain Language Summary

Diabetes is one of the prevalent diseases and impairs social, occupational and personal health of the patients. The common mental disorder among diabetic patients is depression. In recent years, one of the topics discussed in the prevention of psychological problems is mental health literacy that plays an important role in the management and control of negative effects of diabetes such as depression and adjustment disorders. For this reason, the focus of the present study is to improve the mental health literacy of patients with type 2 diabetes by psychological education (Cognitive behavioral therapy). The study results showed that cognitive behavioral therapy is effective in improving mental health literacy and adaptation to disease in patients with type 2 diabetes.

1. Introduction

Diabetes is among the most common chronic and progressive metabolic diseases. It has a potentially harmful effect on the pancreas function of producing insulin and its use [1]. More than 220 million people worldwide suffer from diabetes [2]. Moreover, it is estimated that by 2050, the population of diabetics in the world will increase 165% [3]. More than three-quarters of whom live in developing countries [4]. This disease causes tension in individuals and affects their identity, psychosocial status, emotional balance, self-satisfaction, sense of competence and efficacy, social interactions and interpersonal relationships that require compatibility [5]. In fact, compatibility refers to the individual characteristics used by people for psychosocial management and improving their lives [6].

Compatibility with a chronic disease is a dynamic process, which is constantly affected by individual and environmental stimuli [7]. In other words, chronic diseases like diabetes challenge attitude towards life as a regular and continuous process, with significant psychological consequences [7]. Recent medical achievements have created this expectation in most patients and their families that all medical problems are curable. Thus, it is difficult for a person to accept the consequences of chronic illnesses and to use an appropriate coping strategy to treat his/her illness. Such condition causes psychosocial compatibility problems. In addition, the interdisciplinary approach of medicine has linked patients with more professionals. This situation increases the patients' expectations from themselves, despite their mental capacity limitations. Mental health issues like stress and anxiety have psychosomatic effects on human [8, 9].

This issue in some patients evokes the feeling of not being psychologically well supported. This may be a contributing factor to the formation of chronic diseases in a person [7, 10]. Thus, a self-management approach is required in most chronic problems to control the disease [10]. Importantly, the psychological aspects of chronic diseases are often ignored. In other words, it is assumed that most patients are well adapted to the psychological aspects of chronic illnesses. However, compatibility is much difficult when experiencing a defect in physical health.

In general, about 20% to 25% of patients with chronic medical conditions experience significant psychological symptoms. Because of increasing self-care needs, chronic medical illnesses require behavioral changes [11]. Therefore, an effective management is the key to understanding the differences in disease patterns and their progression. Maintaining an independent and enjoyable life through effective psychological training and increased adaptability and mental health literacy are the

main goals, rather than the treatment. Training also improves human behavior and cognition [12].

The psychological needs of people with chronic illnesses are internationally recognized. However, planned policies and cognitive behavioral services can meet the psychological needs of individuals including diabetic patients [11]. Providing independent living for diabetic patients by increasing the level of compatibility and mental health literacy relevant to these patients plays a significant role in their well-being. General knowledge about physical illnesses is very beneficial. However, providing information about mental disorders (mental health literacy) is somehow ignored [13]. For this reason, Jorm introduced the term mental health literacy and defined it as the knowledge and beliefs about mental disorders that help to identify, manage, and prevent mental disorders [14].

Mental health literacy includes a variety of components such as the ability to identify specific disorders or types of psychological distress, knowledge and beliefs about risk factors, causes, individual interventions/self-help, available specialized services, facilitating attitudes, appropriate identification and help seeking, and awareness about searching information about mental health. People experiencing disabling psychological symptoms or those who closely interact with people with these kinds of problems, try to manage those symptoms. The management of these symptoms is influenced by their mental health literacy. If successful, these management activities will reduce the disability symptoms and change the mental health literacy of individuals.

Maneze et al. reported that limited literacy is associated with poor health in various aspects [14]. This is especially true among the elderly, the minority, people with low education and those with chronic diseases, like type 2 diabetes. Diabetes is a chronic disease. Patients with low health literacy are less involved in understanding their illness and self-care aspects. Thus, they experience the worst health outcomes [15]. In addition, the literature review suggests that research on low mental health literacy in patients with type 2 diabetes is necessary.

Low mental health literacy among diabetic patients is associated with poor self-care and dysfunction in glycemic control (blood glucose control). The population of chronic diseases, including diabetes, is considered among high-risk groups. Psychoeducation can be used to reduce the complications and disabilities, and increase the level of compatibility and mental health literacy in this group. Psychoeducation involves interventions in which psychiatric and psychological educations can make changes in the behavioral and cognitive patterns of patients [12].

Educational interventions can play a preventive role at primary, secondary and tertiary prevention levels by helping the treatment process or reducing the disability caused by a disorder [16]. Accordingly, Cognitive Behavioral Therapy (CBT) can be effective in psychological problems in patients with type 2 diabetes. Cognitive behavioral education is among major treatments for chronic diseases. These treatments can have a coping, immunizing, and preventive effect on the development of various diseases and their complications by creating positive psychosocial impacts [16]. Therapeutic strategies of many medical centers in advanced countries are based on psychological and behavioral concepts like relaxation. In addition, cognitive methods of changing negative thinking are used as effective therapeutic strategies for the treatment of many disorders.

This is because increasing information about diabetes does not always lead to improved self-care behaviors, better blood glucose control, and greater compatibility with the disease. Thus, when cognitive barriers related to attitude rather than the lack of knowledge or skills are the main obstacles of self-management, cognitive behavioral interventions are considered necessary. Such an approach is especially useful for patients who have repeatedly failed in their efforts to control diabetes.

Due to these experiences, such patients believe that they cannot effectively cope with the limitations and requirements of the treatment regimen. In other words, those with strongly negative beliefs about the effectiveness of their own control on diabetes are appropriate candidates for cognitive behavioral intervention [16]. Many studies have been conducted on diabetes and its comorbid disorders like depression. However, there are few studies in the field of mental health literacy and compatibility of these people to their illness. Therefore, the present study intended to examine the effectiveness of psychoeducation (CBT) on improving mental health literacy and compatibility of type 2 diabetic patients.

2. Methods

This was an interventional study with pre-test- post-test and follow-up design and a control group. The study population included patients with type 2 diabetes who referred to Iran Hospital. Based on the research method (in a pilot study, a sample size of at least 30 people per group was recommended), and considering the missing

data, 80 subjects were selected by purposeful sampling method. In total, 40 patients were randomly assigned into the intervention group and 40 patients into the control group.

The inclusion criteria consisted of individuals with a diagnosis of type 2 diabetes for at least 3 years, physical symptoms of diabetes, deficits (but not disruptions) in personal and social performances due to diabetes, holding at least a high school diploma and the maximum age of 65 years. Exclusion criteria were reading and writing illiteracy, disagreement of participating in research and absence from a training session.

Research tools

The Mental Health Literacy Scale (MHLS): This scale was designed by O'Conner and Casey [17]. It includes 35 items with a Likert-type scale scoring. Its Cronbach alpha was reported 0.87 and its reliability using the test-retest method was reported 0.79. In addition, in the present study, the Cronbach alpha coefficient was 0.89 and the retest coefficient for a 2-week interval was 0.86, which was performed on 90 patients with type 2 diabetes. Psychosocial Adjustment to Medical Illnesses Scale: This scale was developed by Morrow, Chiarello and Derogatis [18].

It contains 46 items and 7 subscales. The reliability and validity of its subscales respectively were health care orientation (0.70 & 0.46), social milieu (0.72 & 0.34), family environment (0.52 & 0.43), sexual relations (0.81 & 0.47), development of family relationships (0.33 & 0.08), work environment (0.62 & 0.22), and mental distress (0.82 & 0.44). This scale was validated in Iran by Feghhi et al. [19], who reduced the original version to 45 questions. Feghhi et al. reported the Cronbach alpha of this scale equal to 0.94, in patients with type 2 diabetes [19].

Intervention method

Psychoeducation, as the main purpose of the present study was performed though CBT. A cognitive behavioral therapy for depression [18] was applied in this study. However, its content was adjusted according to the variables of the present study. After determining the sample

Table 1. Summary of the Treatment Sessions Contents

Session	Protocol
1st	Group member familiarity, group rules introduction, group members familiarity with the nature of their disease and the role of psychological factors in the occurrence and exacerbation of symptoms, an introduction to CBT and an explanation of diabetes-related mental disorders, an evaluation of members' expectations for participation in the group, and relaxation training.
2nd & 3rd	Teaching cognitive patterns to patients, explaining spontaneous thoughts, providing record sheets of inefficient thoughts, identifying the activating causes of disease symptoms and unpleasant emotions, examining potential problems in recording thoughts, identifying emotions, helping the patients with solving them, and relaxation training.
4th & 5th	Challenging irrational thoughts and beliefs, introducing challenges as strategies for coping with irrational thoughts and beliefs, and ultimately changing them, facing a practical challenge with the irrational thoughts and beliefs that the group members have recorded over the course of one week, profit and loss analysis and the Socratic questioning of thoughts that create unpleasant emotions and relaxation training.
6th & 7th	Problem solving training, assertiveness training, activity planning training, discussing problem solving as a method of coping with worries, teaching three behavioral styles of passive, daring and aggressive in communication situations to strengthen self-expression and timing and planning training for doing activities and relaxation training.
8th & 9th	Familiarity with diabetes related mental disorders and their symptoms based on Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5).
10th	Explaining the etiology of diabetes related disorders, like depression and anxiety.
11th	Summarizing the last week session contents, introducing several books to get acquainted with cognitive therapy and mental disorders, drawing the patients' attention to interstitial beliefs and underlying assumptions, probing patients' feedback about treatment sessions, performing a post-test.

members, in order to perform the intervention, a pre-test was taken initially, using MHLS and Psychosocial Adjustment to Medical Illnesses Scale. Then, immediately after the intervention and training of psychological skills, a post-test was taken. One month later, trained patients performed a post-test as the follow-up to determine the effect of psychoeducation on improving mental health literacy. Education sessions were held in groups. In total, 11 one-hour sessions were held in an educational class in the hospital (Table 1).

Data analysis

To analyze the obtained data considering the method and objectives of the research, Multivariate Analysis of Covariance (MANCOVA) was used.

3. Results

In the present study, 47% (37 persons) of the participants aged 40 years and above, 23% (19 persons) 35-40 years, 17% (14 persons) 30-35 years and 12% (10 persons) 25-30 years. In addition, 45% (36 persons) had high school diploma, 25% (20 persons) had associate degree, 19% (15 persons), 11% (9 persons), and more.

Table 2 suggests that the average score of mental health literacy and adaptation to disease in the post-test and follow-up stages in the experimental group increased after the intervention, compared with the control group. In other words, psychoeducation was effective in improving mental health literacy and adaptation in patients with type 2 diabetes.

Box's Test was used to evaluate the equality of covariance matrices. The results of the test indicated that the correlation of dependent variables in the studied groups was homogeneous, because F(0.78) calculated at P>0.05 was not significant. Thus, psychoeducation improved mental health literacy and adaptation in patients with type 2 diabetes (Table 3). The Levene's test was used to evaluate the equality of error or homogeneity of variance-covariance matrix. Table 4 indicates that the variation error of variables in the studied groups is homogeneous, because the calculated F is not significant at P<0.05.

Bonferroni test results

Bonferroni post hoc test was used to compare the mean score of the mental health literacy and adaptation with disease variables. The results demonstrated that psychoeducation (intervention) significantly improved the men-

Table 2. Mean±SD of mental health literacy and adaptability variables

Variables		Pre-Test		Post-Test		Follow-Up	
		Mean	SD	Mean	SD	Mean	SD
Intervention group	Mental health literacy	11.13	1.45	16.26	12.33	14.9	11.9
	Adaptability to disease	150.06	7.57	177.06	8.46	168.02	8.1
Control group	Mental health literacy	10.9	1.14	10.5	1.13	9.9	1.5
	Adaptability to disease	141.02	6.11	142.5	6.12	139.1	5.8

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Table 3. Box's test results

Significance Level	df^2	df^1	F
0.73	72.08	21	0.78

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Table 4. Levene's test results based on the assumption of equality of variances in the two groups

Variables	F	df^1	df^2	Sig.
Mental health literacy	0.046	1	28	0.832
Adaptability to disease	0.109	1	28	0.743

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Table 5. ANCOVA results of pre-test, post-test and follow-up stages in the intervention and control groups

Variables	Stages	Source of Changes	TSS	df	MSE	F	Sig.	Eta Squared
Mental health literacy	Post-test	Pre-test	46.436	1	46.436	66.384	0.001	0.711
		Intervention	25.127	1	25.127	35.901	0.001	0.571
	Follow-up	Pre-test	1920.496	1	1920.496	971.565	0.001	0.973
		Intervention	50.910	1	50.910	25.755	0.001	0.488
Adaptability to disease	Post-test	Pre-test	269.200	1	269.200	241.210	0.001	0.899
		Intervention	19.692	1	19.692	17.644	0.001	0.395
	Follow-up	Pre-test	240.610	1	240.610	389.411	0.001	0.735
		Intervention	18.756	1	18.756	24.597	0.001	0.389

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tal health literacy and adaptability in patients with type 2 diabetes. This is because after the intervention, their level enhanced significantly. The mental health literacy and adaptability with the mean score differences of 3.28 and 3.19, respectively were significant at P<0.01.

According to Table 5, after adjusting the pre-test scores of the mental health literacy variable, the difference between the control and experimental groups was significant at P<0.001. Therefore, psychoeducation for type 2 diabetic patients increases the mental health literacy in the experimental group compared with the control group in the post-test phase.

This intervention is 57% effective, that is, treatment intervention can explain 57% of the variance of total remaining scores. In addition, the effect of intervention in the follow-up phase was significant at P<0.001, and the effect of this intervention was 48%. Moreover, after modifying the pre-test scores in adjustment to disease variables, the difference between the control and experimental groups was significant at P<0.001. In other words, psychoeducation improves compatibility in the experimental group compared to the control group in the post-test phase. This intervention is 39% effective, that is, the effect of intervention explain 39% of the variance of total remaining scores . In addition, the intervention in the follow-up phase was significant at P<0.001 with an effect of 38%.

4. Discussion

The obtained results revealed that psychoeducation (CBT) improved mental health literacy and adaptation in patients with type 2 diabetes at post-test and follow-up stages. This is because the effect of intervention in the post-test and follow-up on mental health literacy were 57% and 48%, respectively. In addition, the effect of the intervention on the adaptation in the post-test was 39% and it was 38% in the follow-up. Likewise, the results of Lorig study suggested that CBT diminished the level of disability and the use of medical services in chronic patients. It also optimized the level of social activity and improved the individuals' perception of their health and enhanced compatibility with a disease [20]. Michael suggested that psychosocial compatibility was among the most important variables in diabetes because it had a direct relationship with self-care behaviors.

A high level of compatibility is associated with better control of blood glucose in diabetic patients [21]. Moreover, Rapley concluded that psychosocial adjustment is the best predictor of self-care behaviors in type 2 diabetic patients [22]. Poor compatibility with a disease, using more services and poor outcomes of psychosocial compatibility with the disease is the strongest predictor of using services compared to other variables [22]. Furthermore, one of the predictors of adjustment in people with diabetes and in self-care behaviors is depression. In the research done by Lernmark et al. the depressed and non-depressed groups had a significant difference in metabolic control, adjustment, and self-esteem [23].

Snoek, Van der Ven et al. stated that people with very negative beliefs about the effectiveness of their own control on diabetes are appropriate candidates for CBT [24]. Davazdah Emamy et al. identified the effectiveness of stress management education through CBT to control blood glucose and depression in 20 patients with type 2 diabetes. It was concluded that the mean score of the blood glucose in the intervention group was significantly lower than that of the control group. They also reported the mean depression scores of them were significantly less than the controls after the intervention [25]. In addition, Peyrot observed that performing stress management training based on CBT on 23 women with diabetes

for 12 sessions of 2 hours reduced the mean scores of depression, anxiety and stress in the intervention group compared to the controls [26].

The aforementioned studies are consistent with the results of present study indicating that CBT leads to increased adaptation. We also found that by providing specific information about psychological problems associated with diabetes, cognitive behavioral education increased the mental health literacy in type 2 diabetic patients. Furthermore, socio-cultural research that examined the factors affecting self-management of diabetes have been shown to be substantial in identifying the areas involved in completing cost-effective interventions.

In populations with cultural diversity associated with type 2 diabetes, although socio-cultural elements are determinants of health literacy, these factors are not part of health literacy. Whereas providing specific information about diabetes is more efficient in predicting behaviors associated with self-management of diabetes. In this regard, referring to the issue of incompatibility in perceiving health and the objective measurement of diabetes control in diabetes self-management education can improve patient's admission and supervision.

Depression is a significant factor in the prediction of low health literacy and a limited self-management of diabetes for professionals to screen depression. This way they can ensure that support is appropriate for people with type 2 diabetes, as it guarantees participation in the management of their own conditions. In other words, mental health illiteracy about diabetes and its associated psychiatric disorders can lead to compatibility problems. Jorm et al. introduced the term mental health literacy as the knowledge and beliefs about mental disorders that help to identify, manage and prevent them [13]. CBT can also be explained by considering the role of cognitive factors on inefficient thoughts, underlying assumptions, and disordered information processing in diabetes pathology and the incidence of depression and compatibility problems in these patients [16].

CBT attempts to identify irrational and ineffective thoughts and enables patients to realize the role of these thoughts in their illness and replace them with thoughts that are more correct. Patients with type 2 diabetes gradually develop helplessness and a sedentary lifestyle due to frequent exposures to negative events related to their illness. Isolation and inactivity also affect the patient's perception, and the set of these factors causes the feeling of inefficiency and helplessness in patients about their experiences. Indeed, the patient "loses many opportunities for effective performance", leading to incompatibility in diabetic patients. In the present study, the patients' attitudes about the disease and its disabling effects were challenged by CBT. This included correcting automatic negative thoughts and underlying beliefs in patients. In addition, from the behavioral point of view, using the activity planning technique was very helpful.

Activities planning helps the patient to minimize the odds of failure in meeting daily schedule. In addition, patients are encouraged to value any increase in the level of daily activities and enhance positive thinking. Moreover, due to the nature of diabetes, its comorbid depression and highly irritable mood, most of these patients often develop difficulties in adapting and interpersonal relationships. Moreover, inappropriate communication styles have led to rejection by others, and a greater social isolation in these patients. Therefore, one of the goals of the treatment sessions was developing proper and assertive communications with self-expression in order to encourage the patients to establish appropriate social relationships and strengthen them [26].

According to Azami et al. diabetic patients fail to follow a proper diet. Their physical activity is improper, and their self-control activities are inadequate, leading to depression and compatibility disorders [27]. Therefore, CBT is beneficial to improve these patients' lifestyle [27]. Likewise, Petrak and Herperts suggested that CBT was a very effective treatment to increase the compatibility in such patients [28]. This is because cognitive behavioral models can improve beliefs and attitudes, and increase the sense of pain control, use of positive coping strategies and reduction of negative emotional states in patients [29]. In fact, cognitive behavioral methods are directly concentrated on "improving self-preventive behavior". These ways like this include such as apprenticeships or special tips for taking an action, preparing a calendar to remind the time of the intended behavior. Researchers have reported that these methods enhance the effectiveness of health promotion programs.

CBT is effective in increasing the compatibility of patients with type 2 diabetes. Moreover, because of providing specific information about psychiatric disorders associated with type 2 diabetes; it helps increase the mental health literacy in these patients [29]. To explain this, it can be said that CBT works on maladaptive schemas and misconceptions. Thus, it should provide cognitive reconstruction, predict more information on diabetes self-management, and increase mental health literacy associated with type 2 diabetes. Therefore, in the present research,

this therapeutic approach improved the mental health literacy of individuals and increased their compatibility.

5. Conclusion

Generally, psychological training including CBT can predict the information that is important in diabetes self-management. By increasing the mental health literacy about mental disorders associated with type 2 diabetes, the quality of life will improve in these patients. This helps them increase their compatibility with the disease.

One of the limitations of the present research was the use of self-monitoring tools for data collection. Additionally, the short-term follow-up phase is among the limitations of research. Therefore, it is suggested that other research tools be used to collect data in future research, and to conduct the follow-up study at least 2 months after the intervention. This study was also performed on patients with type 2 diabetes, which limits its generalizability. Thus, the findings must be generalized with caution.

Ethical Considerations

Compliance with ethical guidelines

The present study was approved by the Ethics Committee of the organization, (code No.: IR.bmsu.rec.1396.317).

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Authors contributions

The authors contributions is as follows: main investigator, designed the study, collected the data, performed analysis and wrote the first draft: Alireza Karimpour Vazifehkhorani; Supervision: Fatemeh Rahmati-Najarkolaei; study advisors: Mansoureh Karimzadeh and Mohsen Poursadeghiyan; and All authors read and approved the final revision of the manuscript.wer the study advisors.

Conflict of interest

The authors declared no conflict of interest.

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Research Paper: The Effectiveness of Combined Music Therapy and Physical Activity on Motor Coordination in Children With Autism

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Music therapy, Play therapy, Motor coordination, Autism

ABSTRACT

Objectives: Motor skills play an important role in language, play, academic and adaptive behaviors of individuals. The present study aimed to determine the effectiveness of music therapy along with play therapy in rising motor coordination of children with autism.

Methods: In this quasi-experimental study with pre-test and post-test design, Autism Evaluation Scale and Motor Development Scale were administered to 30 randomly selected male students with autism spectrum disorder aged between 6 and 11 years before and after the intervention. The experimental group attended 15 sessions (each lasted 60 minutes), twice a week and were trained by music therapy along with play therapy program. However, the control group did not receive such programs. One-way analysis of covariance was used for analyzing the data.

Results: There was a significant difference (P<0.001) between the experimental and control groups after applying music therapy along with play therapy.

Discussion: Considering the problems with autism in motor coordination, applying music therapy along with play therapy is necessary for rehabilitating these children. Implications of these results are useful for planning intervention strategies to decrease motor problems in this population.

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Highlights

- A growing body of evidence suggests that motor impairments are frequently present in children with autism.
- Music therapy along with physical activity might benefit children with autism.
- We observed a significant difference between the experimental and control group after applying music therapy along with play therapy.

Plain Language Summary

Children with autism show motor impairments. Music therapy along with physical activity is a significant treatment in improving motor coordination. In this study, 30 children with autism were participated in 15 music therapy sessions. Music therapy are presented in two methods: (a) inactive one; listening to music and (b) active one; playing and rhythmic movements. Based on the results, motor coordination was achieved in the posttest. However, considering the limited studies available, further research is required in this area.

1. Introduction

Autism Spectrum Disorder (ASD) is a large group of heterogeneous disorders that generally include many symptoms. These symptoms are divided into 3 groups as follows: Abnormal social interactions; Abnormal verbal and nonverbal communications; and Repetitive and stereotypical patterns of behavior and interest [1]. However, these symptoms are mostly accompanied by motor abnormalities which can be visible at 6 months of age and postpone the achievement of motor development in important stages of life [2]. Obvious or hidden inability in controlling eye movements, dynamic postural control, manual tasks control [3], and abnormal movements in speed, coordination, stance, and walking, obviously will result in motor coordination disorder in children [4]. Almost 6% of children aged from 5 to 11 years suffer from motor coordination disorders, with a higher prevalence in boys compared to girls [5].

Motor coordination problems negatively impact educational development and everyday life activities in children with ASD [6]. In addition, the children and youth with ASD show limitations in performing gross movements and fine motor coordination, walking disorders, and weaknesses in static and dynamic balance in school years [7]. Studies reported that performers' movements as a spur of the moment display of the expression of "inner motion", the driving force of the music related to interpretation, are shaped by experience and related to emotion, sensation of motion, and communication [8].

Listening to music, playing, and even rhythmic movements accompanied by music improve joints' movement domain and motor skills, increase eye and hand coordination, and reinforce finger control [9]. Musical activities are mostly used for movement and improve the sensorimotor functions of hand, foot, head, and body [10]. Studies indicate that using music and music-based games decrease delay and limitations in non-musical fields in children with ASD [11]. In fact, music and mainly its rhythm lead to the initiation of movements in hands, head, legs, and body, as well as emotional face and tongue expressions.

Listening to music and playing gaming devices empowers the balance of physical movements, body condition, and stimulation of positive feelings through facilitating self-control [10]. In addition, rhythmic actions like clapping and walking during music play considerably facilitate gross motor skills in children with ASD. Studies indicate that a positive result of music therapy is increased motor skills in these children [11]. In addition, combined music and play therapy sessions including play, movement, and singing along the music with the simultaneous usage of play devices further reduces the problems in ASD children, compared to single treatment method [12].

Studies have documented that the common aspect of music along with motor activities is influential on the motor coordination of individuals with ASD [13]. Until 1988, the general idea of available results is based on this fact that physical activities not only improve physical conditions in children with ASD, but also reduce their inconsistent behavioral patterns [14].

It is obvious that precise cognitive and motor abilities and fine motor abilities are largely influenced by the growth and manipulation of motor activities with objects. Greenspan reported that the reduction of motor problems was largely influenced by motor plays [15]. Imitation learning aligned with autistic children's body actions dramatically helps with learning imitative motor skills [16]. In addition, active plays of motor, social, world perception skills facilitate everyday life skills and consistent behavior. It also provides a special chance for children to be physically active [17].

Studies demonstrate that social play therapy while improving social behaviors, increases gross motor skills in these children [18]. Many motor skills used in plays stimulate vestibular system, which is responsible for movement recognition and head position changes. This relation is based on muscle strength, balance, and 2-sided coordination. In addition, it causes some changes in tactile system, as the largest sensory system in our body. This system plays an important role in environment recognition. Kourassanis et al. [18] conducted a research entitled "teaching chained social game behaviors to ASD". They concluded that social plays cause some changes in motor behaviors. They found it an effective method of education in children with ASD. Research findings have supported the positive effect of motor activities on reducing motor problems among ASD children and their merge with society [19].

The innovative aspect of this research is its working model which is based on a double system, as follows: Intra-active (referring to the internal activity of subjects); and Inter-active (referring to the relation with others), for psychotherapeutic intervention and evaluation. Frequent methods are specifically applied in educational settings on ASD individuals throughout each session. These methods include primary errorless learning, shaping, positive and negative reinforcement, and physical restraint. Thus, we explore the effect of music therapy along with physical activity on motor coordination behaviors of children with autism.

2. Methods

This was an experimental study, with pre-test-post-test design and a control group. The study consisted of one experimental group and one control group. The study participants included 30 children with autism (boys), aged between 6 and 11 years. The subjects were selected from exceptional schools of Rasht City, Iran, by convenience sampling method. They were randomly assigned into the experimental and control groups. The participants lacked any experiences of participation in combined music therapy with play therapy. The diagnosis of ASD was confirmed before initiating research plan by a psychiatrist and according to the evaluation scale of Baron Cohen et al. [20].

A consent form was obtained from the subjects' parents and instructors. Then, after completing ASD evaluation questionnaire by instructors of these children, those with both ASD and lower grades in motor coordination were selected. Then, 30 children with ASD were divided into 2 groups (experimental and control groups), through direct random sampling method. The experimental group participated in 15 sessions (60-minute sessions), twice a week (except for the last week that 3 sessions were held). The subjects were trained by music therapy along with play therapy program. However, the control group did not receive any treatments.

The inclusion criteria were: A. age range between 6 and 11 years; B. Confirmation of the diagnosis of autism by a psychiatrist based on Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR); C. The lack of other disabilities; and D. Family's consent for participation in the intervention plan. Children with visual and hearing impairments and those with intense behavioral problems, resulting in their non-cooperation were excluded from the research.

Research tools

The Autism Spectrum Quotient: Children's Version (AQ-Child)

This scale, also called 'Cambridge University Behavior and Personality Questionnaire for Children' is devised by Auyeung, Baron Cohen, Wheelwright, and Allison [20]. The AQ-Child includes a number of descriptive statements to evaluate 5 areas related to ASD and the broad autism phenotype (each represented by 10 items), as follows: Social skills; Attention switching; Attention to detail; Communication; and Imagination. Higher scores indicate more 'autistic-like' behaviors, which is answered on a 4-point Likert-type scale.

It includes 50 items, and for each statement there are 4 options completed by child's parent or guardian. The lowest grade of this questionnaire is 0 and the highest grade is 150. Internal consistency reliability of this scale using Cronbach alpha was equal to 97%, internal consistency reliability of each of the subscales were estimated as 93% for the subscale of social skills, 89% for attention switching, 92% for communication, and 88% for imagi-

nation. The test-retest reliability of this scale is 85% [20]. The validity and reliability of this scale for the Iranian population were previously confirmed [21].

Lincoln-Oseretsky's Motor Development Scale

This scale was applied for evaluating motor skills. Oseretsky prepared the first draft of this test in 1923. This test includes 36 items, which is performed on a person-to-person basis. This scale is designed for evaluating the motor ability of children aged from 4 to 12 years. Performing its complete set requires 45 to 60 minutes. The total sum score of 36 items would be the final score of the participant. The Cronbach alpha value of this test is reported to be 0.92, with 0.95 internal consistency reliability [22].

The reliability and validity of this scale is confirmed in the Iranian population [23]. This scale is scaled as follows: for each subtest, there are some special and standard tests that the subject should repeat each of them twice. Then, the examiner records the grades of each repetition and adds them together.

The educational program

In the present research by music therapy, it is meant to do and play different musical instruments with desired rhythm and intensity, rhythmic accompaniment of instruments and co-singing children's songs, and listening to songs of children's music and coordination and making motor rhythmic with it, which follows 'through Orff-Schulwerk approach to elementary music and movement education. Music activities for children were presented in passive (listening to music) and active (playing and rhythmic movements) forms.

Play therapy in the present research, included applying techniques that are directly or indirectly used for the purpose of improving child's balance and coordination. The play therapy was planned and performed based on the disorder. The music therapy program along with the motor activities have been extracted from the musical composition program and the movement of Matthews Moreno et al. [24] and the program of 'the effect of movement activities in synchronization with music' by Atigh et al. [13].

To guide the sessions, 2 instructors conducted the activities of controlling the subjects. In addition, one instructor (i.e. the researcher) and one expert colleague delivered the intervention program. The instructors were psychologists who participated in the instructional courses of music therapy and play therapy as part of their educational courses. All educational sessions were carried out in a group and in the same class.

The structure of educational sessions of music therapy along with play therapy

The general plan of treatments was as follows: The first session: Using images for making contact, eye contact, singing familiar songs by the music therapist along with music for children with ASD; The second session: Teaching rhythm through body movements, performing active games like golf in small scales and making appointments for the next session; The third session: Regular rotational movements for stimulating vestibular system, and rhythmic games; The fourth session: Balance board game through walking on balance beam, and performing rhythmic motor games accompanied by music; The fifth session: Presenting targeted and planned game designs by including motor elements along with music, and rhythmic and free body movements; The sixth session: Alignment of kid's weakest movements with music rhythm and combining these movements with body beats; The seventh session: Regular rotational movements for stimulating vestibular system along with music play by a music therapist.

The eighth session: Physical skills games and listening to the music; The ninth session: Playing golf in a small scale, throwing a loop to the target, regular rotational movements for stimulating vestibular system, and teaching rhythm through body movements; The tenth session: Playing golf in a small scale, playing with simple devices like wooden blocks, regular rotational movements for stimulating vestibular system, and teaching rhythm through body movements; The 11th session: Walking on the knee, foot and heel, jumping back and forth, and playing music along with a symbol like the photo so that in this way seeing the image associates music; The 12th session: singing children's songs along with music play by a music therapist and performing rhythmic movements simultaneously; The 13th session: using simple exercises along with music play and synchronizing speech with child's movement rhythm; The 14th session: tempo-based training and synchronizing speech with child's movement rhythm; and The 15th session: a brief review of previous sessions and summarizing all of the sessions.

3. Results

The descriptive statistics of pre-test and post-test scores of the experimental and control groups are listed in Table 1 that demonstrates the results of Kolmogorov-Smirnov (K-S)

test for assessing the normal distribution of variables in the study groups. According to Table 1, the Z statistics of Kolmogorov-Smirnov test is not significant for all variables. Therefore, it can be inferred that the distribution is normal in these variables.

To explore the effect of teaching music therapy along with play therapy on the motor coordination of children with ASD, the one-way ANCOVA (analysis of covariance) was used. Results of the homogeneity of regression slopes of pre-test and post-test with respect to motor coordination in the experimental and control groups revealed that regression slope in both groups is identical ($F_{1,26}$=3.95, P>0.05). Levene's test was applied to assess the equality of variances for the dependent variable in the 2 groups. Its results revealed that motor coordination variance is equal in both groups ($F_{1,28}$=1.71, P>0.05).

The F test of the pre-test of motor coordination relation with the post-test of motor coordination (654.55) was achieved as significant (P>0.001). The F test of the pre-test of motor coordination relation with the post-test of motor coordination (1.61) was achieved as not significant. Therefore, there is a linear relationship between motor coordination in the pre-test and post-test. Table 2 lists the 1-way ANCOVA results for the differences between the experimental and control groups in post-test and pre-test.

Considering Table 2, the F value of motor coordination in the post-test is 26.16, which is significant (P>0.001). This indicates a significant difference between the 2 groups with respect to motor coordination. In addition, the effect size of 0.49 indicates that this difference is great and considerable in the society. ANCOVA results indicate that the corrected sum of squares of the experimental group in motor coordination (24.96) is more than that of the control group in this variable (Mean=21.30). The difference between the experimental and control groups in this variable is 3.65, which is significant, considering the F value (P>0.001). As a result, music therapy along with play therapy increases motor coordination in children with ASD.

4. Discussion

The present study aimed to explore the effectiveness of music therapy along with play therapy in increasing the motor coordination of children with ASD. The obtained results suggested that music therapy interventions along with play therapy significantly increased the motor skills of experimental group compared to the controls. The positive effects of music in the motor coordination of children with ASD have been confirmed in previous research studies [13, 25-28], as well.

Findings revealed that, with music practices, the child understands structural components of the beat of music and expresses it through coordinated movements. A rhythmic movement is, in fact, the most prominent part of a coordinated movement [29]. Furthermore, the interrupted and rhythmic nature of musical movements is a kind of movement training and functional balance. Such nature is enjoyable for the individuals. The same temporal struc-

Table 1. Descriptive statistics of pre-test and post-test scores in the experimental and control groups (n=30)

Variable	Situation	Group	Mean±SD	K-S Z	P
Motor Coordination	Pre-test	Experimental	20±8.34	0.74	0.63
		Control	22.13±12.85	0.71	0.68
	Post-test	Experimental	23.86±9.73	0.72	0.66
		Control	22.40±12.65	0.65	0.78

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Table 2. One-way ANCOVA results for the differences between the study groups in motor coordination

Source	TSS	df	MSE	F	Level of Significance	Effect Size
Pre-test	3464.93	1	3464.93	913.66	0.001	0.97
Group membership	99.22	1	99.22	26.16	0.001	0.49
Error	102.39	27	3.79			

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ture in music including rhythmic sounds in a constant pattern facilitates the fine coordination of body movements.

Those functions that are performed according to music require correct and fast responses to visual and audio motives. When producing sound by musical instruments, the individual instantly receives constant audio feedbacks from her/his movements. As a result, they can adjust their response speed with the audio motive or their performance quality [30]. Therefore, coordinating body movements with a rhythm can balance motor responses through affecting the nervous system and discharging simulative or inhibitory neurotransmitters depending on the rhythm type. This process gradually results in performance adaptation in body movements.

Listening to music and playing percussion instruments like bells could enhance recovery by increasing self-control in physical movements, performance balance, and physical states [31]. This is due to the activation of the motor cortex and basic complexes and creating a mutual performance on limbic system and sensorimotor integration of basic complexes and cortex-forehead regions [32]. Therefore, rhythmic auditory cueing is an appropriate technique for providing predictable structures and changeability in motor patterns and facilitating motor planning in children with ASD [29].

The positive effects of play and motor activities in increasing the motor coordination of children with ASD have been mentioned in previous research studies [18, 19, 33]. The studies have suggested that when children are engaged in active games, the intensity, duration, and time of movement have a significant influence on their health and motor development [18]. Motor planning is the ability to conceptualize a plan and perform a series of unfamiliar motor tasks. In order to successfully perform motor plans, the child with ASD should be aware of happenings while performing motor tasks.

These skills could be improved by performing plays and different motor activities such as balling, playing with sand, gravel game, finding hidden objects, and different motor activities. Moreover, bilateral motor integration is defined as the coordination of the 2 sides of the body for performing a correct motor task. As a result, games that cause the child to keep an object in each hand and perform bilateral motor tasks like jumping games are helpful in improving this part of motor coordination. In addition, balance skills based on inputs from several sensory modalities like vestibular and proprioceptive system are required for movement and speed and gravitational pull.

Rotating, playing with toys, and walking are examples of the development of balance skills for children with ASD [34]. In addition, the variety of play activities provides higher chances for fine motor skills development in these children. Thus, the repetition of practice games reinforces gross motor actions without pretending or participating in social rules [16]. Combining music with motor activities result in balance and lower alterations in various areas associated with instinct (sleeping, feeding, and individual body activities), higher capacity in imitation and repetition, shaping actions and games, and finally muscle tone growth in children with ASD [24]. This effectiveness could be due to flexibility and child-centeredness of music and play that facilitated the treatment procedure.

This research was limited to educational grades from preschool to the third grade of elementary school. Therefore, in generalizing the results to other educational grades and other sections necessary caution should be taken. In this research due to executive limitations and the administrative obstacles of centers, the researchers were unable to perform a follow-up. Future studies are recommended to consider a larger sample size and a follow-up stage. Children with ASD suffer from different sensory disorders and music evokes various responses in this population. Thus, in additional studies, it is suggested that hypersensitive and hyposensitive children be separated on the basis of the type of assessment prior to implementing the intervention.

5. Conclusion

This study is a primary research on combined music and play therapy for children with ASD. Overall, this research suggests that the participation of children with ASD in music therapy programs along with play therapy will result in reinforcing motor skills through increase in rhythm understanding, and finally performance adaption in body movements. However, because of social isolation, limited eye contact, and stereotypical behaviors, music and play therapy should be performed in a natural environment considering the conditions of these children. Therefore, the level of sound and number of people in the environment, selection of appropriate devices and teaching strategy are among important issues for these children to receive effective treatment.

It is suggested that further studies explore other types of music therapy programs such as improvising, playing more sophisticated instruments, and group playing along with play therapy and its possible effects on other functioning areas of children with ASD in various age ranges.

Ethical Considerations

Compliance with ethical guidelines

All ethical principles were considered in this article. The participants were informed about the purpose of the research and its implementation stages; they were also assured about the confidentiality of their information; Moreover, They were allowed to leave the study whenever they wish, and if desired, the results of the research would be available to them.

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Authors contributions

The authors contributions is as follows: Supervision and conceptualization: Abbas Ali Hossein Khanzadeh; Funding acquisition and visualization: Ahya Hasirchaman; and Conceptualization, methodology, software, validation, formal analysis, investigation, resources, data curation, writing–original draft preparation, writing–review & editing, visualization and project administration: Fahimeh Imankhah.

Conflict of interest

The authors declared no conflict of interest.

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Case Report: The Effect of Virtual Reality Practice on Postural Control and Balance in Children With Cerebral Palsy: A Single-Subject Study

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ABSTRACT

Objectives: Virtual reality is a new technology that has been recently used for different purposes in the rehabilitation of children. This study aimed to investigate the effectiveness of this method in balance rehabilitation of children with Cerebral Palsy (CP).

Methods: This was an A-B-A design single subject study in which 3 children with hemiplegic CP participated. The baseline phase and intervention phase, lasted 2 and 4 weeks, respectively. Then, the secondary evaluation phase was held at an evaluation session. Intervention sessions as the baseline phase were repeated 3 times a week. In each session, children performed different computer games with displacement of the center of pressure in frontal and sagittal planes (for 21 min). The secondary evaluation phase of this study was held 2 to 3 months after the completion of the intervention phase. The changes made in this study were evaluated by assessment tools of Pediatric Reach Test (PRT), Single Limb Stance (SLS), Plate sensitive to pressure of Biometrics Ltd E-LINK force plate, and Activity Scale for Kids (ASK). Finally, the results were evaluated by C static and the visual analysis method.

Results: Comparison of the results of PRT, ASK and the evaluation of planes sensitive to pressure of Biometrics Ltd E-LINK in all 3 phases revealed the significant improvement of dynamic balance and the enhancement of the independence performance of children in daily living activities and the sustainability of the recovery in the secondary evaluation phase. Although, the SLS test results and data of force Plate indicated no significant improvements in the static balance of patients.

Discussion: The study results suggest that weight shift exercises with the use of virtual reality can effectively improve the dynamic balance of children with CP. However, it fails to make a significant change in the static balance of these children.

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Highlights

- Weight shift practice with the use of virtual reality can significantly improve dynamic balance in hemiplegic cerebral palsy children, but not their static balance.

- Improving dynamic balance practice may not be extended to static balance.

Plain Language Summary

One of the most common problems in hemiplegic cerebral palsy children is postural control and balance. This problem produces a lot of disability in activities of daily living and play and has adverse effect on their self-confidence. Thus, one of the important objectives for family and therapist in rehabilitation center is improving balance and postural control of these children. On the other hand, most of the family members and even therapists complain about low children's desire for doing practice. However, many children are interested in performing video games. Therefore, we investigated the effect of virtual reality practice (weight shift practice on affected limb) on postural control and balance of hemiplegic cerebral palsy children.

In this research, 3 hemiplegic children participated in 12 virtual reality game treatment sessions. Changes in balance and postural control of these children showed the positive effect of virtual reality practice on improving dynamic balance, but not static balance. So we can say that using virtual reality practice in rehabilitation clinics is useful method to improve dynamic balance. Change in balance and postural control was observed using Pediatric Reach Test, Single Limb Stance, plates sensitive to pressure of Biometrics Ltd E-LINK and force plates shows positive effect of Virtual reality practice on improving dynamic balance, but this result shows that this practice cannot improve static balance. So we can say that using virtual reality practice in rehabilitation clinics is useful method to improve dynamic balance.

1. Introduction

Cerebral Palsy (CP) is the most common cause of physical disability in early childhood [1]. Meanwhile, hemiplegia is the most frequent type of CP among preterm infants. It is the second type of CP among preterm infants [2] and constitutes 33% of children with CP [3]. Children with hemiplegia experience various impairments including spasticity, paralysis, and muscle weakness in the half of the body because of involvement of the cerebral hemisphere [4].

Studies indicate that patients with hemiplegia have higher weight on the healthy limbs when standing because of cerebral hemisphere involvement. Putting more weight on certain limbs directs the center of pressure on the healthy limb [5]. More use of healthy limb causes reduction of bone density and shortness of the involved limb, as well as exposure to instability and frequent falls [6]. These children usually survive until adulthood. Thus, frequent falls may cause damage and reduce their self-confidence and consequently their participation in social, family, and working activities decrease [7]. Therefore, a constant goal in the rehabilitation of children with hemiplegia is encouraging them to displace the center of pressure onto the affected limb and build-up symmetry in weight bearing on both lower extremities in standing position, thus contributing to balance improvement [8].

Conventional treatments used to improve children's balance mainly focus on performing single-leg or double-leg activities on fixed or mobile surfaces, and ultimately adding these exercises to other tasks. Although these treatments are effective, they are often boring and exhausting [9]. According to Shumway, motivation is among basic elements in motor learning [10]. However in most disorders, rehabilitation takes a long time and creating and preserving a stimulating and exciting therapeutic environment is a difficult task and a constant challenge for pediatric therapists [11]. In this regard, virtual reality as a new tool provides a promising perspective for rehabilitation, and it seems that it addresses this challenge to some extent [12].

Virtual reality is a computer technology, which simulates virtual environment similar to the real environment, using computer software and hardware. This environment allows disabled people to communicate with the represented images and movements of virtual objects [13]. In such technology, individuals are able to perform activities that are impossible for them in real world with a perfect security level [14]. Virtual reality can create an opportunity for complete participation in pleasant, pur-

poseful, and meaningful tasks related to real life for the individuals [15].

Many studies have investigated the impact of exercises in virtual reality on balance and postural control in adult neurological patients [16-18]. However, a few number of them studied the impact of this technology on children balance, and especially in children with CP. Reid (2002) first investigated the impact of implementing exercises using virtual reality on the improvement of postural control in patients with CP in the sitting position, and gained positive changes [19]. These changes were such that he proposed implementing exercises using virtual reality as part of the process of occupational therapy for children with CP. After that, separate studies by Deutsch [14] and Tatla [20] in 2008 and 2012, respectively, indicated the positive impact of implementing balance exercises in virtual reality on the improvement of balance and postural control of children with CP in standing position.

The study by Silva (2015) also revealed the positive impact of rehabilitation exercises using virtual reality on balance of a child with ataxic CP and introduced virtual reality as a suitable tool for balance rehabilitation in children with CP [21]. In addition, he mentioned few studies in this regard, and the need for more studies. Considering a few studies in this area, Cho investigated the impact of implementation of treadmill exercises using virtual reality on the balance of children with CP. Cho demonstrated the positive impact of using virtual reality on improving balance and power of children with CP [22].

Considering these findings and a few number of studies with long-term follow-up periods, current research aimed to investigate the impact of implementing rehabilitation exercises, using virtual reality, on the static balance and postural control of children with hemiplegic CP and its lasting potential effects.

2. Methods

Research type

This was a single-subject research (A-B-A type). It was conducted in 2014 in the Rehabilitation Faculty of the same university. Single-subject studies are often used in the investigation of new subjects or rare cases. Low number of participants and repeated evaluations are the main characteristics of this type of studies that allow an accurate examination of changes in every patient. A-B-A single-subject study type records basic abilities of the patients at initial evaluation phase. Accordingly, it allows the investigation of treatment impact in intervention phase. Also, with the elimination of treatment in secondary evaluation phase, it allows the investigation of treatment stability and its impact [23]. In this study, primary evaluation phase lasted almost 2 weeks, treatment phase lasted 4 weeks, and follow-up phase was run in an evaluation session, approximately 2-3 months after the completion of the treatment.

Study participants

Three hemiplegic CP children with GMFCS (Gross Motor Function Classification System) level I participated in the current research. Inclusion criteria were being diagnosed with hemiplegic CP based on a physician's report or review of medical records, age range of 7 to 12 years, normal intelligence (studying in normal schools), having a 90º angle of the ankle in standing position and having enough satisfaction and motivation to participate in the research project. The exclusion criteria included drug-resistant seizures, ability to stand on one leg for more than 10 seconds, the presence of visual and auditory defects irreparable with the help of auxiliary equipment, and the lack of cooperation with the therapist during exercises and tests. Based on these criteria, three children with CP Mean±SD age: 10.37±2.93 years were selected to participate in the study. Their characteristics are presented in Table 1.

Study procedure

Current study was run at 3 phases as follows: primary evaluation or baseline phase (A), intervention phase (B), and secondary evaluation or follow-up phase (A). Primary evaluation phase consisted of 4 sessions with 3 repetitions per week. The Pediatric Reach Test (PRT), Single Limb Stance (SLS), Activities Scale for Kids (ASK), and Biometrics Ltd E-LINK (the evaluation of maximal weight shift on the affected limb in the sagittal and frontal plane with open and closed eyes and evaluating deviation from the center in a standing position with open eyes for 30 seconds), were used. In addition, the center of pressure was examined to measure participants' abilities. Data collection of the center of pressure in this study was performed in a standing position with open and closed eyes, with a frequency of 100 Hz and sampling time of 30 seconds. PRT and Biometrics Ltd E-LINK data were reviewed at each primary evaluation session. However, SLS, ASK, and the center of pressure tests were only examined at the end of the primary evaluation phase.

At the end of primary evaluation phase, treatment phase was immediately started. This phase lasted for 1

month. Similar to primary evaluation phase, it was run 3 times per week. At the end of each treatment session, after the implementation of computer games, PRT and Biometrics Ltd E-LINK data were measured. In addition, two tests were used to assess the patient's abilities in the 6th and 12th sessions of the treatment phase by SLS, ASK and the examination of fluctuations of center of pressure with open and closed eyes, on the force plate. In 2-3 months after the last treatment session, follow-up or secondary evaluation phase was held, and the probable duration of treatment effects was evaluated in an assessment session using all of the tests mentioned in the primary evaluation phase. Duration for follow-up phase for each patient is presented in Table 1.

The number of primary evaluation phase sessions in this research was specified considering ethical issues and paying attention to the results of the pilot study, which was conducted with participation of a 4.5-5 year-old child with CP.

Research tools

PRT: It is a simple, reliable, and valid test for investigating the balance of children in standing and sitting positions on stool. The distance the child can reach forward and the sides without losing his balance and lifting the heel or shaking the foot, then return to his/her initial state is recorded, for investigating balance [24].

SLS: It is a simple, quick, reliable, and valid test for investigating static balance in children with CP. In this test, static balance is investigated by the calculation of period that one can stand on one leg with hands on the waist [25, 26].

ASK: It is an appropriate questionnaire for investigating independent performance in children (5-15 years old) with musculoskeletal disorders in the daily activities. It measures child's performance level in a specific period. Thus, it allows the measurement of changes over time. According to studies by Dehghan et al. this test has high reliability and validity among the Iranian children with CP [27].

Biometrics Ltd E-LINK: It is a computer system with the capability of implementing multiple assessments and medical exercises in the form of defined games. This tool was designed in England aiming to be used in rehabilitation clinics. The lower extremities set of this system (EP40 Dual-axis Force Plate System), includes a 24-inch screen and 4 sensitive 14-inch thick 200-mm screens that are connected by a cable to a central machine. The device software enables therapist to record the fluctuations of weight distribution in the standing position and the amount of voluntary force imposed to each lower limb [28]. In this research, the Biometrics Ltd E-LINK was used for the assessment and implementation of virtual reality practice.

Force Plane Device: It is a suitable and accurate tool for recording the center of pressure data, which allows detecting the smallest changes in postural control [29]. In this study, Kistler Force Plane, Model 2260A, in Rehabilitation Faculty of Iran University of Medical Sciences was used for recording the center of pressure data.

Intervention process

All 3 participants attended 12 treatment sessions with 3 repetitions per week. Every treatment session consisted of the implementation of computer games in Biometrics Ltd E-LINK for 21 minutes, and performing specified tests. The games applied in this study were selected according to the treatment goal and based on the results of the pilot study. The games were performed with the displacement of center of pressure in both sagittal and frontal axes in standing position and could be defined either in a single axis or dual axes by the device.

At each session, the patients initially performed 16-min single axis games that required shift of the weight in the frontal (driving, football, basketball) and sagittal axis (monkey, skating and shooting in space). Then, they played two-axis games (golf, puzzles, and the selection of uniform shapes), for 5 minutes. At the end of each session and following finishing the computer games, the changes of children in balance skills and weight shifting on the affected limb were measured using the mentioned tests. In the next session, depending on the progress and ability of the child, the levels of game got more difficult by increasing weight shifting on the affected limb and increasing the speed of game. During the research, whenever the child got tired, the treatment process was stopped, and it was continued after the elimination of exhaustion.

Statistical analysis

Firstly, serial dependence among all obtained data was investigated using Excel 2016. Following the absence of significance in data dependence (Table 2), visual analysis, 2SD method, and C Static were used for measuring the significance of changes in the specified tests. If the results of Pearson correlation coefficient for the data with series dependency classified based on time order were not significant, variance analysis, t-test or Mann-Whitney U

Table 1. Clinical characteristics of the study participants

Participant	Age	Gender	Hemiplegic Side	Follow-Up Duration
1	12 years and 3 months	Female	Right	9 weeks
2	11 years and 8 months	Male	Left	11 weeks
3	7 years	Male	Right	11 weeks

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test could be used for statistical investigation [30]. Data of force plate device were analyzed using 2-way Analysis of Variance (ANOVA) and considering the patient as random-effects (repeated measures) in SPSS.

3. Results

All participants passed all research steps without any physical damage or fall. Statistical tests were performed using the 2SD method and the C Static at the significance level of $P<0.05$. Test results demonstrated a stable pattern in the baseline phase of all subjects. Biometrics Ltd E-LINK data analysis on maximum weight shift in the affected limb, in frontal and sagittal planes with open and closed eyes were performed using C Static, visual analysis and 2SD method. The obtained data revealed significant statistical changes from the base phase to the treatment phase. The prolonged stability of these changes in the secondary evaluation phase was confirmed, too. According to 2SD statistical test, data stability was not significant in maximum weight shift on the affected limb in the frontal plane with the open eyes in the first patient. Also, the maximum weight shift to the back in the sagittal plane with the open eyes in the second patient, and maximum weight shift in the frontal plane with the closed eyes in the third patient (Figures 1, 2, and 3, Table 3) were not significant.

Table 2. Serial dependency results

Variable	Participant	Autocorrelation	Interpretation
Weight shift in sagittal plane with open eyes (to the front-injury side)	1	0.063	Not significant
	2	0.277	Not significant
	3	0.166	Not significant
Weight shift in frontal plane with open eyes (to the injury side)	1	0.236	Not significant
	2	0.5	Not significant
	3	0.007	Not significant
Weight shift in sagittal plane with open eyes (to the back-injury side)	1	0.07	Not significant
	2	0.35	Not significant
	3	0.096	Not significant
Weight shift in frontal plane with closed eyes (to the injury side)	1	0.073	Not significant
	2	0.230	Not significant
	3	0.126	Not significant
Weight shift in sagittal plane with closed eyes (to the front-injury side)	1	0.063	Not significant
	2	0.265	Not significant
	3	0.264	Not significant
Weight shift in sagittal plane with closed eyes (to the back-injury side)	1	0.07	Not significant
	2	0.35	Not significant
	3	0.096	Not significant

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Table 3. C statistic results of Biometrics Ltd E-LINK tests

Variable	Participant	CAB	ZAB	P
Weight shift in frontal plane with open eyes (to the injury side)	1	0.40	1.73	0.042
	2	0.84	3.60	0.0002
	3	0.84	3.59	0.0002
Weight shift in sagittal plane with open eyes (to the front-injury side)	1	0.80	3.44	0.0003
	2	0.84	3.59	0.0002
	3	0.92	3.96	0.001
Weight shift in sagittal plane with open eyes (to the back-injury side)	1	0.83	3.54	0.0002
	2	0.85	3.66	0.0001
	3	0.69	2.98	0.0014
Weight shift in frontal plane with closed eyes (to the injury side)	1	0.82	3.50	0.0002
	2	0.84	3.59	0.0002
	3	0.76	3.27	0.0005
Weight shift in sagittal plane with closed eyes (to the front-injury side)	1	0.76	3.25	0.0006
	2	0.95	4.05	0.0001
	3	0.93	3.97	0.0001
Weight shift in sagittal plane with closed eyes (to the back-injury side)	1	0.84	3.60	0.0002
	2	0.91	3.91	0.0001
	3	0.92	3.92	0.0001
Deviation from center (open eyes)	1	0.25	1.09	0.1379
	2	-0.23	-0.99	0.1611
	3	-0.33	-1.42	0.0778
Deviation from center (close eyes)	1	0.00	0.02	0.492
	2	-0.26	-1.13	0.1314
	3	0 .21	0.91	0.1814

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Analysis of PRT data using C Static test, visual analysis, and 2SD method indicated significant changes from baseline phase to intervention phase (P<0.001) in all 3 directions in all patients. This analysis also suggested the stability of treatment effects in secondary evaluation phase. Analysis of Biometrics Ltd E-LINK data using C Static test, visual analysis, and 2SD method did not indicate significant changes in relation to the deviation from the center with open and closed eyes from baseline phase to intervention phase (Table 3).

Data analysis of the force plate device in the baseline phase and intervention phase using two-way ANOVA, except for calculating the velocity of the center of pressure in the direction of the sagittal plane (P=0.005), demonstrated no significant changes in any of the domains (P=0.749 for frontal plane, P=0.681 for sagittal plane), velocity (P=0.254, for frontal plane), and the area of center of pressure (P=0.502) in closed and open eyes.

Table 4. Results of single leg stance and activities scale for kids

Variable	Participant	Baseline Phases	Intervention Phases (6th Session)	Intervention Phases (12th session)	Follow-up Phases
SLS (Injury side)	1	2.89 s	7.85 s	7 s	4.33 s
	2	1 s	1.78 s	1.80 s	1.06 s
	3	1.66 s	1.47 s	1.84 s	1.50 s
ASK	1	60	63.33	62.5	63.3
	2	86.66	87.5	95	91.6
	3	73.33	79.16	88.33	87.5

S: Second

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In examining the post hoc test results, the fluctuation velocity of the center of pressure in the direction of the sagittal plane was significant only in comparison with the results of the second session (P=0.01). Moreover, the third phase of treatment (P=0.05) was significantly related to the results of secondary evaluation phase (Figure 4).

Results of ASK indicated performance improvement in participants from baseline phase to intervention phase (Table 4). Results of SLS did not suggest any changes in the single-leg stand ability in participants from baseline phase to intervention phase (Table 4).

4. Discussion

The current research was conducted to investigate the effect of implementing exercises using virtual reality on balance, postural control, and performance in children with CP as well as the stability of probable outcomes. In this study, dynamic balance variations were analyzed using the PRT. The maximum weight shift in the frontal and sagittal planes (with open and closed eyes) were calculated. The static balance changes were measured using the SLS. In addition, the velocity, domains, and the area of center of pressure in a static position (for 30 seconds) were examined on a force plate. Also, deviation from the center in a static position was measured using Biometrics Ltd E-LINK as a symmetric weight bearing device in standing position. Finally, the rate of patient's performance changes in daily activities was assessed using the ASK and parent's reports.

The dynamic balance test results revealed a significant improvement in the dynamic balance of patients in the intervention phase and higher stability of these changes in the secondary evaluation phase. This result is consistent

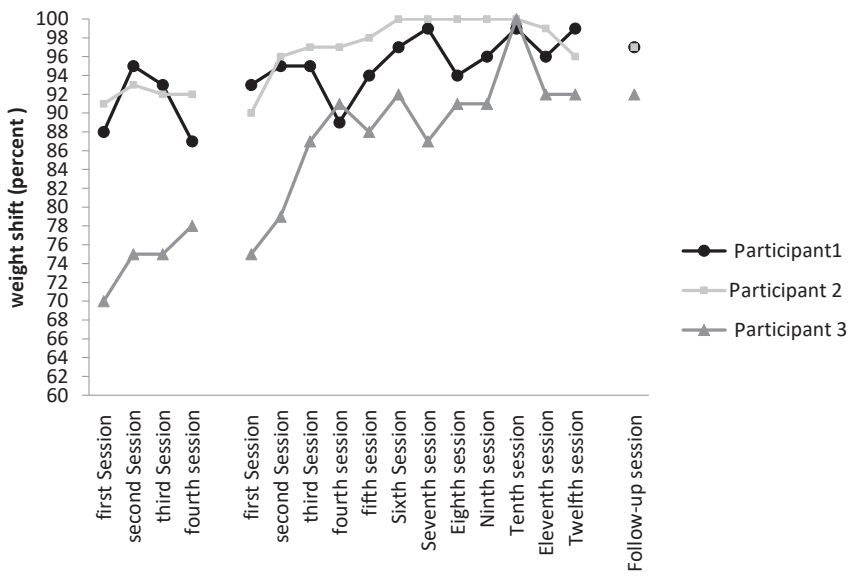

Figure 1. Weight shift in frontal plane with open eyes (to the injury side)

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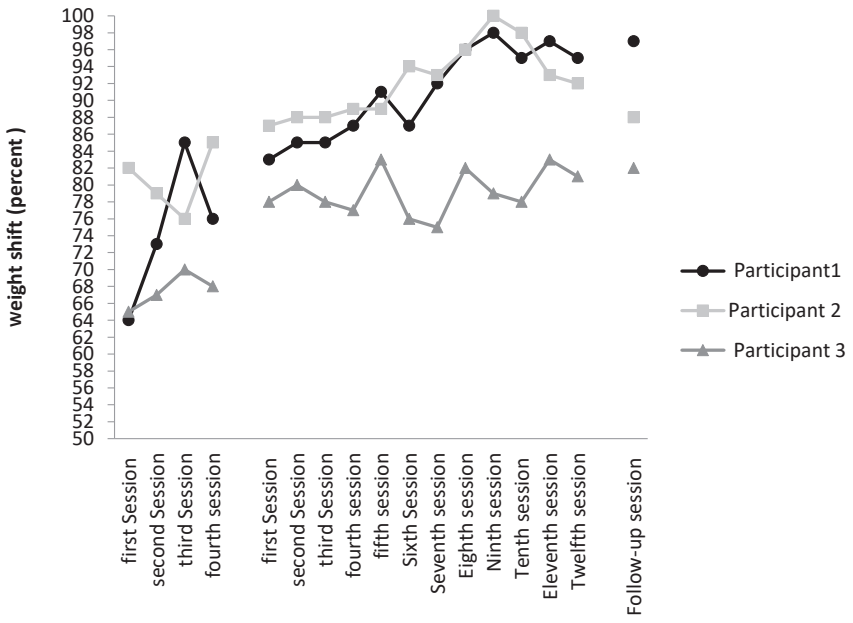

Figure 2. Weight shift in sagittal plane with open eyes (to the back-injury side)

with findings by Brian [31], Deutsch [14], Luna-Oliva [32], Tarakci [33, 34], Jelsma [4], and Siconolfi-Morris [26]. We selected specialized exercises of weight shift in sagittal and frontal planes with varying speeds and forces and implemented them in the form of attractive computer games. This caused the higher participation of children in performing the exercises and repeating and enhancing ankle and pelvic balancing strategies. Thus, it was effective in improving the scores of dynamic balance in children. Thus, even 2-3 months after the completion of intervention phase, stability of this treatment approach could have been observed.

However, the analysis of changes of patients in SLS, deviation from the center and reviewing the results on the force plate suggested no effect of the performed exercises on the improvement of children's static balance. Investigation of changes in the velocity of center of pressure of patients in sagittal plane also revealed no significant improvement from baseline to intervention phase. Only changes from the intervention to secondary evalu-

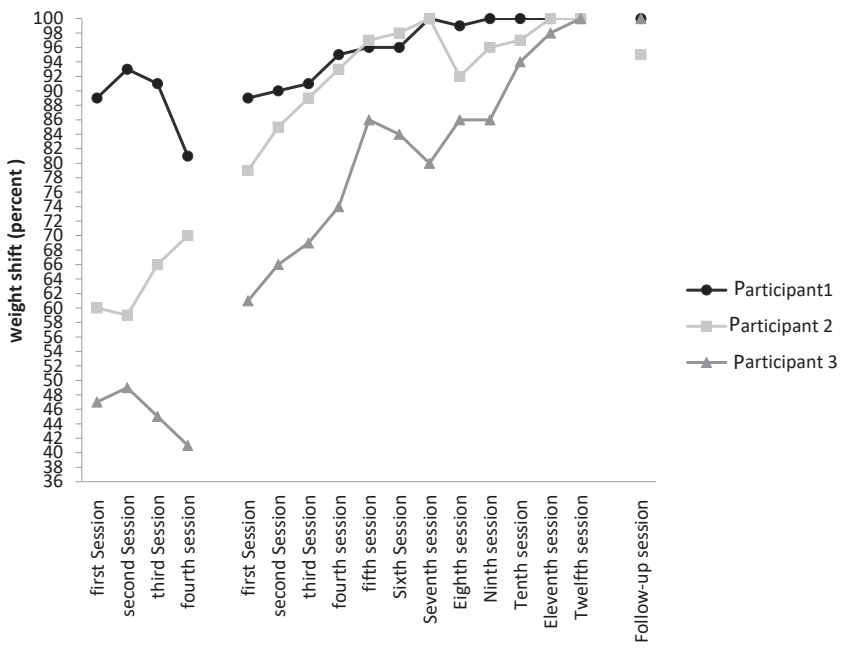

Figure 3. Weight shift to the front in injury side (sagittal plane-close eyes)

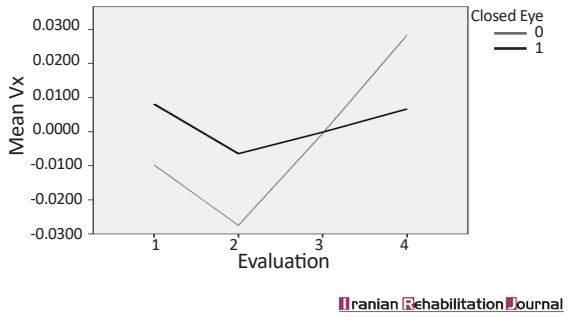

Figure 4. Velocity of center of pressure in the sagittal plane (open eyes)

ation phase were interpreted as significant. Increased velocity of center of pressure and return to the baseline state were observed from the results and drawn graphs (according to the statistical investigation, the velocity of center of pressure difference in the primary and secondary evaluation phases was not significant).

In a similar study, Tatla also stated that implementing balance exercises using Nintendo Wii might improve dynamic balance in children with brain injury. However, it does not improve their static balance [20]. Ramstrand reported similar results as well. He found that a 5-week balance exercise program by Nintendo Wii had no impact on the velocity and the area of center of pressure [35]. Siconolfi-Morris (2012) studied children with CP and gained almost similar results. Siconolfi-Morris reported that the impact of 6 weeks of balance exercises by Nintendo Wii had trivial impact on velocity and the area of center of pressure of participants [26].

Unlike the current study, the work by Deutsch [14], Tarakci [33], Gatica-Rojas [36], and Brumels [9] demonstrated the positive impact of balance exercises by Nintendo Wii on reducing the fluctuations of center of pressure. The observed difference can be due to the focus of selected exercises on weight shift in sagittal and frontal planes. Furthermore, the selected exercises mostly challenged dynamic balance, and overlooked static balance, because the researcher assumed that weight shift practice also improves static balance [37]. However, the obtained results indicated that the improvement of dynamic balance could not be generalized to the static balance [19]. Therefore, the absence of appropriate exercises can explain such results. Moreover, differences among the participants and inconsistent studies should also be taken into account.

The current study was conducted on hemiplegic children with GMFCS level I. While in the study by Deutsch [14], a diplegic adolescent (GMFCS level III), in Tarakci [33] study a group study with different types of CP (GMFCS levels I -III), and in Brumels [9] study healthy subjects with ankle injury were investigated. In addition, the number of sessions that children were treated using virtual reality should also be considered. Gatica-Rojas conducted 18 sessions with 3 repetitions per week [36]. Tarakci held 24 sessions twice a week [33]. In both studies, the number of practice sessions by patients using the virtual reality was more than the number of sessions in this study. Therefore, the difference between participants' diagnosis and the number of virtual reality treatment sessions could be considered effective in obtaining different outcomes. Subsequently, differences among participants also impact the results.

The improvement of children's independent performance in daily activities is the main goal of occupational therapy practices. However, ASK test results were considered as the secondary research objectives, because of the low odds of change in the results. ASK test results suggested the improvement of children performance in daily activities following 12 treatment sessions using Biometrics Ltd E-LINK. Siconolfi-Morris [26], Luna-Oliva [32], Tarakci [33], and Atasavun Uysal [38] indicated the positive impact of implementing balance exercises using computer systems on the independent performance of children with CP.

The parents of children participating in this research reported the improvement of their children in performances not measured by ASK. The parent of Child 1 referred to the improved ability in wearing trousers and playing. The parent of Child 2 mentioned improved balance and tolerance of the child in long-term walking. The parent of Child 3 mentioned improvement in his ability to ride the bicycle, and balanced movement of both legs on the bicycle, as well as the increased speed of riding the bicycle. In the current study, consistent with the previous works, researcher believes the reason for such improvement is due to the impact of implementing and repeating different exercises, which are prerequisite for many daily activities. This refers to the positive impact of balance exercises on the performance capacity of individuals in performing daily activities.

Finally, in order to measure exercises enjoyment, the children's ideas and researcher's observations were considered. The tendency of children to do exercises revealed a decline from initial sessions to the ending sessions because of low variety of games and their simple graphics. However, all participants reported that this method of offering exercises is more enjoyable than the traditional approach, and they demanded to continue their treatment in this way.

5. Conclusion

As previously stated, the ability to maintain balance and postural control is a key factor in various daily living activities. Therefore, it should be included in all rehabilitation programs. The results of this study suggested that weight shift practice using virtual reality did not improve static balance. However, it could improve the dynamic balance, and consequently increase the independent functioning of children in daily living activities. The obtained results also highlighted the need to incorporate both static and dynamic practices into children's balance rehabilitation programs. This is because selecting and performing dynamic balance practice may not be generalized to static balance. Furthermore, we observed the effect of virtual reality on encouraging children to therapeutic practices. Therefore, it seems that this technology, with its capabilities, can provide a variety of fun and meaningful therapeutic practices for clients and can serve as a useful tool in the rehabilitation of dynamic balance in hemiplegic CP children with characteristics identical to those in this research.

Ethical Considerations

Compliance with ethical guidelines

The present study was approved by the Ethics Committee of Iran University of Medical Sciences (code: 5532.D.105.93).

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Authors contributions

The authors contributions is as follows: Design, planning and writing: Afsoon Hassani Mehraban; and intervention, analysis and writing: Samira Boroumand.

Conflict of interest

The authors declared no conflict of interest.

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Report: Developing the Guideline of Therapeutic Interventions for Street Children With Substance Use Disorders

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ABSTRACT

Millions of children are left to survive on the streets around the world. Investigations on drug use disorders among street children reveal that they not only abuse all types of drugs higher than their peers who live at home or in shelters, but also they abuse more harmful drugs such as injection drugs or methamphetamines. This guideline provides a comprehensive approach to the treatment and management of substance use disorders among children of 3 to 18 years of age for the staff of substance use disorder clinics. It highlights examples of how to perceive and approach the management and issues of substance abuse among street children at an early stage of development through various medical, psycho-social, and other interventions. It also defines the characteristics of the street children with a focus on prevention. These provisions consist of addressing the applicability matters in this area and necessity of a decision model in our country.

Highlights

- This guideline provides a comprehensive approach for the management of substance use disorders among children.
- It highlights examples for the early management of substance abuse among street children.
- It also defines the characteristics of street children with a focus on prevention programs.

Plain Language Summary

Millions of children are left to survive in the streets worldwide. Street children abuse not only all types of drugs, but also more harmful drugs such as injection drugs or methamphetamines. This guideline provides a comprehensive approach for the management of substance use disorders among children of 3 to 18 years old for the staff of substance use disorder clinics. It also defines the characteristics of the street children with a focus on prevention, which could be helpful for policy makers.

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1. Introduction

Based on the United Nations International Children's Emergency Fund (UNICEF) reports, millions of children are left to survive on the streets around the world [1]. They are forced to work and live on their own without fulfilling their essential needs such as food, housing, social security, affection, and education, which not only leads to a vulnerable living and an extremely inadequate biopsychosocial care [2], but also lures them into drug abuse in order to cope with their challenging living and to survive on the streets [3]. In such cases, "the non-medical use of chemical substances in order to achieve alterations in psychological functioning has been termed as substance use". [4]. According to UNICEF surveys in 2002, the number of street children was about 100 million [5].

There are some helpful factors in identifying intervention areas for street children in order to prevent further damages to their lives, and possibly reducing their number. Such factors consist of studying the psychopathology and its affecting elements in this regard. Street children mostly visit Non-Governmental Organizations (NGOs), seeking needs like eating, bathing and medical care. NGOs assist thousands of street children with various programs, which are good opportunities to reach a better assessment of vulnerability to various psychological disorders among them and improve interventions and prevent further problems in their lives [6].

The key findings of prior investigations on drug use disorders among street children was that the rate of all types of drugs abused by this population is higher than their peers who live at home or in shelters. In addition, they abuse more harmful drugs like injection drugs or methamphetamines. Such high prevalence of substance abuse necessitates the provision of adequate management for adolescents who live on the streets [7-9]. Based on the studies, poverty, child abuse and neglect, and family breakdown are the major causes of the problem [10]. Thus, this guideline was developed to assist in the prevention, harm reduction and treatment interventions of opioid abuse among the street children of 3-18 years of age. It was hypothesized that using this guideline could facilitate effective actions in the target society.

The literature review reveals an available guideline on the same area of subject in Iran [11]. Some authors have also developed the typology of street substance users' communities in Iran and highlighted the necessity of modifying provided harm reduction services, according to these communities [12]. In addition, the guidelines of other countries literally do not address the specific needs of Iranian population. The process of developing an opioid harm reduction guideline for street children aged 3-18 started with an oversees committee who advised on the development of substance abuse harm reduction guidelines. The committee members included representatives from relevant organizations in substance abuse, university professors, and experts in substance use disorders.

A draft of guideline was initially prepared based on the recommendations of Ministry of Health and Medical Education of Iran and UNICEF counseling. The final draft was presented after applying comments of various children service provides, clinicians and social workers. This guideline is presented before any pilot interventions and shall be updated and revised based on the administration results. This is only used as an implementation basis to represent various services in a comprehensive format and the results will be determined after implementation.

2. Target Population

This guideline provides a comprehensive approach to the treatment and management of substance use disorders among children of 3 to 18 years of age for the staff of substance use disorder clinics who provide services to opioid dependent children. It is also applicable for the all groups of healthcare providers to children ages 18 years and younger, including governmental and NGOs supporting street children, social welfare organizations, staff of the children shelters, municipal administrators, and any street children care authorities, in general.

3. Guideline Development Process

The guideline committee followed a well-defined process for its development, based on a systematic review of the literature on substance abuse disorders for street children. The guideline was organized in steps like choosing the topic of the proposal to dissemination and implementation process, as follows: 1. Form a systematic review author panel; 2. Develop clinical questions; 3. Review the literature; 4. Hold focus group discussion sessions; 5. Summarize the obtained evidence; 6. Organize expert panels; 7. Draft the protocol and consider professional comments; 8. Employ the recommendations; and 9. Finally stage establish a dedicated clinic for pilot implementation/practice of the guideline by Substance Abuse and Dependence Research Center, University of Social Welfare and Rehabilitation Sciences, which has not been performed yet. The manual is considered a dynamic document that could be updated by the scientific com-

mittee as needed. Therefore, it is designed rigorously to evaluate the strength of the evidence and formulate explicit practice recommendations to improve treatment and management outcomes.

4. Literature Review

To some extent, the literature review was an additional step, because there were no existing guidelines on the subject. Thus, the committee conducted an article review, to create a framework about the project and reach an up-to-date knowledge of the relevant work of others. We searched the entire history of the field, and not only a particular period of time. However, there were not many studies on the topic. Therefore, we decided to expand the review on various topics related to the street children, in order to realistically 'address a gap', rather than 'fill a gap'. The review objectives were to identify necessary services and programs on the street children. We have outlined interventions in detail to empower all affecting factors with better management services for those children.

5. Guideline Committee Meetings

The process of developing this guideline was a joint venture between the Substance Abuse and Dependence Research Center, University of Social Welfare and Rehabilitation Sciences and Ministry of Health and Medical Education of Iran. All committee members involved literature review in the area of their own specialty, and shared the results with other members. In addition, they all collaborated on establishing the "substance abuse disorders treatment clinic for minors" and were appointed duties there. Meanwhile, a subcommittee was in charge of coordinating and scheduling the qualitative studies and field visits. A subgroup consisted of professionals to contribute on the social work package. Another subcommittee administered the prevention, treatment and harm reduction package. Guideline committee chairs carried the key responsibility of observing committee work thorough and communicated with the guideline committee leadership.

The guideline officers and executive committee supported the objectives by micromanaging the process. The method of how the committee chairs have led the committee and supported when required were as follows: Provided general instructions about committee function and designed and processed a questionnaire consisting of the demographic data of subjects, and risk factors and protecting factors prior to the establishment of "substance abuse disorders treatment clinic for minors". Budgets were adopted by the UNICEF committee after discussion with the executive committee. General plans for committees were approved by the Substance Abuse and Dependence Research Center. Committees reported their actions orally or in written, through regular scheduled meeting, and finally when the project was finalized.

Most of the committee's reporting took place via e-mail, with the occasional in person meetings of subgroups and monthly meetings with all members. The executive staff provided lists of subjects or brief reports if applicable, to facilitate communication among the members.

6. Clinical Recommendations

The guideline consists of 3 parts and several sections. First part "substance abuse prevention interventions among street children" is published as a manual for the prevention interventions of substance abuse among street children. It contains specific intervention recommendations. Sections of the first part include background, definitions and risk factors for becoming a street child; "general substance abuse prevention principles" which discusses the management and considerations for prevention plans as those apply to all children in general and street children specifically whom may be at the risk for substance abuse.

Another section features "assessments and clinical treatment" and explains the implementation of a treatment plan and discusses a range of clinical formulations that leads to a clinical intervention algorithm (Figure 1). Also, the "intervention" section recommends some alternative methods and various effective interventions for the street children. This section provides detailed assessments, like the diagnosis of comorbid psychiatric or medical disorders, and necessary family, school and mentoring interventions. Eventually, intervention manuals for shelter home for street children and personal and social skills educations are discussed respectively.

The second part "the assessment and treatment of substance abuse disorders among the street children" underlies an overview of screening, assessment, treatment planning, pharmaceutical treatments, psychological interventions, social support and the management of psychiatric and medical comorbid disorders. Third part "harm reduction manual for substance abuse disorders among the street children" summarizes the definitions, necessities, and general relevant points. It also provides a comprehensive harm reduction manual.

Part 1. Substance abuse prevention interventions for street children

Considering different groups of street children, specific and distinct plans were required for each group of them. Therefore, an algorithm was designed in the aim of ordering all treatments, relevant organizations and profes-

sional comments (Figure 1). The algorithm provided different circumstances and the suggested treatment in order to gain the best possible preventive actions (Figure 1).

Consequently, next step is to conduct a wide assessment to achieve precise information regarding parents and the child himself/herself. This step covers socioeconomic situation, comorbid disorders, and histories of domestic violence, child abuse, sexual orientation, substance abuse disorders and so on. Children who work and live on the street are heterogeneous with regard to a number of clinical features. Care of street children includes a complete psychiatric and biopsychosocial functioning assessment.

Early recognition

This section summarizes primary prevention interventions, which aimed at children who have not been living on the street for too long and not abandoned by family and still in touch with their family and/or school. The goal is to reduce the harmful factors and focus on residential or rehabilitative care. The guideline suggests a "mobile outreach" team for such interventions.

Family interventions

Some aspects such as educating the shelter home staff about communicating with the child to endorse him for going back home; educating social workers in family assessments and facilitating the "family reunion" and follow-ups and educating psychologists on family therapy interventions could be useful in the successful reunion of child-family and improving family protection in substance use prevention among street children.

Assessing the provided interventions

Considering the aforementioned various prevention methods for substance abuse among street children, the following suggestions are helpful on increasing the quality of services provided: Preparing manual and making standard implementation to provide equal and optimal services to different professionals, Determining evaluation indicators and specifying the goals of executing programs, Collecting sufficient data for evaluating the program implementation, and Using appropriate data analysis methods. These evaluation steps aid professionals to realize the deficiencies and meet the predicted goals.

Part 2. Treatment of substance abuse disorders among street children

Screening

Global Appraisal of Individual Needs (GAIN) questionnaire is a screening tool used for the diagnosis and treatment planning of patients ≥12 years of age. It could be used in outpatient settings, different types of in-patient treatments and methadone maintenance treatment.

Assessment

The ultimate goal of assessment is to determine the most appropriate treatment plan with the co-operation of the child. The assessment is comprehensive and focuses on all aspects of child's life, such as biopsychological health factors, available social support and any potential effective factor on the treatment.

Treatment planning

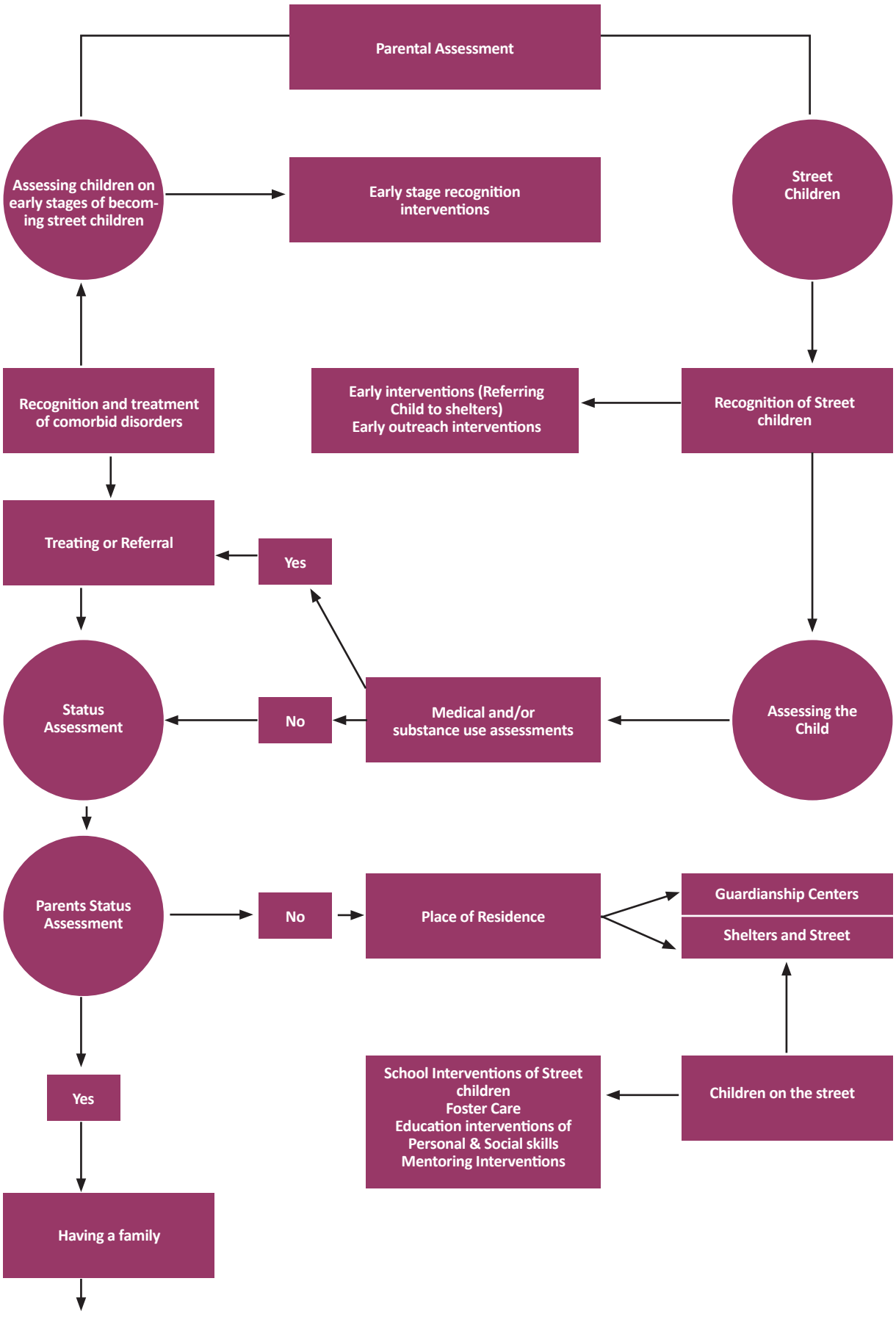
Individuals should be treated in the most confidential setting, based on a comprehensive assessment. Except primary intervention programs, decisions regarding the site of care should be written based on each child's comprehensive assessment data, his/her particular advantages, willingness and capacity to cooperate, and preference for a particular treatment. The treatment plan must be structured according to the issues in child's lifetime history which should consider gender and age, in a caring, respectful and safe environment. Specific treatments must be dedicated to children with substance abuse disorders. In addition, it is essential to frame treatment plans with achievable goals and time schedules.

Pharmaceutical interventions

Treatment goals are to achieve maintenance to facilitate the prevention of withdrawal states, lapses and overdoses. The types of pharmacological treatments are decided in accordance with the individuals' past history of substance abuse and treatment goals.

Psychosocial interventions

The main targets of psychosocial interventions consist of increasing the effectiveness of pharmacotherapy, achieving maintenance, changing their lifestyle and improving the quality of their lives. Psychosocial interventions are categorized as either with or without a therapist. The first category could be delivered in short-term (1-4 sessions) or long-term (5-12 sessions), in the form of individual or group psychotherapies.


Parental Assessment
Assessing children on early stages of becoming street children
Early stage recognition interventions
Street Children
Recognition and treatment of comorbid disorders
Early interventions (Referring Child to shelters)
Early outreach interventions
Recognition of Street children
Treating or Referral
Yes
Status Assessment
No
Medical and/or substance use assessments
Assessing the Child
Parents Status Assessment
No
Place of Residence
Guardianship Centers
Shelters and Street
Yes
School Interventions of Street children
Foster Care
Education interventions of Personal & Social skills
Mentoring Interventions
Children on the street
Having a family

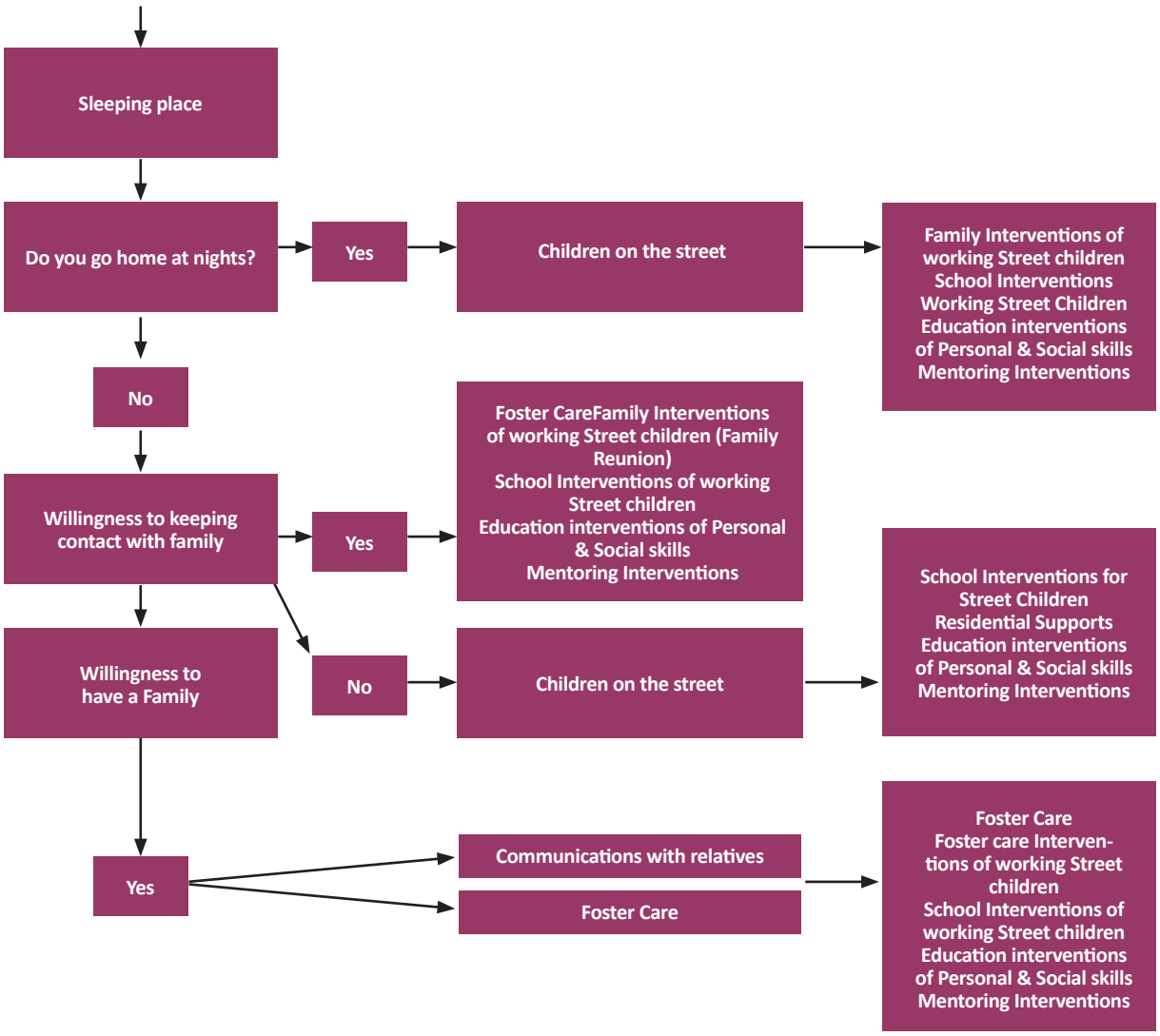


Figure 1. Intervention algorithm for street children

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Social support

Street children are faced with various issues such as substance abuse, sexually transmitted diseases (e.g. HIV/AIDS), and fertilizing problems. Given that numerous personal and social factors evolve arousing such issues, appropriate care must be given to each level of such issues. Types of treatment provided by the professionals depend on the environmental situation, availability of sources, cultural norms and society expectations. Therefore, a comprehensive program is required to meet child's needs in all aspects. Three different treatment levels address personal, social, and other needs.

General medical comorbid disorders

Children are at risk of various medical conditions including diabetes, asthma, obesity and infections, which in fact require appropriate assessment and treatment. Common problems among street children are lack of necessary nutrition and different types of injuries. The guideline explains general medical conditions and the treatments for street children, in details.

Psychiatric comorbid disorders

Substance abuse disorders often co-occur with psychiatric disorders in children and exacerbate their condition. Tendency toward psychoactive substances in children could initiate psychiatric disorders. Moreover, such disorders could highly affect the treatment process. Meanwhile, the comorbidity of psychiatric disorders in children leads to higher treatment withdrawal and poor treatment outcomes in long term.

Part 3. Harm reduction manual for substance abuse disorders among street children

Harm reduction approaches are literally practical, effective, safe, evidence-based and cost-effective. Most harm reduction approaches are inexpensive and easy to implement.

Comprehensive manual of harm reduction

To reduce the rapid spread of HIV among substance users and prevent its transmission to the public, an effective and evidence-based action is required. In order to achieve these goals and according to the United Nations Office on Drugs and Crime, the World Health Organization and the United Nations Program on AIDS, the implementation of "the comprehensive package" including 9 stages of interventions for the prevention and treatment of HIV among injection drug abusers is necessary. This package is also known as "harm reduction package" and includes scientifically approved and effective interventions in the prevention of HIV spread.

Guideline applicability issues

The guideline provides clarification and guidance on the management of substance use among street children. The guideline is designed for the use of professionals and staff in care of street children, to better understand the substance abuse among street children, their requirements and how to meet their demands. The practice must be delivered only as per guidelines and adherence to them may yield successful outcomes for individuals. However, they must not be misinterpreted as including all methods of care. Also, other approved methods of care for the same population must not be overlooked. The ultimate treatment plan must be made by considering the individual's history and conditions and the available options.

7. Conclusion

The guideline provides examples of how to perceive and approach the management and issues of substance abuse among street children at an early stage of development, through various biopsychosocial and other interventions. It also defines the characteristics of the street children with a preventive focus. These guidelines consist of addressing the applicability matters in this area and necessity of a decisive model in Iran. The management of neonatal abstinence syndrome is excluded from the scope of the guideline.

Ethical Considerations

Compliance with ethical guidelines

The development of guideline was approved by the Ethics Committee of the University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.

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Authors contributions

All authors contributed in preparing this article.

Conflict of interest

The authors declared no conflict of interest.

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