

فعالية برنامج بورتيج في تنمية قدرات الأطفال المصابين بمتلازمة داون - حالة الكويت

فاطمة عياد
نوف المطيري

ملخص:

هدف الدراسة: هدفت الدراسة إلى بحث فعالية برنامج بورتيج التدريبي في تنمية وتطوير قدرات عينة من الأطفال المصابين بمتلازمة الداون، بالإضافة إلى الكشف عما إذا كان هناك فرق في التأثير الإيجابي باختلاف المجال (المهارة) وما إذا كانت فترة التدريب عاملاً مرتبطاً بمستوى التحسن. المنهجية: تكونت عينة البحث من 27 طفلاً ممن يعانون من متلازمة الداون (15 أنثى و12 ذكراً)، تم توزيعهم إلى مجموعات ثلاث حسب فترة التدريب، المجموعة الأولى تلقت التدريب لمدة 26 أسبوعاً أو أقل، المجموعة الثانية تلقت تدريباً لمدة راوحت من 27-30 أسبوعاً، أما المجموعة الثالثة فقد تلقت تدريباً لأكثر من 30 أسبوعاً. النتائج: باستخدام الأسلوب الإحصائي تحليل التباين الأحادي كشفت النتائج عن وجود فروق دالة إحصائية بين المجموعات الثلاث، يمكن إرجاعها إلى فترة التدريب؛ إذ كانت المجموعة التي حصلت على فترة تدريب أطول من غيرها (أكثر من 30 أسبوعاً) أكثر تحسناً من المجموعتين الأخريين. بالإضافة لذلك كشفت النتائج عن وجود فروق في مستوى التحسن باختلاف مجالات التدريب؛ فقد كانت هناك فروق دالة إحصائية في التحسن قبل التدريب وبعده في مجالات المهارات الحركية، اللغة والتفاعل الاجتماعي، في الوقت الذي لم تكن فيه الفروق دالة إحصائية في مجالات المهارات المعرفية، العناية بالذات ومهارات تحفيز الطفل الرضيع.

المصطلحات الأساسية: برنامج بورتيج، متلازمة الداون، التدخل المبكر، الفعالية.

The Effectiveness of the Portage Program in Enhancing the Down Syndrome Children's Ability in Kuwait

*Fatma S. Ayyad**
*Nouf A. Almutairi***

Abstract:

Objective: The aim of this study was to investigate the effectiveness of the Portage Training Program in enhancing the abilities of Down syndrome children. In addition, the study aimed at studying the differential effect of the program among the program's domains in terms of the duration of the children's enrollment in the program. **Methods:** The study sample consisted of 27 Down Syndrome children (12 boys, 15 girls) who were enrolled in the Portage Program. They were later categorized into three groups based on the duration of time they spent in the training program (26 weeks or less, 27 to 30 weeks, and more than 30 weeks). The children's abilities were assessed before and after entering the program. One-way ANOVA test was used to test the study's hypotheses. **Results:** The study found out that there were significant differences in the level of enhancement among the three groups based on the duration of training ($p < .05$) in the motor, language and socialization domains. However, the differences in the infant stimulation, cognitive and self-help domains were not significant. In addition, results showed that the group that spent more than 30 weeks in the program had the highest level of enhancement. These results indicated that the more time spent in the training, the more the benefit gained by the child.

Keywords: Portage Program, Down Syndrome, Early Intervention, Effectiveness.

* Psychology Dept. Kuwait University.

** Psychologist, Public Authority for Applied Education and Training.

Introduction

The advancement and availability of healthcare and medical technology has resulted in an increase in the number of children with special needs and their life expectancy.

Although this is a positive outcome, it poses substantial societal challenges. Specifically, children with special needs require special education and training programs that are suited to their abilities (De Graaf, 1993). Given the importance of the first six years of life, many educational specialists have focused on early intervention programs that help such children acquire new skills and maximize their repertoire of abilities.

Differences between children with special needs and normal children are not noticeable during the first few years. However, as they grow older, the differences become more apparent because the rate of intellectual development in children with Down syndrome is considerably slower. This is reflected across various domains such as their reaction time, attention, and memory. When compared to normal children, children with Down syndrome experience difficulties in being independent in their daily living skills, and most if not all of them require assistance and they depend on others frequently or occasionally.

The special needs of children with disability, including those with Down syndrome pose challenges to caregivers, parents, teachers, and the education system in general. They need motivated specialists and teachers who can provide special and effective learning and training programs.

The families of children with special needs tend to feel helpless and disappointed, and these feelings have significant negative effects on their children's development. Therefore, to alleviate such feelings, early interventions, especially those that train families on how to handle their child, are necessary (Gomez, 2011). This study focused on the effectiveness of the Portage training program in improving the abilities of children with Down syndrome.

Many intervention programs that have been designed to benefit children with Down syndrome aim to remediate their weaknesses and reinforce the strengths of the child. Such programs educate and support the families of children with Down syndrome, and they utilize techniques that optimize interactions and relationships between children and their

parents. This in turn facilitates the integration of children with Down syndrome into society and develop their abilities (Larocci, Virji& Reebye, 2006).

In this regard, Portage is one of the most commonly used training programs. It has been designed to help parents, teachers, aides, nurses, physicians, and other caregivers evaluate a child's behavioral abilities, strengths, and weaknesses across six domains: infant stimulation, socialization, self-help, cognitive, motor, and language. This program relies on a realistic training curriculum and goals (Gomez, 2011).

This study aimed to evaluate the effectiveness of the Portage program in improving the developmental skills of children with Down syndrome. Further, this study also investigated differences in the rate of improvement across the aforementioned domains.

Definitions

Portage program

Portage is a home-based early intervention program, whereby psychologists and teachers train children with disability and their parents in their own homes. In particular, they train parents to help their developmentally delayed children and enable them to bridge the gap between their children and healthy children (Rao, 2010).

Portage was established in 1969 in Wisconsin. It was designed to meet the needs of children with disability and provide services and learning programs to young children, especially those who live in rural areas. Currently, it is practiced in 90 countries, and the Portage assessment tool has been translated into 34 different languages (Rodgers, 1998).

In 1984, the Portage program was introduced to the Arab world (i.e., in the Gaza strip; United Nations Educational Scientific and Cultural Organization - UNESCO, n.d.). Since this program was introduced at a later time in Arab countries (i.e., when compared to Western countries), there is a limited amount of empirical literature and awareness about it. In Kuwait, this program was first offered in 1996 at an early intervention center, which belonged to the Ministry of Social Affairs (Barakat, Drylie & Nash, n.d.).

The Portage assessment tool consists of 624 statements that are

arranged in a developmental sequence. They measure the behavior of children whose ages range from 0 to 6 years across six domains: socialization, self-help, language, cognition, and motor (Nfer Nelson, 1987). The Portage program is a home-based training intervention in which the supervisor visits parents once a week. During these weekly visits, the supervisor demonstrates how the program should be implemented. Each session typically lasts for 40 to 60 minutes. The parents or caregiver begin the training by choosing a specific skill in which they train the child on using a one-on-one approach. They typically begin the training by focusing on the most attainable skills (Reed, Osborne & Corness, 2007).

According to Shearer & Shearer (1972), the Portage program should adhere to the following specific requirements:

1. Baseline data about the child's level of functioning should be recorded by the home teacher (parents) prior to the provision of instructions about how the child should be trained; his/her readiness should be evaluated.
2. Each week, it should target three skills or behaviors that the child and his/her family will be able to achieve.
3. The parents should implement the actual teaching process during the week, and this should include the reinforcement of desirable behaviors and the reduction of behaviors that interfere with the acquisition of necessary skills.
4. One week later, the home teacher should record follow-up data to determine whether the parents taught the child the targeted behavior and whether the child succeeded in learning it.

In addition, Shearer & Shearer have mentioned that there are many advantages to using the Portage program to teach children with disability, and they are as follows:

1. The Portage program is implemented at the child's and his/her parents' natural environment; this eliminates the problems that are associated with the transfer of skills that have been acquired in a classroom or clinic to the home.
2. The parents provide information about the needs of their children and determine what and how they should be taught. Further, the Portage program is sensitive to parents' goals. These features ensure that

the program is customized in accordance with the characteristics of the child's environment.

3. The maintenance and generalization of behaviors are enhanced when they are taught by a child's parent within his/her home environment.

4. When a desired behavior is taught, and the instructions are provided within the home environment, there is a greater opportunity for the entire family to participate in the teaching process.

5. Teaching behaviors within the home environment grants greater access to a complete range of behaviors, some of which cannot be targeted and modified within the classroom environment.

6. It has been hypothesized that training parents, who serve as natural reinforcing agents, will equip them with the skills that they need to manage their children's new behaviors.

7. Since the home teacher works with parents and their children on a one-on-one basis, the individualization of goals in accordance with the child's needs is an operational reality.

The Portage program is unique because it is flexible; specifically, it can be modified to meet the needs of a given child. Further, it is a home-based intervention that offers training to children and their caregivers on the following six developmental domains: infant stimulation, self-help, motor, socialization, cognitive, and language (Nfer Nelson, 1987). Since this program is comprehensive and affordable, it is acceptable to parents (Brue & Oakland, 2001).

Thus, the Portage program aims to assess the abilities and needs of children with disabilities. In addition, it provides rehabilitative services to disabled children and helps them reach their optimum level of functioning. Moreover, it provides help, counseling, and training to the families of children with special needs. Further, it provides a simple and clearly translated material about disabilities (Shahzadi, n.d.). It also stimulates the development of 0-6-year-old children with developmental delays and modifies their behaviors. At the same time, it provides support to parents to enable them to help their children (Hoekstra, van der Meulen, Ruijsenaars & Oenema-Mostert, 2012).

The Portage program is important because it is a home-based intervention. Many studies have shown that intervention programs that

train children within their own home environments yield more positive effects than those that focus solely on the child (Shonkoff & Meisels, 2000). Accordingly, Guralnick (2005) found that the effects of interventions are optimal only when they focus on a child in his/her home environment.

Down syndrome

Down syndrome is the most common developmental disorder with a known genetic cause. Its prevalence rate is one in every 750-1000 live births. Therefore, it is the most researched developmental disorder. Down syndrome is a chromosomal disorder that is caused by the presence of three copies of chromosomes. In 88% of the cases, it occurs accidentally during the formation of the germ cells; the causative factors remain unknown. Additionally, in 11% of the cases, it occurs during the process of meiosis of chromosome 23. In very rare cases, it occurs when the entire chromosome is triplicated; however, only a proportion of the cells are trisomies (i.e. mosaicism), and the other cells are normal. Individuals with Down syndrome differ in the level of intellectual disability and social and motor skills. Because of their disabilities, children with Down syndrome require special attention and learning and training programs that suit them and help them maximize their full potentials (Karmiloff-Smith et al., 2016).

Down syndrome used to be called Mongolian idiocy. However, during the 1970s, Mongolian idiocy was renamed as Down syndrome after Dr. John Langdon Down, who was the first to identify the disorder in 1866 (New York State Department of Health, n.d.).

This extra chromosome affects the orderly development of the body and brain. It impairs mental abilities, behaviors, and developmental progress, and the resultant intellectual disability can range from mild to severe. (National Dissemination Center for Children with Disabilities, 2010).

Down syndrome is not associated with race, nationality, religion, or socioeconomic status, and it is equally prevalent among males and females. Further, it is not related to any events or parental behaviors that occur during pregnancy (Down syndrome Association of West Michigan, 2010).

The following three types of chromosomal abnormalities can cause Down syndrome:

1. Meiotic nondisjunction: this occurs when a pair of chromosomes 21 fails to separate during cell division of the sperm or egg.

2. Translocation: in approximately three percent of individuals with Down syndrome, the extra chromosome 21 is attached to another chromosome.

3. Mosaicism: in two percent of individuals with Down syndrome, the condition is caused by the presence of a mixture of cells; some cells will have 46 chromosomes, but the others will not (New York State Department of Health, n.d.).

First, in 92% of the cases, the egg or sperm carry an extra chromosome, thereby resulting in a fertilized egg with an extra chromosome. The second possibility of carrying an extra chromosome occurs in approximately 2% to 4% of individuals with Down syndrome. The etiology of mosaic trisomy is similar to that of the first condition; however, it results in some cells having 46 chromosomes and others having 47. The third cause of Down syndrome (i.e., translocation trisomy) occurs in approximately 3% to 4% of the cases. This occurs when material from one chromosome 21 gets stuck or translocated onto another chromosome, either before or during conception. The cells of individuals with Down syndrome have two normal chromosomes 21, but they also have additional chromosome material (i.e., the translocated chromosome; Merrick, Kandel & Vardi, 2004).

More than 50 clinical signs and symptoms of Down syndrome have been identified. However, it is rare for one child to show all these symptoms. Indeed, the symptoms of Down syndrome vary across children. However, the following symptoms are commonly observed:

1. Poor muscle tone
2. Slanting eyes with folds of skin at the inner corners
3. Short broad hands with a single crease across the palm
4. Broad feet with short toes
5. A flat nasal bridge
6. Short low-set ears
7. A short neck and small head

8. Small oral cavity
9. Slow intellectual and physical development (National Dissemination Center for Children with Disabilities, 2010).

Children with Down syndrome are at high risk for the following conditions: a short stature, heart disease (> 40%), frequent respiratory infections, ear infections, hearing loss (which they begin to develop after 10 years of age), vision problems (including nystagmus and cataracts; they can lead to vision loss if left untreated), gum disease, dental abnormalities, thyroid disorders, obstructive airway disease, defects of the gastrointestinal tract, leukemia (higher incidence: 1%), and obesity. Down syndrome can be diagnosed through chromosome analysis and an examination of white blood or placental cells (New York State Department of Health, n.d.).

Down syndrome is considered the easiest neuro developmental disorder to diagnose because it is associated with physical anomalies such as dimorphic facial features, growth retardation, hypertonia, and broad hands. In addition, silent neurocognitive deficits, primarily, impaired communication, language, and memory are also associated with Down syndrome (Laws, Byrne & Buckley, 2000).

Because of observable variations in the cognitive, behavioral, and social skills and physiological and health problems of children with Down syndrome, it is difficult to create a single profile that is representative of all such children (Davis, 2008).

Literature review

Because of an increase in the number of people with disabilities, there is an evident need for special education and training and healthcare programs, especially those that spread awareness about their needs and rights. As a result, many researches and specialists have focused on the needs of such children. Specifically, they have sought to identify the causative factors and assess their abilities and needs so that the findings can be used to develop training and rehabilitation programs.

The remaining part of this section is a review of the findings of these studies. Nawi, Ismail & Abdullah (2013) found that early intervention is

more effective in enhancing the children's abilities across many developmental domains(e.g., communication, motor skills, social and emotional abilities), when compared to late interventions.

Other studies that have evaluated the short-term benefits of early intervention programs(including thePortage program)have consistently shownthat they improve children'sfine motor skills, social development, and intellectual functioning.In addition, training programs increase and promote the children's ability to performdaily life activities,such as feeding, bathing, and dressing (Carpenter, 1997; Mahoney & Perales, 2005; Mahoney, Perales, Wiggers & Herman, 2006; Nilholm, 1996; White, Bush & Casto, 1985).

Manystudies have evaluated the effectiveness of thePortage program in improving the abilities of disabled and autistic children by conducting pre and post intervention comparisons. The results suggest that the Portage program has a positive effect on children's abilities,and this finding is consistent with the results of several other studies(Abualhijaa, 2014; Al-Saleh, 2010; Brue & Oakland, 2001; Goddard, 2006; Golubovic, Markovic & Perovic, 2015; Guralnick, 2005; Kassem, 2016; Leite & Pereira, 2013; Mittler, 1990; Mustafa, 2012; Peterson, Luze, Eshbaugh, Hyun-joo & Kantz, 2007; Rickards, Walstab, Wright-Rossi, Simpson & Reddihou, 2009; Shin, Nhan, Lee, Crittenden, Flory & Hong, 2009; Uzundemir, 1997; Wallander et al., 2010).

Others like Miron & Farcas (2009) comparedthe effectiveness of two different early intervention programs, namely the Kinto and Portage training programs, in enhancing the motor skills of children with Down syndrome. The sample ($N = 3$) was divided into two groups ($n = 2$; $n = 1$). One group was subjected to three sessions of Kinto therapy per week, and the other group was subjected to the Portage programacross the same time intervals. The results showed that there was a significant improvement in the children'abilities of both groups,but the children who participated in the Portage program demonstrated greater improvement.

Meulen & Sipma (1991)examined the effectiveness of the Portage program in improving the mental abilities of a sample of 32 disabled children, six of whom had been diagnosed with Down syndrome; the rest

of them, who participated in the Portage program, had mental disability with unknown etiologies. The results revealed that there was an improvement in the rate of mental development in both groups. This finding is consistent with the results of another study that Cochran & Shearer (1984) conducted in India. Using a sample of 120 developmentally delayed children, they examined the effectiveness of the Portage program by conducting pre and post intervention comparisons. The results showed that there was an increase of 18 points among children who had participated in the program for 8 months.

Liu, Wang, Ge & Dong (2018) also evaluated the effectiveness of the Portage program. Their sample consisted of two groups of 45 individuals each; one group underwent the Portage training program for six months, and the other group was the control group. The two groups were assessed before and after the training. When compared to the control group, the treatment group demonstrated significant improvements across five domains: gross motor and fine motor skills, adaptability, language, and personal and social activities.

Finally, Russell (2007) reported that the National Portage Association in the United Kingdom conducted a survey to examine how the parents of children with special needs, who used Portage services, evaluated the program. The results showed that the participating families valued the Portage program and considered it effective because it helped their children and provided support to the entire family.

Purpose of the present study

The purpose of this study was to investigate the effectiveness of the Portage program in enhancing the abilities of children with Down syndrome by investigating the differences in the level of improvement across the six developmental domains (i.e., infant stimulation, cognitive, motor, self-help, language, and socialization) between groups that differ in the duration of their participation in the training program. The study also sought to investigate the differences in the level of improvement across the different domains of functioning.

Significance of the present study

The Portage program has been designed to help children who are of the age group 0-4 years (or sometimes 6 years) because these are the most

critical and important years of age during which children acquire their basic developmental skills. Hence, providing this intervention to children who belong to this age group will be beneficial because it can arrest the deterioration of a child's condition and increase his/her chance to benefit from training programs. Furthermore, the Portage program provides training to the parents of disabled children to equip them with the skills that they need to effectively deal with their children. The Portage program is important because such children are entirely dependent on their parents for the first few years of their lives. Parental feelings of helplessness have a negative impact on them (i.e. psychological functioning) and their children.

This study is important because the Portage program was introduced to the Arab world at a later time and, consequently, gained salience much later than it did in western countries (Faour, Hajjar, Bibi, Chehab & Zaazaa, 2006).

The findings of the present study can be used to develop training programs that aim to support the parents of children with special needs and increase their awareness about this program and its benefits (Shearer & Shearer, 1972).

Hypotheses

1. There will be a significant difference in the level of improvement across the six developmental domains (i.e. infant stimulation, cognitive, motor, self-help, language, and socialization) between groups that differ in the duration of their participation in the training program.
2. There will be significant differences in the level of improvement across the different domains of functioning.

Methodology

Method

The study implemented the Descriptive Research Method in proportion to the study objectives and hypotheses.

Participants

The study sample consisted of 27 children (12 boys, 15 girls) from the age group 1-5 years who were suffering from Down syndrome and associated psychological problems, such as congenital heart diseases,

digestive and respiratory problems, speech disorder and motor deficiency. They participated in the Portage program at an early intervention center in Kuwait and received training by specialists in the presence of parents to teach them so that parents can later take over the process of training at home 3 times a day in 20 minute long sessions.

Instruments

To address the objectives of this study, the researchers used the Portage program, which had been used at the early intervention center in Kuwait since 1996. The Portage program tool consists of 624 items, which assess 6 developmental domains: infant stimulation, socialization, self-help, cognitive, motor, and language.

The Portage program aims to improve the afore mentioned six developmental domains by teaching children skills in a sequential order (i.e. least difficult to more difficult) in accordance with their developmental level. These skills can be divided into the following three types:

1. Current skills: all the skills that a child uses in a new situation or are taught to use through activities
2. Emerging skills: skills that require reinforcement in order to ensure their regular use
3. Skill deficit: skills that are particularly difficult for a child to acquire or demonstrate.

At the beginning of the program, a psychologist assessed the children's abilities using the Portage Checklist, the items of which are arranged in a developmental sequence. The baseline measure was the item on which a child successfully demonstrated three skills in a row. The test was terminated when the child failed to demonstrate three skills in a row. Next, the psychologist and parents taught the children one skill per week, and post-training evaluations were conducted six months after the training program. Finally, a chart was created to visualize improvements and ascertain the domains in which the child had demonstrated improvements.

Pre and post intervention comparisons were conducted using the scoring codes that were recorded in each child's checklist. Children's pre-intervention and post-intervention scores (i.e. the number of checks on the checklist) were compared. A score of zero was assigned when the

child responded occasionally. Further, a check mark (i.e. made by either the parents or psychologist) indicated that the child was able to demonstrate the required skill at all times; successful demonstration of the skills was measured by counting the number of check marks.

In this study, the Portage program charts were used for children with Down syndrome that were available at the early intervention center to assess the effectiveness of the program in improving the children's skills.

Procedures

After obtaining the permission from the authorities of the early intervention center and parents of the participants, children's developmental levels (i.e. across the six domains) were assessed using the Portage checklist. Next, children were trained by their parents; a specialist in the implementation of the Portage program had taught them how to teach their children the different skills. Finally, the children's developmental levels were evaluated after the completion of the training program.

The duration of the training period ranged from 16 to 66 weeks ($M = 29.6$, $SD = 11.9$).

Prior to analysis, the sample was divided into the following three groups based on the durations of their participation in the Portage program:

1. ≤ 26 weeks ($n = 13$ children)
2. 27-30 weeks ($n = 9$ children)
3. > 30 weeks ($n = 5$ children)

Results

The results of the research hypotheses:

1. There will be a significant difference in the level of improvement across the six developmental domains (i.e., infant stimulation, cognitive, motor, self-help, language, and socialization) between groups that differ in the duration of their participation in the training program.

2. There will be significant differences in the level of improvement across the different domains of functioning.

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Table 1
Means, standard deviations, F-values, and significance of the difference in infant stimulation, cognitive, motor, self-help, language, and socialization between the three groups

Domain	The three groups	N	Mean	SD	F value	Sig.
Infant stimulation	1.00	13	0.76	1.96	0.02	0.98
	2.00	9	0.77	0.97		
	3.00	5	0.60	0.89		
	Total	27	0.74	1.48		
Cognitive	1.00	13	2.84	1.62	3.08	0.06
	2.00	9	3.11	0.78		
	3.00	5	5.20	3.34		
	Total	27	3.37	1.98		
Motor	1.00	13	2.07	1.55	3.32	0.05
	2.00	9	2.44	1.58		
	3.00	5	6.40	7.23		
	Total	27	3.00	3.56		
Self-help	1.00	13	1.53	1.26	3.19	0.06
	2.00	9	2.22	1.30		
	3.00	5	5.60	6.98		
	Total	27	2.51	3.33		
Language	1.00	13	1.07	0.95	6.76	0.01
	2.00	9	1.11	1.53		
	3.00	5	5.60	5.41		
	Total	27	1.92	2.97		
Socialization	1.00	13	0.84	0.98	4.30	0.03
	2.00	9	1.77	1.64		
	3.00	5	5.40	6.65		
	Total	27	2.00	3.31		

- 1 refers to the first group (≤ 26 weeks)
- 2 refers to the second group (27-30 weeks)
- 3 refers to the third group (> 30 weeks)

It can be inferred from Table (1) that there were significant differences ($p < 0.05$) in the level of improvement in motor, language, and socialization skills between the three groups.

On the other hand, with regard to the domains of infant stimulation, cognitive, and self-help, no significant differences in the level of improvement emerged between the three groups.

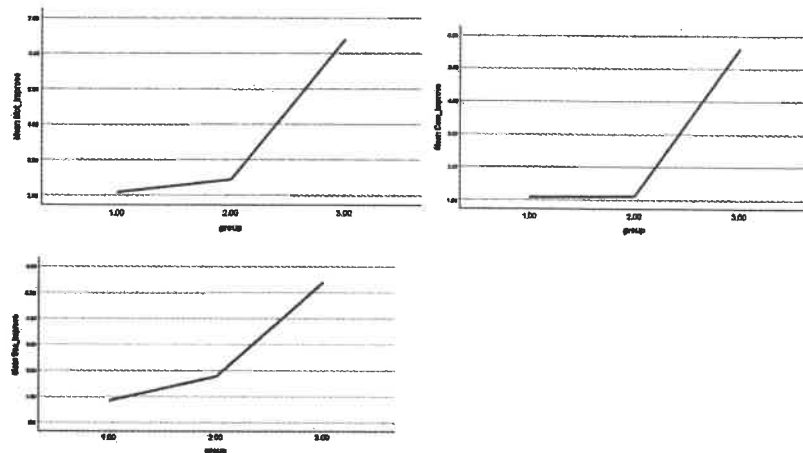


Figure (1)

Improvement in motor, language, and socialization skills across the three groups: 1 refers to the first group (26 weeks), 2 refers to the second group (27-30 weeks), 3 refers to the third group (> 30 weeks)

Figure (1) shows that there was an evident improvement in the motor, language, and socialization skills of the second group, which had received training for 6 months. The third group, which had undergone more than 30 weeks of training, demonstrated the most substantial improvements.

Discussion of results

This study aimed to investigate the effectiveness of the Portage program in improving the abilities and skills of children with Down syndrome. In addition, this study investigated the differences in improvement across the different domains on which the program focused and examined whether children's performance was contingent on the duration of the training program. Pre and post intervention comparisons

were conducted to examine pre and post intervention differences in the children's performance across the different developmental domains.

The results showed that the training resulted in an improvement in the following developmental domains: infant stimulation, cognitive, motor, self-help, language, and socialization. However, there were significant differences in the level of improvement across these different domains (e.g. differences in the level of improvement between language, socialization, and motor skills at the end of the training program). The results revealed that there was a greater improvement in the language domain than in the motor and socialization domains, and this was an unexpected finding. This may have been the case because the participants possessed good motor skills at baseline.

Furthermore, the results showed that there were differences in the level of improvement between groups that differed in the duration of their participation in the training program. Specifically, children who received training for more than 30 weeks demonstrated greater improvements than those who had received training for a shorter duration of time.

The infant stimulation domain subsumes very simple skills that do not require higher-order mental processes, and they may not be adequately challenging to the children who belong to this age group. Therefore, mean differences in the scores that they obtained before and after the training may not have been significant.

In regard to the cognitive domain, the children did not demonstrate a significant improvement; this finding is not surprising because cognitive skills require higher-order mental processes and advanced cognitive development. Mental disability is a permanent and relatively stable condition. Even if a child demonstrates improvements, he/she will continue to belong to the same category of mental disability to which he/she was assigned at the beginning of the training program. (American Psychiatric Association, 2013, p 33-40).

Children demonstrated significant improvements in motor skills; this finding is not only consistent with expectations but also the results of many past studies (Nilholm, 1996; Shin, Nhan, Lee, Crittenden, Flory & Hong, 2009). Specifically, studies that relied on direct observations revealed that children respond well to physical therapy, especially when

their deficits in motor skills are not related to damages to the nervous system(Ayyad, 2012 p58-61).

There was no significant improvement in the self-help domain. This finding may be attributable to cultural factors. Specifically, in eastern cultures, families tend to have low expectations of disabled children; in contrast, in western cultures, children are encouraged to care for themselves and be independent in performing their daily life activities. (Mahoney, Perales, Wiggers & Herman, 2006). In eastern cultures, children are neither expected nor encouraged to care for themselves; instead, they are cared for entirely by their families.

In regard to the domain of language skills, there was a significant improvement. This finding may be attributable to the fact that the Portage program was conducted in the child's natural environments, including those that foster learning and recreation (e.g., amidst the family, in childcare centers, within the community). Specifically, families create a natural environment within which children's development occurs. The support that is provided by parents and caregivers is critical to the learning and emotional health of children, and family relationships create an environment in which parent-child interactions can occur (Liu, Wang, Ge & Dong, 2018). Additionally, the individualized training that the Portage program offers further contributes to the development of these skills, because it maintains an intense focus on the child. This in turn explains why a significant improvement was observed in the socialization domain (Uzundemir, 1997). Since children with Down syndrome are characterized by friendliness, kindness, and a willingness to interact with others, these traits may have helped them make the best use of the Portage program (Ayyad, 2012, p54-56).

Recommendations

1. Recognise the specific developmental and educational needs of children and young people with Down syndrome.
2. Implement effective planning and monitoring for people with Down syndrome.
3. Provide families and caregivers of children with Down syndrome training programs focusing on how to implement the Portage training program which improve their skills in dealing with the Down syndrome children.

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4. Support and implement strategies and policies targeting mainstreaming.

5. Psychological and educational needs of parents of Down syndrome children and the caregivers should be considered when implementing training programs for children with disabilities.

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